

		ACCOUNTING	
ACCT 101	Financial Accounting	Designed to introduce all business students to the field of accounting, the course covers the fundamental principles of accounting, highlighting balance sheet and income statement presentation. Primary emphasis on accounting as a source of financial information, with procedural details kept to a minimum.	Credit Hours: 3.000
ACCT 102	Managerial Accounting	Objective analysis and interpretation of accounting information. Use of accounting information as a basis for planning, control and managerial decisions. <b>Prerequisites: ACCT 101</b>	Credit Hours: 3.000
ACCT 120	Entrepreneurial Accounting	This course introduces students to accounting and financial skills necessary for entrepreneurial ventures. Fundamental accounting concepts include understanding financial statements and performing basic financial statement ratio analysis. Managerial accounting concepts useful in management decision-making will be introduced including the preparation of operating and capital budgets and cost-volume-profit (break-even) analysis. The course also addresses objectives of financing, internal and external sources of financing, forms of financing, short-term vs. long-term financing, role of stock exchanges, Islamic financing, defining working capital, and managing of working capital.	Credit Hours: 3.000
ACCT 203	Intermediate Accounting I	An in-depth study of basic accounting principles and theory including financial accounting standards, conceptual framework for financial reporting, the accounting cycle, income statement, cash flows overview (to be addressed in greater depth in a later course), time value of money, and selected current assets accounting (cash & accounts receivable). Text supplemented by current rulings of the Financial Accounting Standards Board and the International Accounting Standards Board. <b>Prerequisites: ACCT 101</b>	Credit Hours: 3.000
ACCT 204	Intermediate Accounting II	Continued in-depth study of basic accounting principle and theory including accounting for inventory, long-lived assets (property, plant, equipment and natural resources and related purchase costs, depreciation, depletion, and impairment), intangible assets, current liabilities and contingencies, long-term liabilities, and investments. Text supplemented by current rulings of the Financial Accounting Standards Board and the International Accounting Standards Board <b>Prerequisites: ACCT 203</b>	Credit Hours: 3.000
ACCT 303	Accounting Theory and Practice	Topics studied include stockholders' equity, revenue recognition, earnings per share, accounting for income taxes, pension and post-retirement accounting, lease accounting, accounting changes and error corrections, and the statement of cash flows. Text supplemented by current rulings of the Financial Accounting Standards Board and the International Accounting Standards Board <b>Prerequisites: ACCT 203 or ACCT 204</b>	Credit Hours: 3.000
ACCT 309	Federal Taxes I	This course examines the federal tax laws as related to individual income taxation. The textbook is supplemented by using the actual 1040 tax forms and the related supporting schedules. <b>Prerequisite: ACCT 101</b>	Credit Hours: 3.000
ACCT 316	Cost Accounting I	This course includes study of job order, process and standard cost systems; cost-volume-profit analysis; absorption versus direct costing; inventory-control systems, including EOQ and JIT systems concepts; relevant costing in decision making; time value of money concepts; and capital-budgeting theory and application. <b>Prerequisites: ACCT 203</b>	Credit Hours: 3.000

ACCT 325	Business Taxes-State and Feder	An in-depth coverage of business taxes. Emphasis is placed on partnership, corporation and sub-corporations. Pennsylvania, New Jersey and Delaware tax laws will be examined. <b>Prerequisites: ACCT 309</b>	Credit Hours: 3.000
ACCT 409	Auditing	This course includes study of business combinations and consolidated financial-statement preparation, foreign subsidiary operations, foreign transactions, and government and not-for-profit industry accounting. The text is supplemented with current rulings of the AICPA. <b>Prerequisites: ACCT 303</b>	Credit Hours: 3.000
ACCT 412	Advanced Accounting	This course includes study of business combinations and consolidated financial-statement preparation, foreign subsidiary operations, foreign transactions, and government and not-for-profit industry accounting. The text is supplemented with current rulings of the AICPA. <b>Prerequisites: ACCT 303 (Minimum Grade D)</b>	Credit Hours: 3.000
<b>AMERICAN DIVERSITY</b>			
ADIV 200	American Social Justice	This course examines pervasive issues of difference and inequality in the U.S. through the lens of social service and nonprofit organizations. Students will learn about major American social movements, what cultural values cause and seek to remedy them (and how), and will research a social justice cause of their choosing. Students will apply course concepts by volunteering at a social justice nonprofit; students should expect to contribute out-of-class time to developing a relationship with this organization. Transportation is not necessary. <b>Prerequisites: AMST 114, WRIT 101</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity
ADIV 201	Defining American Voices	How do individual American voices influence and interact with American culture? Students in this course explore the development of key issues in American identity and culture through individual expressions such as memoir, song, fiction, film, photography, and poetry. By examining ideas and products of influential and diverse American thinkers from a variety of disciplines, this course approaches American culture from a multivocal, multimodal perspective. <b>Prerequisites: WRIT 101, AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity
ADIV 202	Immigrant America	This course examines cultural and social issues surrounding immigration in the U.S., in the past and present. Students will analyze historical, literary, and cultural texts of immigrants and immigration and navigate multiple perspectives on related issues like assimilation and acculturation, race and xenophobia, language and culture, and ethnic experience. Students will develop their Confidence competency by using reasoning and evidence to challenge arguments and reach conclusions about immigration and American diversity. <b>Prerequisites: WRIT 101, AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity
ADIV 203	Thmomas Jefferson in a Diverse America	This course explores diversity in America through the political and cultural legacy of Thomas Jefferson. Jefferson's approach to democracy, particularly perspectives on freedom, nationality, culture, and race, have shaped the current American landscape. Students examine Jefferson's legacy through close analysis of historical texts, as well as through analysis of contemporary representations of these texts and of Jefferson himself. Students will identify how Jefferson's perspectives on individual rights and freedom inform cultural values that permeate American institutions, particularly surrounding issues of difference and inequality. <b>Prerequisites: WRIT 101, AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity

ADIV 204	Red and Blue America	<p>Red and Blue America: Political Subcultures in the U.S. surveys the diversity of current political identities in the United States and traces their origins. Beginning with an examination of the dividing lines between liberal and conservative viewpoints, students consider the historical and political forces that created this central division and how it shapes today's political landscape. The course then reviews the various political subcultures to both the left and the right of the mainstream parties to assess their role in American culture and politics.</p> <p><b>Prerequisites:</b> AMST 114, WRIT 101</p>	<p><b>Credit Hours:</b> 3.000  <b>Schedule Types:</b> Lecture  <b>Course Attributes:</b>  American Diversity</p>
ADIV 206	Gender & Diversity in the US	<p>This course focuses on recent developments in gender scholarship in a U.S. context. It examines how gender has been conceptualized and analyzed, historically and in the present day. Topics considered may include the formation of masculinities and femininities, the intersections between gender, sexual orientation, class, race, age and place, and the significance of gender in personal and professional contexts. Readings are drawn from a variety of disciplines depending on the instructor.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours:</b> 3.000  <b>Schedule Types:</b> Lecture  <b>Course Attributes:</b>  American Diversity, Junior Seminar Course, Writing Intensive</p>
ADIV 211	African American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of African Americans. We will examine African Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how African American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of African Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST114</p>	<p><b>Credit Hours:</b> 3.000  <b>Schedule Types:</b> Lecture  <b>Course Attributes:</b>  American Diversity</p>
ADIV 212	Asian American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of Asian Americans. We will examine Asian Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how Asian American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of Asian Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours:</b> 3.000  <b>Schedule Types:</b> Lecture  <b>Course Attributes:</b>  American Diversity</p>
ADIV 213	Jewish American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of Jewish Americans. We will examine Jewish Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how Jewish American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of Jewish Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours:</b> 3.000  <b>Schedule Types:</b> Lecture  <b>Course Attributes:</b>  American Diversity</p>

ADIV 214	Race in America	<p>This course highlights the role of race and ethnic identity in American politics and culture, examining how concepts of race have evolved through time and space, and how the racial identities of African Americans, Asian Americans, Latino/a and Hispanic Americans, European Americans, Middle Eastern Americans, Native Americans and other groups have interacted to shape the American nation. Students and faculty will examine together how the definition and use of racial categories have influenced the power dynamics of American society and generated social movements advocating for greater racial equality and opportunity. This interdisciplinary course combines history, sociology, politics, culture and economics to illuminate how racial thought has shaped America's past and present.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes:</b>  American Diversity</p>
ADIV 215	Latinx American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of Latinx Americans. We will examine Latinx Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how Latinx American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of Latinx Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes:</b>  American Diversity</p>
ADIV 216	LGBTQIA American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of LGBTQIA Americans. We will examine LGBTQIA Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how LGBTQIA American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of LGBTQIA Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes:</b>  American Diversity</p>
ADIV 217	Muslim American Studies	<p>This course explores American life, past and present, from the experiences and perspectives of Muslim Americans. We will examine Muslim Americans' struggles for equity in U.S. society and how their encounters with different forms of discrimination and exclusion fit into broader narratives of oppression and civil rights in the U.S. In addition to considering how Muslim American communities have responded to and resisted inequality, we will also assess their representation, inclusion and influence in the social, economic, political and cultural realms of American life. Using scholarly texts, memoirs, films, music and other media, this course takes an interdisciplinary approach towards understanding the impact of Muslim Americans on the dynamics of diversity and equity in U.S. society.</p> <p><b>Prerequisites:</b> WRIT 101, AMST 114</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes:</b>  American Diversity</p>

ADIV 218	Studying Philadelphia: Diversity in the City of Brotherly Love	The diversity found in Philadelphia has long been a topic of study for historians, anthropologists, and linguists. Sociologists, including Max Weber and W.E.B. Du Bois, have been particularly active in analyzing the city's diverse populations and how they have experienced complex social processes such as industrialization, immigration, and segregation. In this course, we will read important scholarship that examines Philadelphia's diverse social fabric: from Center City, to Germantown, and elsewhere. How can these studies change how we think about our city? Moreover, what can our analyses of Philadelphia's diversity teach us about the history of, and future for, social modernity? <b>Prerequisites: WRIT 101, AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity
<b>AMERICAN STUDIES</b>			
AMST 114	Topics in American Studies	In Topics in American Studies, students examine a series of pressing current political, economic and/or social issues in the United States. Using perspectives from fields such as history, sociology, ethnic studies, religious studies, and political science, students and faculty will work together to trace the longer-term developments that have shaped the modern United States, and to examine competing interpretations of and responses to them. Topics may include current issues in areas such as healthcare, immigration, race, foreign policy, gender, economic inequality, sexuality, electoral politics, criminal justice, the environment, and religion. This is the first Touchstone course in the Hallmarks Core, where students will learn about the Hallmarks Folio process and post artifacts and reflections from their first-year course work. <b>Note: AMST 114: Topics in American Studies was DBTU 114: Debating US Issues prior to Fall 2019.</b>	Credit Hours: 3.000
<b>ANIMATION</b>			
ANIM 201	Introduction to Animation	This course will introduce students to the practice of animation and the various techniques employed in its production. Short exercises involving hand-drawn, stop-motion and other non-digital means will serve to expose students to the fundamental concepts involved. Students will then apply these concepts to their digital toolkit in order to create a longer final project.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 202	Storytelling & Storyboarding	This course will seek to give students a strong foundation in storytelling. Emphasis will be placed on visual storytelling, as the storyboard is the script for animation. In addition to story structure, students will explore screen composition and editing as means of relating narrative content. The class will consist of several storyboard exercises, culminating in the production of an animatic, a filmed version of the storyboard with a soundtrack.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 204	Design Essentials Digital Media	This course is an introduction to the necessary graphic design methods, materials and vocabulary used in the animation and digital media professions. This studio emphasizes concepts in design including color theory, typography, visual abstraction & visual metaphor. Students also get a foundation understanding of Adobe Illustrator, InDesign and Photoshop. <b>Prerequisite : DSGNFND 203, VDES 101, ADFND-102 or INDD 102 (Minimum grade C)</b>	Credit hours:4.000 Schedule Types: Studio
ANIM 206	Typo & Icon for Digital Media	This course emphasizes visual design, typography, iconography and technologies for on-screen design. Students in this course have a primary focus on type and icons and how shape, size, and style convey deep meaning in a digital user experience. Additionally, students explore in-depth issues with screen sizes, resolution, color variance, and use of typography and iconography in motion. Students will demonstrate an understanding of properly licensing and creating fonts & icons using modern technology platforms for integration into digital products.	Credit Hours: 4.000 Schedule Types: Studio
ANIM 301Z	Motion Graphics I	This major studio course explores time and motion in the creation of primarily graphic narratives. The techniques of abstraction, motion typography and musical synchronization are studied in the context of increasingly complex projects. A major aspect of the course will be the screening of both abstract films and reels from contemporary motion graphics films.	Credit Hours: 3.000 Schedule Types: Lecture, Studio

ANIM 301N	Motion Graphics I	This major studio course explores time and motion in the creation of primarily graphic narratives. The techniques of abstraction, motion typography and musical synchronization are studied in the context of increasingly complex projects. A major aspect of the course will be the screening of both abstract films and reels from contemporary motion graphics films.	Credit Hours: 4.000 Schedule Types: Studio, Lecture, Lecture/Studio Combination
ANIM 302	Intro to VR Design	This studio course focuses on exploring the basics of virtual reality including understanding virtual environments and how users interact within a virtual space. Two major components of the class are contemporary practical examples and tutorials with new and emerging technologies. Student projects will provide a space for a hands on learning experience. Class discussion portions of the course will allow for further explorations on current and future VR implementations and their significance in the digital era.	Credit Hours: 3.000 Schedule Type: Lecture, Studio
ANIM 303	History of Animated Cinema	This class will expose students to the range of animated cinema, from the early days of film to contemporary computer-generated work. Class will consist of screening and discussing a range of short and feature-length films. During the semester, students will be expected to write responses to the films as well as conduct further research into the medium and its history	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
ANIM 305	Comics & Graphic Narrative	An introduction to the creation and marketing of comic strips, comic books and graphic novels, this course will emphasize graphic narrative theory and structure, the creation of characters and stories suited for the medium, strategies for monetizing the work in the real world and the development of each student's individual style.	Credit Hours: 3.000 Schedule Types: Lecture
ANIM 307	3D Modeling	This course will give students a foundation in the concepts and techniques of 3D modeling and rendering. Specific attention will be paid to modeling environments, objects and characters. Students will explore polygonal, NURBS and subdivision-surface modeling and their respective workflows.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 308N	3D Animation	This course builds upon the concepts learned in 3D modeling to include animation and character setup. Special attention will be given to applying the techniques of traditional character animation to this contemporary medium. Projects will range from short animation exercises to a longer, character-driven piece. In addition, the class will view and discuss current and classic animated film. <b>Prerequisites: ANIM 307 (Minimum Grade C)</b>	Credit Hours: 4.000 Schedule Types: Lecture, Studio
ANIM 308Z	3D Animation	This course builds upon the concepts learned in 3D modeling to include animation and character setup. Special attention will be given to applying the techniques of traditional character animation to this contemporary medium. Projects will range from short animation exercises to a longer, character-driven piece. In addition, the class will view and discuss current and classic animated film. <b>Prerequisite: ANIM 307 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 310	Digital Audio Production	This course introduces students to intermediate digital audio concepts and skills for use in a broad array of multimedia including instructional applications. Students will generate a variety of professional grade digital audio artifacts using industry-standard software and processes; instruction will focus on common elements of digital audio production to allow transfer of knowledge to various tools and platforms rather than focusing solely on the mastery of a single tool. <b>Prerequisite: DIGD 318</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 312	Motion Graphics II	This class explores the concepts covered in Motion Graphics I but with the introduction of 3D graphics and video as elements of motion graphics. In addition, the mediums of dance, photography, architecture and painting will be discussed as possible inspirations.	Credit Hours: 3.000 Schedule Types: Lecture, Studio

ANIM 318	3D Animation II	This course is a continuation on the concepts, techniques, and theories learned in 3D Animation I. Students will advance their 3D animation skills by designing, modeling, texturing, and rigging a hard-surface character. Each student's character will serve as the centerpiece of an animated short with a focus on visual narrative and cinematic presentation. Emphasis will be placed on understanding and adhering to a sensible and efficient production pipeline. In this course, students will hone their expertise in 3D animation through experience and will lay the foundation for concepts explored in Advanced Topics in 3D Animation and Animation Capstone I & II.	Credit Hours: 3.000 Schedule Types: Studio
ANIM 407N	Advanced Topic in 3D Animation	This class will allow students to delve deeper into areas covered in prior 3D classes. Topics include advanced modeling techniques, character setup, special effects, dynamics, lighting and rendering. The creation of a character interacting with its environment will drive the projects in this class. <b>Prerequisites: ANIM 308N (Minimum Grade B-)</b>	Credit Hours: 4.000 Schedule Types: Lecture, Studio
ANIM 407Z	Advanced Topic in 3D Animation	This class will allow students to delve deeper into areas covered in prior 3D classes. Topics include advanced modeling techniques, character setup, special effects, dynamics, lighting and rendering. The creation of a character interacting with its environment will drive the projects in this class.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ANIM 497N	Animation Capstone I	This course focuses on preparing the student to create a short film in the Spring. The pre-production phase includes conceptualizing the story, writing the script and creating storyboards. In the process of preparing, students will also learn to schedule, budget and distribute their film. Before the end of the semester, students will have all necessary materials to begin production on their short film.	Credit hours: 6.000 Schedule Types: Lecture, Studio Course Attributes: Writing Intensive
ANIM 497Z	Animation Capstone I	This course focuses on preparing the student to create a short film in the Spring. The pre-production phase includes conceptualizing the story, writing the script and creating storyboards. In the process of preparing, students will also learn to schedule, budget and distribute their film. Before the end of the semester, students will have all necessary materials to begin production on their short film. <b>Prerequisites: ANIM 312 (Minimum Grade D) and ANIM 308N (Minimum Grade D)</b>	Credit Hours: 4.000 Schedule Types: Lecture, Studio Course Attributes: Writing Intensive
ANIM 499	Digital Animation Capstone Project	This course represents the culminating experience for Digital Animation students. Students are required to produce and deliver a short film, realizing the concepts they developed in the previous semester and synthesizing the knowledge and skills from the preceding courses. In addition, students will be required to produce a finished portfolio appropriate to the industry in which they will be pursuing further work. <b>Pre-requisite: ANIM-497: Digital Animation Capstone Project Preparation, ANIM-407: Advanced Topics in 3D Animation. Prerequisites: ANIM 497 (Minimum Grade D)</b>	Credit Hours: 5.000 Schedule Types: Lecture
ANIM 499N	Animation Capstone II	This course represents the culminating experience for Animation students. Students are required to produce and deliver a short film, realizing the concepts they developed in the previous semester and synthesizing the knowledge and skills from the preceding courses. In addition, students will be required to produce a finished portfolio appropriate to the industry in which they will be pursuing further work.	Credit Hours: 6.000 Schedule Types: Lecture, Studio
<b>APPLIED BUSINESS ANALYTICS</b>			
ABA 201	Intro to Business Analytics	Descriptive statistical measures and probability theory are combined to provide the basis for statistical and analytic based decision-making techniques. Software is introduced for data visualization techniques and for analytics on spreadsheets. Topics covered: data analytics using spreadsheets; data presentation and visualization; measures of central tendency and variability; basic probability laws; binomial; 't,' and normal distributions; confidence intervals.	Credit Hours: 3.000 Schedule Types: Lecture

ABA 202	Statistical Data Analytics	This course uses statistical methods for data analytics aimed at estimation, inference and prediction. This includes applications of confidence intervals and hypothesis testing, using simple and multiple linear regression analysis to estimate relationships between variables and make predictions, use regression models for time series forecasting and conduct analysis of variance and chi-square tests. Excel and SPSS will be utilized to analyze data. <b>Prerequisites: ABA 201</b>	Credit Hours: 3.000 Schedule Types: Lecture
ABA 301	Data Mining & Predictive Analytics	Utilizing MS Excel and Database Access, as well as IBM Analytics (SPSS) software, students will: become acquainted with essential data mining and machine learning concepts, practice regression, cluster, classification and decision tree analysis methods; learn data unsupervised and supervised learning models, and apply them through the course project. <b>Prerequisites: ABA 201 (Minimum Grade D); ABA 202 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
ABA 401	Operations and Data Analytics	This course introduces the student to various Operations and Supply Chain Management tools and quantitative decision making models. Quantitative decision making adds value to data by building models that aid the prescriptive decision-making process. This course focuses on model formulation and the rationale behind the quantitative tools and techniques without delving deep into the mathematical theory. Topics in this course include Forecasting, Statistical Process Control, Scheduling, Decision Analysis, and various Optimization models such as Linear and Integer Programming. <b>Prerequisites: ABA 201 (Minimum Grade D) and ABA 202 (Minimum Grade D) and ABA 301 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>ARCHITECTURAL HISTORY</b>			
AHST 205	Built Environment: Ancient Med & Int 1	By tracing significant historical themes, this course spotlights canonic examples of Western and non-Western architecture, interiors, and landscape design from Ancient times to the Medieval period. Major monuments of Europe, Asia, Africa, and the Americas are examined as solutions to technical problems, utilizing available materials, and as spatial and structural embodiments of cultural belief systems. Students acquire a working vocabulary for both analyzing and evaluating the built environment and material culture.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses, Honors Assignment
AHST 206	History 2: Renaissance /Baroque	Focusing upon global changes relative to patterns of patronage, and the intersection of church and state, this course highlights significant examples of Western and non-Western architecture and interiors produced from the 14th through the mid-18th centuries. Each case study is situated within a broad historical context and understood as paradigmatic of a period's values and aspirations that are given concrete form through available materials, construction methods, and technologies. Students acquire a working vocabulary for both analyzing and evaluating architecture, interiors, and material culture <b>Prerequisites: AHST 205</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses, Honors Assignment
AHST 305	History 3: Early Modern	History III: Early Modern Architecture and Interiors (1750-1930) This course chronicles the impact of Enlightenment thinking and of the shifting definitions of modernity upon architecture and interior design by tracing the transition from Historicism to the International Style. New notions of progress and evolution; industrialization and urbanization; and debates concerning the role of the machine and the meaning of ornament are set against major technological advances. Students examine key theoretical texts and accomplish archival research on an historic structure in the Philadelphia area. <b>Prerequisites: AHST 206</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment, Writing Intensive



AHST 306	History 4: Modern/ Contemporary	History IV: Modern/Contemporary Architecture and Interiors (1930-Present) This course analyzes major movements and theoretical constructs that have dominated architecture and interior design from the post-World War II period until the present. Discussion focuses upon societal and environmental aspects? politics, economics, science and technology, psychology, etc. ? that shape the greater context for architecture, interiors and the allied arts. Students examine key theoretical texts to evaluate current thinking relative to issues such as sustainability, critical regionalism, phenomenology and the role of the digital in contemporary practice. <b>Prerequisites: AHST 305</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment, Writing Intensive
<b>ARCHITECTURAL STUDIES</b>			
ARST 221	Issues in Contemporary Preservation	This course introduces the multi-faceted field of contemporary preservation, examining fundamental principles and practices used today by historians, architectural conservators, designers, archaeologists, non-profit museum directors, and professional advocates, with attention given to issues of sustainability and adaptive reuse. Students learn through guest lectures, case studies, class discussion, field trips and "hands-on" projects. <b>Prerequisite: AHST 206</b>	Credit Hours: 3.000 Schedule Types: Lecture
ARST 266	Building Conservation and Assessment	Through site visits, demonstrations, laboratory exercises, guided research, and discussions, this course provides a comprehensive overview of historic building materials and the ongoing processes of material deterioration, contemporary approaches to treatment, and sustainability concepts of embodied energy and life cycle analysis as these pertain to building conservation. Topics include: investigative techniques for historic structures; diagnosing existing conditions, including non-destructive and laboratory testing methods; and designing appropriate interventions to remedy observed problems. Students will collect, present, critically review findings and formulate recommendations for conservation. <b>Prerequisite: ARCH 102 or INTD 102 or LARC102</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ARST 300	Exhibition Design & Planning	The renaissance of museums, product display, and exhibitions has made the making of exhibitions a significant, recognizable, and highly valued skill as well as profession. This course covers the fundamentals of exhibition design, as well as its history, theory and practice. Through the use of lecture based case studies, field trips to exhibitions, and studio work, students will not only learn to develop, design, build, and document exhibitions, but to prepare written design proposals, didactic exhibition material, and exhibition critiques. Emphasis will be on the narrative used to create exhibitions, employing scale, color, materials, lighting, sound, and graphics. <b>Prerequisites: INTD 102 (Minimum Grade D) or LARC 102 (Minimum Grade D) or INDD 102 (Minimum Grade D) or DSGF 203 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ARST 302	Uncovering the Past: Tools, Methods & Stories	Buildings are silent witnesses to the past. Rediscovering the "stories" of a building's many lives relies upon piecing together archival, physical, and ethnographic evidence. This course affords in-depth study of the techniques, strategies, and resources employed to track down data, using written, graphic, and oral sources. Field trips to key archival repositories provide students with first-hand experience in collecting and interpreting documentary evidence to develop historical narratives. <b>Prerequisites: AHST 206 Minimum Grade of D</b>	Credit Hours: 3.000 Schedule Types: Lecture

ARST 324	Architectural Forensics and Documentation	<p>In this course students decode a building's past by deciphering and recording the physical evidence of its evolution. Students learn the fundamentals of professional field techniques used to document and interpret historic structures and places, utilizing sketching and technical drawing via hand drafting and computer modeling. Through field work and labs, students survey, sketch, draft, and annotate comprehensive, technically proficient drawings that represent the salient aspects of historic structures and sites. Procedures and techniques for analyzing historic buildings to determine original appearance and the nature, extent, and chronology of physical change which has occurred over their history are introduced.</p> <p><b>Prerequisite:</b> ARCH 102 or INTD 102 or LARC102</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab</p>
ARST 341	American Architecture	<p>What makes the built environment in America unique? How has American design changed over the generations? What were architects, clients, and critics thinking? Where will American architecture go in the future? Using history, sociology, and the humanities, we will address these types of questions as we examine American architecture according to themes such as the iconic American home, public buildings, buildings for work and play, and American architectural practice.</p> <p><b>Prerequisites:</b> AHST 206 (Minimum Grade D) or LARC 206 (Minimum Grade D)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
ARST 403	Restoration and Rehabilitation of Modernism	<p>Preservation of modern and mid-century modern buildings and sites is the next frontier within the profession as the significance of this architectural period is recognized and materials with which they were built reach the end of their serviceable lives. Working in track-based teams, students collaborate to determine historical significance and identify character-defining features of a building in the Philadelphia region, assess its condition, and prepare design solutions for adaptive reuse while preserving historic character.</p> <p><b>Prerequisite:</b> AHST 305</p>	<p>Credit Hours: 4.000 Schedule Types: Lecture/Lab</p>
ARST 410	Vernacular Architecture	<p>This elective course provides the groundwork for the study of architecture built without architects or in some other way, unlike the buildings that comprise the standard architectural canon. Scholars estimate that 95 percent of buildings fall into this category. Depending on faculty expertise, focus will be on national and regional traditions, non-Western traditions or a combination of the two. Examples of vernacular architecture will be examined in the context of their materials, building technology, climate and culture.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
ARST 412	Adaptive Reuse & Urban Revitalization	<p>Preservation of modern and mid-century modern buildings and sites is the next frontier within the profession as the significance of this architectural period is recognized and materials with which they were built reach the end of their serviceable lives. Working in track-based teams, students collaborate to determine historical significance and identify character-defining features of a building in the Philadelphia region, assess its condition, and prepare design solutions for adaptive reuse while preserving historic character.</p> <p><b>Prerequisites:</b> ARCH 214 or INTD 202 or LARC 300</p>	<p>Credit Hours: 3.000 Schedule Types: Studio</p>
ARST 422	Issues in Contemporary Architecture	<p>Through discussion and field trips, this seminar investigates selected topics that have dominated architectural thinking during the 20th and 21st centuries. The course focuses upon major issues that continue to influence both the meaning and practice of contemporary architecture, such as: the relationship of architecture to the region and culture-at-large; the impact of technology and the digital realms; patterns of settlement and the city; the spatial and sensory experience of a building; sustainable design; and the role of adaptive reuse and historic preservation, to name a few. Students will critique contemporary theory and practice to develop their own architecture and design theory.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>

ARST 425	Meaning in Arch Ornamentation	<p>contemporary practice. What is ornament? How and why have attitudes toward architectural ornamentation changed through history? Is ornament essential to architecture? Lectures will be presented following a reconstructed chronology of theoretical topics; from the things (res materialis) of which architecture consists; to the 'rules' and 'abuses' of classical ornament; to the role of imitation; to the effects of the Industrial and Post-industrial Revolutions on theories of ornament. The relationship between the forms and the materials of ornament will be examined in lecture and group discussions.</p> <p><b>Prerequisites: AHST 206 (Minimum Grade D) or LARC 411 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
ARST 428	Restoration /Rehab Interiors	<p>This is an elective lecture/lab course in which students work with period and historic spaces. The course introduces students to theories and techniques of adaptation and preservation of period spaces, preserving their historical integrity. The course will deal with applicable building codes, National Park Service standards of rehabilitation, designing within ADA guidelines and use of appropriate materials and lighting.</p> <p><b>Prerequisites: AHST 305 (Minimum Grade D) or LARC 307 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, Studio</p>
ARST 4XX	Architectural Studies Capstone Project	<p>The Architectural Studies Capstone Project provides an opportunity for students to engage in high-level inquiry, focusing upon an area of specialization within the student's track—Historic Preservation, Real Estate Development, UX Gaming Environment—or from a synthesis of the student's two declared minors. Capstone projects are research and practice-centered and draw upon areas of interest to the student.</p> <p><b>Prerequisite: Senior status and permission of program director</b></p>	<p>Credit Hours: 4.000 Schedule Types: Lab</p>
ARST 434	Water and Architecture	<p>The rich architecture of public water in urban and rural contexts is a key to the cultural landscape. From the gravity systems of a Roman city, through the rich world of medieval water, and concluding with water powered by outside energy, we will study Western, Arab and Asian water systems. Through architecture, the course will link the technology of water cycles, purity, collection and storage with the aesthetics and rituals of culture.</p> <p><b>Prerequisite: SOC 2XX</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
ARST 471	Design Theory: Special Topics	<p>This upper-level course is organized to take advantage of faculty members' expertise and the interests of the student body. All topics chosen require that students have completed basic courses in architectural history and theory, so that this course can focus on (1) an advanced analysis of theoretical texts in architecture, literary texts and buildings; and (2) an examination of architecture as a cultural discipline that seeks to accommodate contemporary human needs and natural situations.</p> <p><b>Prerequisites: AHST 306 (Minimum Grade D) or LARC 411 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
<b>ARCHITECTURE</b>			
ARCH 102	Design 2: Architecture Foundation Studies	<p>This basic foundation course is required in the Architecture and Architectural Studies curricula. It is a synthesis of fundamental design principles and an introduction to research as a tool for understanding programming and design. Lectures and demonstrations will utilize the case-study methodology to investigate various design strategies and to chart the historical course of modernism.</p> <p><b>Prerequisites: ARFD 101 (Minimum Grade C)</b></p>	<p>Credit Hours : 4.000 Schedule Types: Studio</p>

ARCH 204	Great Build: Structure Style & Context	This course surveys selected, key monuments of architectural history from ancient through modern times that are paradigmatic of building art and science during a particular period. The buildings spotlighted represent dominant types from pyramids to skyscrapers that are not only laboratories for innovative design and cutting-edge technologies, but also are expressive of the values and aspirations of the society at large. Developments in the areas of materiality and structural systems will be integrated with changing social, economic, political, stylistic, and environmental demands that are normative of a particular time and place. Students majoring in Architecture, Architectural Studies, Landscape Architecture, or Interior Design are not permitted to take this course.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses
ARCH 212	Tech 2: Passive Systems Build Environment	This lecture/lab course examines technological issues relevant to passive environmental systems and sustainable technologies. Central to the course is a students understanding of the temporal nature of program and site and their impact upon the design of natural lighting, passive heating and cooling systems, and issues of enclosure, materiality, and skin, as well as their relation to our natural and built environments.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ARCH 213	Design 3: Architecture Foundations	This foundation studio concentrates on general issues concerning dwelling and specific issues addressing housing and residential design are explored. Emphasis is placed on designing in the urban context. This course uses research, writing and analysis of human patterns of occupancy and settlement as a means of exploration. Techniques of representation are developed and refined. <b>Prerequisites: ARCH 102 (Minimum Grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio
ARCH 214	Design 4:Arch Foundation Studies	This foundation course focuses on building the landscape using the elements, principles and theories of architectural and landscape design. Concurrently, specific theoretical issues related to design, organization and the interrelationship of interior and exterior space are explored. A particular emphasis is placed on an experiential and intuitive design process. The importance of the building as a response to naturally occurring context is stressed. Techniques of representation are developed and refined.	Credit Hours: 4.000 Schedule Types: Studio
ARCH 303	Structures 1	This course merges structural design (form) and analysis as a simultaneous act and introduces the role of structural engineering in the architectural process. Students develop familiarity with the fundamentals of statics, gain a sense of how structures resist forces, and learn to visualize the load path and the direction of forces. Material is learned while designing actual structures and details. Structural design and analysis is taught using both numerical and graphical analyses for the preliminary shapes of cable structures, arches, and trusses. <b>Prerequisites: PHYC 101 (Minimum Grade D) and MATH 103 (Minimum Grade D) or MATH 111 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
ARCH 304	Structures 2	Reinforcing concepts learned in Structures 1, this course presents the effect of cross-sectional properties on stresses in beams as well as the concept of bending as it is applied to beams, columns, slabs and walls in wood, steel and reinforced concrete. Also covered are the resistance of buildings and their components to lateral loads (wind and earthquake) and the introduction to structural grids and patterns for structural systems in wood, steel and concrete as they relate to gravity and lateral loads. <b>Prerequisites: ARCH 303 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
ARCH 308	Visual 4: Advanced Modeling	This advanced, computer-aided design, course focuses on complex three-dimensional modeling, photorealistic rendering and virtual reality; with an emphasis on using 3-D Studio Advanced modeling and rendering software. Interactive media and digital imaging are introduced in order to increase the effectiveness of student presentations. Students complete a series of specifically designed exercises of increasing difficulty leading to a final project of the student's choosing from a concurrent or earlier design studio.	Credit Hours: 3.000 Schedule Types: Lab, Lecture

ARCH 311	Design 5 for Architecture	<p>In this course, students will develop high-impact architectural design projects that explore the integration of society, buildings and the urban context. Projects focus specifically on community within the city by addressing issues related to sustainability, resiliency and equity. Students investigate socio-cultural and environmental aspects of the urban condition as they relate to access to resources, project programming and the implications of architectural design. The studio includes discussion of architectural history, theory and principles of sustainability as the basis for the making of urban architecture. Emphasis will be placed on the student's development of a critical and synthetic design process founded on research, engagement and innovation.</p> <p><b>Prerequisites:</b> ARCH 212 (Minimum Grade D), ARCH 214 (Minimum Grade C)</p>	<p><b>Credit Hours: 6.000</b>  <b>Schedule Types: Studio</b></p>
ARCH 312	Design 6 for Architecture	<p>In this course, students will develop high-impact architectural design projects that explore sustainable design principles and tectonic practices with an emphasis on environmentally responsible proposals. This course considers sustainability as a core value balancing architectural design, building performance, social equity and environmental resiliency. It seeks to utilize innovative interdisciplinary methodologies to foster a collaborative approach to designing sustainable built environments. The inherent properties of building materials &amp; systems will be explored to understand their roles in informing the design process including structure, enclosure, and assembly. Students will generate solutions to design problems from a perspective which balances design decision making and building performance.</p> <p><b>Restrictions:</b> Must be enrolled in Architecture, B. Arch.  <b>Prerequisites:</b> ARCH 313 (Minimum Grade D), ARCH 311 (Minimum Grade C)</p>	<p><b>Credit Hours: 6.000</b>  <b>Schedule Types: Studio</b></p>
ARCH 313	Tech 3: Dynamic Environmental Systems	<p>This lecture/lab course presents basic theory and application parameters associated with the dynamic building systems within the architectural environment. These include HVAC, power and data, lighting, acoustics, security, plumbing, vertical transportation, and life and fire safety. Emphasis is placed on the relationships of these systems within the building structure and envelope, as well as the integration of design processes, the implementation of sustainable design principles, and the health, safety, and welfare of users.</p> <p><b>Prerequisites:</b> ARCH 212 (Minimum Grade D)</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Lab</b></p>
ARCH 314	Tech 4: Advance Building Analysis	<p>This lecture/lab is the capstone course to the Structures and Technology course sequences. This course presents advanced theory, design and application parameters associated with structures, environmental systems and enclosure within the architectural environment. These parameters are examined through the context of building form typology. Emphasis is placed on the relationships of structures, environmental systems and building enclosure within each building type, and the use of these design elements in the conceptualization and realization of architecture.</p> <p><b>Prerequisites:</b> ARCH 313 (Minimum Grade D)</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lab, Lecture</b></p>
ARCH 320	Ecology & Making	<p>The objective of this seminar is to broaden the base of understanding relative to the current discussion of sustainability and reveal some of the greater complexities of the topic. The course will include relevant design work, work outside of the realm of convention, and non-designers that have contributed greatly to the field. The semester's readings will explore the topic through different filters: technological, historical, philosophical, aesthetic, scientific, social, economic, political, and cultural.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
ARCH 324	Visualization: Experimental Modeling	<p>This advanced digital elective course focuses on the direct correlation between digital techniques and the design process. Complex three-dimensional modeling, rendering, animation, design visualization and presentation are emphasized in the course methodology. Using a variety of softwares, students complete a series of exercises of increasing difficulty leading to a final project that demonstrates the culmination of the skills developed throughout the semester.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Lab</b></p>

ARCH 372	The Architectural Publication	This seminar introduces students to the publication as a representational tool for considering architecture, landscape architecture, and interior design as a critical artifact for the dissemination of environmental design theory and praxis. This course also introduces students to the history and conceptual underpinnings of the architectural publication as well as typography, layout and architectural writing. Concurrent with the analysis of architectural publications through case studies, students will utilize their design and editorial skills	Credit Hours: 3.000 Schedule Types: Lecture/Lab Course Attributes: Nexus Design Experience
ARCH 401	Design 7 for Architecture	This studio permits students to customize their professional education by offering a series of options, including study abroad architectural studio, design-build studio, interdisciplinary studio, design studio within another discipline or another option approved by the program director. <b>Prerequisites:</b> ARCH 311 (Minimum Grade C), ARCH 312 (Minimum Grade C)	Credit Hours: 6.000 Schedule Types: Studio Course Attributes: Nexus Design Experience
ARCH 412	Design 8 for Architecture	This comprehensive course demands that students work in teams integrating constructional structural and environmental systems in the design and documentation of a large and complex building. Students research building type and systems precedents and their resulting impact on built form, analyze material properties, specify component building systems and apply codes and standards to fulfill technical, programmatic and aesthetic needs. Corequisites: ARCH 416 <b>Prerequisites:</b> ARCH 314 (Minimum Grade D), ARCH 311 (Minimum Grade C), ARCH 312 (Minimum Grade of C)	Credit Hours: 6.000 Schedule Types: Studio
ARCH 413	Experimental Structures	This elective lab/seminar course is an exploration into the architectural potential of form-active structures (including thin-shell, tensile-membrane and fabric structures), and new and alternative materials and methods of construction. Unlike conventional structures that rely on their internal rigidity, form-active structures rely purely on their geometric shape to carry loads, thus providing a base for experimenting with form to create innovative solutions for structural-design problems. <b>Prerequisites:</b> ARCH 304 (Minimum Grade of D) or AREN 301 (Minimum Grade of D)	Credit Hours: 3.000 Schedule Types: Lecture, Studio Course Attributes: Nexus Design Experience
ARCH 414	Experimental Materials	This elective lab/seminar course is a hands-on exploration into the mechanical properties and aesthetic potential of materials in the built environment. The course encourages experimentation with both new materials and non-traditional use of existing materials toward the full-scale production of architectural objects and building components. Implications of craft and technology underscore research and production. Students complete several smaller individual projects and a larger group project of longer duration. <b>Prerequisites:</b> ARCH 303 (Minimum Grade of D) or AREN 301 (Minimum Grade of D)	Credit Hours: 3.000 Schedule Types: Lecture/Lab, Studio
ARCH 416	Tech 5: Document-ationn & Detailing	This course focuses on the important role of structural, environmental, and constructional systems in the design process through the creation of technically precise computer generated drawings and models. Students systematically analyze precedence through case studies and develop their own design into a set of technical documents and details that enhance the project concept. The utilize CAD and BIM computer software to convey their technical design intentions. Corequisites: ARCH 412 <b>Prerequisites:</b> ARCH 314 (Minimum Grade D) and ARCH 308 (Minimum Grade D)	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
ARCH 418	Housing and Construction Techology	This elective seminar course explores interrelated issues of house, land and construction. Discussions and research center around how historical and cultural concepts of the home and land-use have brought housing to its present condition, and how current concerns about land use and construction technologies might effect a change. <b>Prerequisite:</b> ARCH 212 or LARCH 207	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Nexus Design Experience

ARCH 419	High Performance Building Envelope	This course explores future possibilities for advanced building envelopes as well as the properties of interior and exterior building materials and their relation to construction methods and detailing. The building envelope will be considered using the following criteria: architectural expression, sustainability, spatial order, performance, and user experience. The goal of these investigations is to develop new building envelope systems that integrate the construction process with structure, materials, climate, energy use, transparency, surface qualities, and aesthetics. Students will participate in an integrated design process leading towards the technical and architectural design of a high performance-building envelope.	Credit Hours: 3.000 Schedule Types: Lecture, Studio Course Attributes: Nexus Design Experience
ARCH 423	Architecture Fellowship	This course is designed to allow students to take the first step towards learning to be a teacher. During the semester students will be linked one-to-one with a section of a foundation design studio. Participation in desk critiques and the review process, as Studio Assistants rather than as the student, allows upper level students the opportunity to share their knowledge with foundation students. In return by revisiting the fundamentals as a Studio assistant, students will be able to reevaluate the work they are doing in their own coursework and to develop further their critical, analytical, speaking and communication skills. <b>Prerequisite: ARCH 214 or INTD 202 or LARCH 202 and completion of the second year of studio courses and instructor approval and minimum GPA of 3.00.</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Studio Course Attributes: Nexus Design Experience
ARCH 426	Design/Build	Through a combination of lecture and lab, students apply knowledge of building technologies and structural systems to the design and construction of a project at appropriate scale. Working under the supervision of faculty, students research, plan, and build their solution to a problem of topical interest. <b>Prerequisite: ARCH 212 or LARCH 207</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
ARCH 430	Architecture in Education	Through a combination of lecture and lab, students apply knowledge of building technologies and structural systems to the design and construction of a project at appropriate scale. Working under the supervision of faculty, students research, plan, and build their solution to a problem of topical interest. <b>Prerequisite: ARCH 212 or LARCH 207</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio Course Attributes: Nexus Design Experience
ARCH 503	Professional Management	This course focuses on the nature of the architect's practice and on office proprietorship typologies, through detailed studies of legal, financial, marketing and management issues. Using individual projects, it examines the project process - from development through construction, including administrative procedures, economic systems, codes, standards and regulations - as well as various professional disciplines' responsibilities and requirements for professional registration. Contractual and ethical obligations of the architect, particularly in response to client needs and safety, as well as codes, standards and regulations are covered. <b>Prerequisites: ARCH 312 (Minimum Grade D) or LARC 301 (Minimum Grade D) and ARCH 312 (Minimum Grade C) or LARC 302 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture
ARCH 507	Design 9 for Architecture	This studio combines seminar and workshop elements in a non-linear manner to allow students to develop the architectural agenda explored in their position papers done for the required theory seminar. Students engage in a rigorous process uniting research, analysis, and design. Each studio section is topical according to the curricular streams identified in the students' work. <b>Prerequisites: ARCH 412 (Minimum grade C); ARCH 416 (Minimum grade C); Successful completion of Architectural Theory Seminar; Minimum grade C in ARCH 401 or successful completion of 6 Credit Nexus Design Experience</b>	Credit Hours: 6.000 Schedule Types: Studio

ARCH 508	Design 10 for Architecture	<p>This studio combines seminar and workshop elements in a non-linear manner to allow students to develop the architectural agenda explored in their position papers done for the required theory seminar. Students engage in a rigorous process uniting research, analysis, and design. Each studio section is topical according to the curricular streams identified in the students' work.</p> <p><b>Prerequisite:</b> ARCH 507 (Minimum Grade C); (Students with the ability to complete their degree requirements in December may request permission of the Program Director with the following prerequisite requirements: ARCH 412( Minimum Grade C); ARCH 416 (Minimum Grade C); Successful completion of Architectural Theory Seminar; Successful completion of ARCH 401 or 6 Credit Nexus Design Experience; Minimum cumulative GPA of 3.00; any student taking Design 10 prior to Design 9; ARCH508 (Minimum Grade C) to move on to/back to ARCH 507</p>	<p>Credit Hours: 6.000 Schedule Types: Studio</p>
<b>ARCHITECTURE DESIGN</b>			
ARDS 208	Visual 3: Digital Mod for Arch	<p>The primary intent of this course is to establish the computer as an effective tool in the design and presentation process. The course will focus on two primary areas in this regard: visualizing design concepts in three dimensions and communicating those concepts in a manner consistent with studio level work. Methods include digital model construction, creating and applying surface materials, lighting, rendering, and post-processing.</p> <p><b>Prerequisites:</b> ARCH 102 (Minimum Grade C) or LARC 102 (Minimum Grade C) or NTD 102 (Minimum Grade C)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab</p>
ARDS 209	Visualization 3: Digital Model for Interiors	<p>The primary intent of this course is to establish the computer as an effective tool in the design and presentation process. The course will focus on two primary areas in this regard: visualizing design concepts in three dimensions and communicating those concepts in a manner consistent with interior design studio level work. Methods include digital model construction, creating and applying surface materials, lighting, rendering, and post-processing.</p> <p><b>Prerequisite:</b> INTD 102 (Minimum Grade C)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
ARDS 210	Tech 1: Materials and Methods	<p>This course focuses on the presentation of the technical factors of construction that affect a building's structure. Students are introduced to and compare the nature and structural characteristics of the major construction systems of wood, masonry, steel and concrete. Structural principles, as well as building and zoning codes, are introduced and their influence on form and choice of materials is emphasized.</p> <p><b>Prerequisites:</b> ARCH 102 (Minimum Grade C) or INTD 102 (Minimum Grade C) or AREN 200 (Minimum Grade C)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab</p>
ARDS 212	Color: Theory and Practice	<p>This elective studio explores the phenomena and meaning of color, based on appropriate theories light and space. Exercises examine what color is, why it is and how we see it. Additional foci include control of color interactions and distinguishing color differences. This course will provide the basis for color choices in a logical and sequential manner and will bridge the gap between theory and use.</p> <p><b>Prerequisite:</b> DSGNFND 203 or ADFND 102 or INTD 102</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Studio</p>
ARDS 381	Independent Study in Arch, Intd & Land	<p>This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. Permission required. See the statement on Independent Study under 'Academic Policies.</p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Independent Study</p>
<b>ARCHITECTURAL FOUNDATIONS</b>			
ARFD 101	Design 1: Interdisciplinary Foundation	<p>This basic foundation course is required in the Architecture, Interior Design and Landscape Architecture curricula. It is an introduction to fundamental design principles and vocabulary, process methodologies and problem-solving strategies. Lectures and demonstrations will stress abstraction as a primary building block for future design studios.</p>	<p>Credit Hours: 4.000 Schedule Types: Studio</p>



ARFD 103	Visualization 1: Drawing	<p>This course introduces basic drawing to develop an understanding of form as applied to two- and three- dimensional space. The student works from nature, still life, the human figure, and the built environment in a variety of media; exploring qualities of line, texture, light and space representation. Students begin to explore subjects and visualization methodologies applicable to ideation for design majors.</p> <p><b>Mutual Exclusion: You may not enroll in this course if you have successfully completed DRAW 101</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Studio</b></p>
ARFD 108	Visualization 2: Technics & Graphic Representation	<p>The designed object is tangible, but it is always first an image. The image, the product of visualization, is most fundamentally communicated through the techniques of two-dimensional modeling we call drawing. The course will include a range of drawing techniques and digital technology to devise comprehensive strategies for visualizing and communicating design ideas. By integrating techniques the student will learn the appropriate tool to employ at any given point in the design process to effectively communicate to self and to others.</p> <p><b>Prerequisites: ARFD 103 (Minimum Grade D) or DRAW 101 (Minimum Grade D)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Lab</b></p>
ARFD 109	Visualization 2 for Interiors	<p>Following one semester of basic drawing, this course focuses on the fundamentals of graphic representation used by designers for representation of the built environment. Emphasis includes foundational visualization methodologies using analogue and digital techniques for orthographic and paraline drawings including floor plans, elevations, sections, and perspectives. Students will also be exposed to basic building survey methods and documentation.</p> <p><b>Prerequisites: ARFD 103 or DRAW 101</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Studio</b></p>
ARFD 120	Design Leadership: Leader as Pract	<p>Largely absent from the curriculum of architecture and design programs elsewhere, this course supports the development of students to be the next generation of design professionals by addressing the leadership and management characteristics needed to be successful in the modern complex environment of professional design. Students will learn leadership characteristics, capacities and competencies that design professionals seek in the students they propose to hire, that they seek to develop and enhance in their colleagues via internal leadership development programs, and that design leaders consider to be most important to their selfdevelopment and leadership for their profession. This course will examine leadership from multiple perspectives and will present leadership concepts that translate into real-world applications.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
ARFD 150	History Takes Form	<p>The designed object is tangible, but it is always first an image. The image, the product of visualization, is most fundamentally communicated through the techniques of twodimensional modeling we call drawing. Today?s designer is privileged to own a vast range of technologies, ancient and modern, to devise comprehensive strategies for visualizing and communicating ideas. By integrating techniques the student will learn the appropriate tool to employ at any given point in the design process to effectively communicate to self and to others.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
<b>AREA STUDIES</b>			
ASTU 201	Contemporary Europe	<p>A multidisciplinary study of European society, history and culture with emphasis on the 20th century. Through a variety of materials and approaches including fiction, visual sources, political commentary and cultural artifacts, this course will examine the rise of the European Community and the continuing conflict between ethnic, cultural and political forces in the region.</p> <p><b>Prerequisite: WRTG 101, HIST 1XX</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Language/Area Studies, Global Courses</b></p>

ASTU 2015	Contemporary Europe (Study Abroad)	A multidisciplinary study of European society, history and culture with emphasis on the 20th century. Through a variety of materials and approaches including fiction, visual sources, political commentary and cultural artifacts, this course will examine the rise of the European community and the continuing conflict between ethnic, cultural and political forces in the region. This study abroad course is taught in Europe. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Citizenship, Global Diversity
ASTU 202	Latin America	A multidisciplinary introduction to Latin American history, society and culture through a variety of materials including literature, film, music, journalistic accounts and history with emphasis upon the 20th century. The course will emphasize the complex interplay between indigenous, Iberian and African influences in the forging of the continent's past, present and future. Students will examine the roots of everyday and state violence, as well as the current controversies over "liberalization" and "market" economies. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
ASTU 205	East Asia	A multidisciplinary course examining the shifting relationship between 'tradition' and 'modernity' in East Asia. The course will explore such topics as kinship, gender relations and stratification systems in the Asian past and present. Students will investigate some of the different paths of development that Asian societies have followed in the last two centuries including communism and state-directed capitalism. The course will close with Asia's increasing significance in the globalization of capitalism. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
ASTU 208	Africa	A multidisciplinary introduction to African civilization through a variety of sources including oral epics, film, music, literature, ethnographies, historical studies and visual materials with emphasis upon the 20th century. The course will investigate such topics as the cultural roots of African leadership, the enduring importance of family and community, the impact of the trans-Atlantic trade in human beings on African societies, the struggle to achieve a just, multi-ethnic society in Southern Africa, and the present continent-wide democratization process. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
ASTU 210	Middle East	The contemporary Middle East will be examined from an interdisciplinary perspective, including the region's history, geography, politics, economy, religions and cultures with emphasis upon the 20th century. The course aims to promote an understanding of the social dynamics of this region, as well as to provide the basic tools for a better understanding of world events in general. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
ASTU 226	Italy: Study Abroad Prep	A multidisciplinary study of Italy including social, political, economic and cultural issues with particular emphasis upon the post-1945 period; attention is given also to Italy's role in Europe. The course also introduces students to how to learn a language and basic communication skills in Italian needed to cope with daily living in the society, with a special emphasis on issues relating to 'culture shock' when living, working and studying in Italy.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
ASTU 227	India and South Asia	South Asia A multidisciplinary introduction to the Asian Subcontinent, including the countries of India, Pakistan, Bangladesh and Sri Lanka. The region's modern history, geography, politics, economies, religions, cultures and social issues are each discussed in an integrative manner. Regional popular culture, including modern music, literature and cinema, are also analyzed in order to help students understand the rapidly changing nature of this region today. <b>Prerequisite: WRTG 101, HIST 1XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Courses
<b>ART &amp; SCIENCE OF HEALTHCARE</b>			

ASH 100	Art and Science of Healthcare	<p>This course is designed for students seeking a career in medicine, dentistry, veterinary medicine or the allied health fields. The course focuses on the process of career planning and professional development. The process involves thoughtful self-assessment, career exploration, planning strategies and follow-through with the application process to healthcare professional schools. Class meetings will include: a seminar series of guest lectures representative of numerous healthcare specialties and visiting admission officers from professional schools in the area by which the students can develop a network of contacts. Students will engage in active learning, in which students provide group presentations involving innovations in medicine and healthcare dilemmas facing the world today.</p> <p><b>Registration by non-postbaccalaureate students is by arrangement. Please contact Dr Bryne, 215-503-6905.</b></p>	Credit Hours: 0.500 TO 3.000
		<b>BIOLOGY</b>	
BIOL 101	Current Topics in Biology	<p><b>(for non-science majors)</b> Explore contemporary biological topics that you hear and read about or that are part of your daily life and learn the fundamental scientific concepts that underlie them. Topics will cover molecules to cells and organisms to populations as well as inheritance, development, infectious disease and what constitutes well-supported science. The course utilizes projects, hands-on activities, online discussions and group work to illustrate concepts.</p>	Credit Hours: 3.000 Attributes: Science Level II, Scientific Understanding, Social Science I
BIOL 102	Introduction to Botany	<p>This course will review botanical topics including ecology and diversity, form, growth and reproduction, selective breeding and genetic modification and other newsworthy botanical topics that arise during the semester. These topics provide a foundation for those interested in agriculture and horticulture, plants in nutrition and pharmaceuticals, and alternative energy production. Class time will be a combination of lectures, discussions, hands-on activities, laboratory exercises, and field work.</p>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab Course Attributes: Science Level II, Scientific Understanding, Social Science I
BIOL 103	Biology I	<p>The objective of this course is to gain an understanding of the cellular, molecular and genetic basis of life. Students will be introduced to the physical and chemical principles involved in biological processes, the microscopic world of the cell, regulation of gene expression and the laws that govern inheritance. This course and BIOL-104 and BIOL-104L Biology II are the introductory courses for science majors.</p> <p><b>Corequisites: BIOL 103L</b></p>	Credit Hours: 3.000
BIOL 103L	Biology I Lab	<p>This laboratory course reinforces the understanding of cellular, molecular and genetic processes learned in Biology I lecture. Exercises include microscopic examination of cells and tissues, biochemical analysis of enzyme activity, osmosis, cellular respiration and genetic investigation, including electrophoretic analysis of mutation.</p> <p><b>Corequisites: BIOL 103</b></p>	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Scientific Understanding, Social Science I
BIOL 104	Biology II	<p>In this course students will apply the principles learned in Biology I to the structure and function of organisms. Physiological processes that will be examined include nutrition, gas exchange, transport and regulation of body fluids, chemical and nervous control, and reproduction.</p> <p><b>Corequisites: BIOL 104L</b> <b>Prerequisites: BIOL 103 (Minimum Grade C-) or BIOL 112 (Minimum Grade C-)</b></p>	Credit Hours: 3.000 Schedule Types: Lecture
BIOL 104L	Biology II Lab	<p>In this course students will apply the principles learned in Biology I to the structure and function of organisms. Physiological processes that will be examined include nutrition, gas exchange, transport and regulation of body fluids, chemical and nervous control, and reproduction.</p> <p><b>Corequisites: BIOL 104</b> <b>Prerequisites: BIOL 103 (Minimum Grade C-), BIOL 103L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-), BIOL 112L (Minimum Grade C-)</b></p>	Credit Hours: 1.000

BIOL 105	Environmental Issues	In this course, students will explore the ecological, chemical, social, economic and political implications of critical global environmental issues including water pollution, pesticides, energy, acid rain, global warming, waste management, biodiversity loss and population growth. Alternative solutions proposed to address these experimental issues will be explored from multiple perspectives.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses
BIOL 107	Science, Art, and Society	This course will explore the interconnections of science with the arts across various subfields of the Biological Sciences, including contemporary and historical examples. The course's scientific subject matter will be organized around the theme of "Patterns and Trends". The course will begin by describing the general process of how patterns and trends are identified and described in science and move on to specific examples from a variety of biological fields including climate science, plant and animal development, neurobiology, and genetics. Each scientific example will be placed in a social context that emphasizes how society uses that scientific knowledge for the purpose of interpreting the world around them and for predicting the future. Finally, we will explore how the citizen science and SciArt communities integrate scientific knowledge with artistic and social endeavors. The course will culminate with a student created SciArt project and exhibition.	Credit Hours: 3.000 Course Attributes: Science Level I, Science Level II, Scientific Understanding
BIOL 112	Core Concepts of Biology	Students in this course will gain a working knowledge of the core concepts of biology necessary for further studies in biology and the health sciences. These concepts include the relationship of structure and function across scales of biological organization, the flow of energy and information through biological systems, and an introduction to animal physiology in a systems context. This course is the introductory course for students in the health sciences and is a prerequisite for BIOL 201 and 202. <b>Corequisite: BIOL 112L</b>	Credit Hours: 3.000 Schedule Types: Lecture, On-Line Course Attributes: Science Level I, Science Level II, Scientific Understanding
BIOL 112L	Core Concepts of Biology Lab	This laboratory course reinforces the understanding of cellular, molecular and genetic processes learned in Biology 110 lecture. Exercises include microscopic examination of cells and tissues, biochemical analysis of enzyme activity, osmosis, cellular respiration and genetic investigation, including electrophoretic analysis of mutation. <b>Corequisites: BIOL 112</b>	Credit Hours: 1.000 Schedule Types: Lab
BIOL 201	Human Anatomy and Physiology I	This course is the first of a two-semester sequence. This course will examine anatomical and physiological aspects of the following systems of humans: tissues, integumentary, musculoskeletal and neurologic. A close correlation between lecture and laboratory topics will be maintained. During lecture, both anatomy and physiology will be discussed however greater emphasis will be placed on the physiology of each system while during the laboratory session, greater emphasis will be placed on anatomy. <b>Corequisites: BIOL 201L</b> <b>Prerequisites: BIOL 104 (Minimum Grade C-), BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-), BIOL 112L (Minimum Grade of C-)</b>	Credit Hours: 3.000 Schedule Types: Lecture
BIOL 201L	Human Anat & Physiology I Lab	opportunities to help conceptualize content discussed in lecture. During lab, students will work on problem sets, examine and dissect organs and/or anatomical models, use microscopes, perform basic physiological experiments and examine cadaver specimens. During laboratory sessions of the first half of this two-semester course, emphasis will be placed on the anatomy of the relevant system. <b>Corequisites: BIOL 201</b> <b>Prerequisite: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or (BIOL 112 Minimum Grade C-) and BIOL 112L (Minimum Grade C-)</b>	Credit Hours: 1.000 Schedule Types: Lab

BIOL 202	Human Anatomy & Physiology II	<p>This course is the second of a two semester sequence. This course will examine anatomical and physiological aspects of the following systems of humans: sensory, endocrine, circulation, respiration, nutrition-digestion, excretion and reproductive. During lecture, both anatomy and physiology will be discussed. While some lab sessions will focus mainly on the anatomy of the current system, most laboratory sessions will involve physiological experiments to provide students with greater insight into the physiology of the current system. A close correlation between lecture and laboratory topics will be maintained.</p> <p><b>Corequisites:</b> BIOL 202L  <b>Prerequisites:</b> BIOL 201 (Minimum Grade C-), BIOL 201L (Minimum Grade C-)</p>	Credit Hours: 3.000 Schedule Types: Lecture
BIOL 202L	Human Anat & Physiology II Lab	<p>The A&amp;P laboratory sessions will provide students with hands-on learning opportunities to help conceptualize content discussed in lecture. During lab, students will work on problem sets, examine and dissect organs and/or anatomical models, use microscopes, perform basic physiological experiments and examine cadaver specimens. While some lab sessions will focus mainly on the anatomy of the current system, most laboratory sessions will involve physiological experiments to provide students with greater insight into the physiology of the current system.</p> <p><b>Corequisites:</b> BIOL 202  <b>Prerequisite:</b> BIOL 201 (Minimum Grade C-) and BIOL 201L (Minimum Grade C-)</p>	Credit Hours: 1.000 Schedule Types: Lab
BIOL 204	Cell Biology	<p>This course focuses on both structure and function of cellular components. Cellular structure is investigated from the molecular level to macromolecular assemblies and organelles with the major emphasis on how these structures function to form a dynamic cell interacting with its environment. Cell growth, reproduction and communication are discussed. Cells studies include single cells to those organized into tissues in multicellular organisms.</p> <p><b>Corequisite:</b> BIOL 204L  <b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit Hours: 3.000 Schedule Types: Lecture
BIOL 204L	Cell Biology Lab	<p>The purpose of this laboratory is to introduce the student to some of the procedures and techniques used to investigate cell structure and function, including use of the microscope, differential cell fractionation and biochemical exercises.</p> <p><b>Corequisite:</b> BIOL 204  <b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit Hours: 1.000 Schedule Types: Lab
BIOL 205	Plant Biology	<p>Students will study the diversity and evolution of plants, their structure, selected physiological processes, and current topics in plant biology.</p> <p><b>Corequisite:</b> BIOL 205L  <b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
BIOL 205L	Plant Biology Lab	<p>This laboratory course includes the examination of algae to flowering plants, and cells, tissues and organs to whole plants. Plant species will be propagated by cloning and spore culture.</p> <p><b>Corequisite:</b> BIOL 205  <b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit hours: 1.000 C Schedule Types: Lab Course Attributes: Writing Intensive
BIOL 207	Principles of Genetics	<p>This course will consider Mendelian genetics and the contributions of other early research on our present knowledge. Included will be crossover consequences, gene mapping, sex linkage, statistical genetics, mutation, chromosome abnormalities and human genetics.</p> <p><b>Corequisites:</b> BIOL 207L  <b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-) and BIOL 112L (Minimum Grade C-)</p>	Credit Hours: 3.000 Schedule Types: Lecture

BIOL 207L	Principles of Genetics Lab	<p>This is the laboratory course which must be taken to complete the genetics requirement. The laboratory exercises use current techniques of DNA technology as applied to disease diagnosis, forensic determinations and the isolation and structural examination of the DNA molecule.</p> <p><b>Corequisites:</b> BIOL 207</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-) and BIOL 112L (Minimum Grade C-)</p>	<p>Credit Hours: 3.000</p> <p>Schedule Types: Lab</p> <p>Course Attributes: Creative Intensive Course</p>
BIOL 208	Biodiversity	<p>The purpose of this course is to explore what is known about the abundance and distribution of all species on earth, what threatens and supports these species and what efforts humans have taken both in the United States and globally to destroy and conserve biodiversity. Genetic variability, demographic and population dynamics, environmental variation, economic value and legal status will be compared for the design of captive breeding programs, protected areas management and sustainable use alternatives.</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	<p>Credit Hours: 3.000</p> <p>Schedule Types: Lecture</p>
BIOL 209	Medicinal Plants	<p>This writing-intensive course focuses on the use of plants and plant products in human health. Topics include a survey of plants and plant families with medicinal properties, their cultivation and conservation, physiological effects of plant extracts, plant-derived drugs, historical and cultural aspects of medicinal plant use.</p> <p><b>Prerequisites:</b> BIOL 104 (Minimum Grade C-), BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-), BIOL 112L (Minimum Grade C-), WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D) or WRIT 211 (Minimum Grade D) or WRIT 215 (Minimum Grade D) or WRIT 217 (Minimum Grade D)</p>	<p>Credit Hours: 3.000</p> <p>Schedule Types: Lecture</p> <p>Course Attributes: Honors Assignment, Writing Intensive</p>
BIOL 209L	Medicinal Plants Lab	<p>This hands-on laboratory supports the application of medicinal properties of plants and their cultivation. Extraction procedures using hot and cold water, vinegar, honey, oil and alcohol will be compared for active constituents, organoleptics, texture and final herbal product quality. Medical efficacy will be analyzed from clinical trial analysis. Each student will grow, test and harvest a medicinal plant species following light, water, nutrient and soil regimes.</p> <p><b>Prerequisites:</b> BIOL 104 (minimum grade C-) and BIOL 104L (minimum grade C-); and (WRTG 211, 215, 217 or WRIT 201)</p>	
BIOL 221	Microbiology	<p>This course provides an introduction to environmental, industrial, food and medical microbiology. An understanding of the methods by which microbes produce disease as well as interact with body surfaces to maintain human health is also discussed.</p> <p><b>Corequisites:</b> BIOL 221L</p> <p><b>Prerequisites:</b> BIOL 104 (Minimum Grade C-), BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-), BIOL 112L (Minimum Grade C-)</p>	<p>Credit Hours: 3.000</p> <p>Schedule Types: Lecture</p> <p>Course Attributes: Honors Assignment, Writing Intensive</p>
BIOL 221L	Microbiology Lab	<p>Laboratories are designed to complement and expand information from lectures. Students will gain experience in classical techniques used by environmental and clinical microbiologists for determining unknown bacteria and molds. Practical studies will also compare historical and current methods for physical and chemical removal of microbes.</p> <p><b>Corequisites:</b> BIOL 221</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C) and BIOL 112L (Minimum Grade C-)</p>	<p>Credit Hours: 1.000</p> <p>Schedule Types: Lab</p>

BIOL 256	Molecular Genetics	<p>This lecture/lab course reviews the structure and function of the macromolecules that manifest genetic information. Topics include DNA and chromatin structure, replication, recombination, repair, RNA structure transcription, regulation of transcription and downstream processes and current investigative technologies. The lab enables students to have hands-on experience with handling and analysis of macromolecules. Students prepare lab reports and seminar presentations typical of real-world dissemination methods.</p> <p><b>Corequisites: BIOL 256L</b>  <b>Prerequisite: BIOL 104 (Minimum Grade C-), BIOL 104L (Minimum Grade C-)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
BIOL 256L	Molecular Genetics Lab	<p>This lecture/lab course reviews the structure and function of the macromolecules that manifest genetic information. Topics include DNA and chromatin structure, replication, recombination, repair, RNA structure transcription, regulation of transcription and downstream processes and current investigative technologies. The lab enables students to have hands-on experience with handling and analysis of macromolecules. Students prepare lab reports and seminar presentations typical of real-world dissemination methods.</p> <p><b>Corequisites: BIOL 256</b>  <b>Prerequisite: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</b></p>	<p>Credit Hours: 1.000  Schedule Types: Lab</p>
BIOL 301	Ecology	<p>This course quantitatively measures the relationship between organisms and their environment at the population, community, landscape and global level. Critical ecological controversies will be explored. Field data for both flora and fauna will be collected, analyzed and presented following guidelines from professional scientific journals.</p> <p><b>Corequisites: BIOL 301L</b>  <b>Prerequisites: BIOL 104 (Minimum Grade C-) BIOL 104L (Minimum Grade C-)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes: Honors Assignment</p>
BIOL 301L	Ecology Lab	<p>In this outdoor field-based environmental laboratory students sample, measure, assess, analyze and compare a multitude of ecological field methods for streams, ponds, meadows and forests to the primary scientific literature as well as long-term local, regional and national historical trends. Census methods sample the following taxons: plants, invertebrates, fungi, fish, amphibians, reptiles, birds and mammals. Abiotic factors that impact ecological relationships (sun, soil, air, water) are also measured, assessed, interpreted and compared to scientific standards used by government agencies and environmental professionals.</p> <p>Corequisite: BIOL 301  <b>Prerequisite: BIOL 104 (minimum grade C-) and BIOL-104L (minimum grade C-)</b></p>	<p>Credit Hours: 1.000  Schedule Types: Lab</p>
BIOL 302	Medical Genetics	<p>The course in medical genetics deals with the definition of the role of genetic variation and mutation in predisposing to disease, modifying the course of disease, or causing the disease itself. It will cover single gene defects caused by a critical error in the information carried by a single gene, diseases due to an excess or deficiency of the genes contained in whole chromosomes or segments of chromosomes, and multifactorial inheritance diseases which result of more than one genes which can act together to produce or predispose to a serious defect. The course will also introduce the method collection and interpretation of a family history as an integral tool in medical genetics, and integrate this in all aspects of the presentation.</p> <p><b>Prerequisite: BIOL 207 (Minimum Grade D) and BIOL 207L (Minimum Grade C-)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>

BIOL 303	Histology	<p>Histology provides students with an integrated perspective of how adaptations in physiology, biochemistry and morphology allow cellular organization into human organs and support systems.</p> <p><b>Prerequisite: BIOL 202 (Minimum Grade D) and BIOL 202L (Minimum Grade of C-)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Honors Assignment</b></p>
BIOL 303L	Histology Lab	<p>Laboratory studies will introduce students to abnormal embryology, which is the core of many aspects of disease, especially those affecting children. As well as analysis of prepared slides, students will learn to interpret and present abnormal histology/embryology in the form of case histories.</p> <p><b>Prerequisite: BIOL 202 (Minimum Grade D) and BIOL 202L (Minimum Grade of C-)</b></p>	<p><b>Credit Hours: 1.000</b>  <b>Schedule Types: Lab</b>  <b>Course Attributes: Honors Assignment</b></p>
BIOL 305	Preventative Medicine	<p>Are Americans healthy? This upper-level science elective course examines the scientific, psychological and policy dynamics associated with public health. Students will design experiments to measure their own health in a series of hands-on interactive laboratory exercises while comparing their results to national level demographic, epidemiological and historical trends to intervention of the nation's leading health issues. Client case studies will be used to engage students in problem-solving scientifically sound interventions that examine the environmental, socio-cultural, behavioral, and biological determinants of health.</p> <p><b>Prerequisites: BIOL 104 (minimum grade C-) and BIOL 104L (minimum grade C-)</b></p>	<p><b>Credit Hours: 4.000</b>  <b>Schedule Types: Lecture/Lab</b></p>
BIOL 305L	Preventative Medicine Lab	<p>This laboratory experience supports evaluation of the demographic, epidemiological and historical trends to intervention of the nation's leading health issues with hands-on measurements, analysis, synthesis and comparison to current environmental, socio-cultural, behavioral, and biological norms for whole person healthcare. <b>Prerequisites: BIOL 104 (minimum grade C-) and BIOL 104L (minimum grade C-)</b></p>	<p><b>Credit Hours: 1.000</b>  <b>Schedule Types: Lab</b></p>
BIOL 307	Developmental Genetics	<p>This course is an elective for students who have completed BIOL 104/104L and required for those in the genetics minor. It will consider animal embryology from gametogenesis (of sperm and egg) to organogenesis (development of organs) and specification with emphasis placed on the genes controlling these processes. The course includes cytogenesis (development of cells) and morphogenesis (genes which control change in body form) of the developing embryo.</p> <p><b>Prerequisites: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture/Lab</b></p>
BIOL 308	Tropic Field Studies Costa Rica	<p>This travel course to Costa Rica is offered as an upper-level biology course that is also appropriate for many other majors. The emphasis will be on tropical ecology and issues associated with the preservation of biodiversity. This course will immerse students in the diverse ecosystems of the Neotropics, including visits to coral reefs, mangroves, tropical dry forest, rainforest, and cloud forest, and will explore issues associated with the preservation of these habitats. Students will apply field methods in biology by working to develop hypotheses and collect and analyze data at several of the sites visited.</p> <p><b>Prerequisites: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or permission of instructor) and GPA 2.5 or greater and Completion of the Study Abroad application and policy guideline process.</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lab, Lecture, Study Abroad</b></p>



BIOL 309	Applications in Molecular Biology and Bioinformatics	<p>In this upper level biology course students will take a hands-on approach to applied molecular biology and genetics. In the first part of the semester students will learn to extract, amplify, and sequence DNA from a target organism. In the second half of the class students will apply bioinformatics techniques to characterize and analyze their sequences with the tools of bioinformatics. Along the way students will be introduced to numerous additional techniques in applied molecular biology.</p> <p><b>Corequisite: BIOL 309L</b>  <b>Prerequisite: BIOL 104 (Minimum grade C-) and BIOL 104L (Minimum grade C-), and CHEM 104 (Minimum grade C-) and CHEM 104L (Minimum grade C-)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
BIOL 309L	Applications in Molecular Biology and Bioinformatics LAB	<p>The laboratory component of Applications in Molecular Biology and Bioinformatics. In the laboratory component of this course students will spend time in the biology laboratory and working in the computer lab. This lab is closely integrated with the lecture activities.</p> <p><b>Corequisite: BIOL 309</b>  <b>Prerequisite: BIOL 104 (Minimum grade C-) and BIOL 104L (Minimum grade C-), and CHEM 104 and CHEM 104L (Minimum grade C-)</b></p>	<p>Credit Hours: 1.000</p>
BIOL 317	Experimental Field Ecology	<p>This course focuses on the historical, legal, ethical, economic and scientific foundation of the emerging field of conservation biology. Genetic, ecological and population analytical methods will be applied to case studies of conservation programs from around the world with an emphasis on research design critiques. Experimental design and statistics for field problems will be covered in depth. Students will design, implement, analyze and present their findings from an ecological field experiment.</p> <p><b>Prerequisites: BIOL 301 (Minimum Grade D) and BIOL 301L (Minimum Grade D)</b></p>	<p>Credit Hours: 4.000  Schedule Types: Lecture/Lab  Course Attributes: Global Courses</p>
BIOL 318	Urban Ecology, Restor & Planning	<p>Natural lands and natural systems occur in densely populated areas and because of the human impacts present vast challenges to the landscape architects and environmental planners who are entrusted with their protection and enhancement. This course studies in detail urban ecological systems, and the human impacts that shape them. The student will also be exposed to current restoration techniques, which are being utilized in the urban setting to restore natural ecological functioning to the city</p> <p><b>Prerequisites: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
BIOL 319	Oceanography	<p>An introduction to the biological, chemical, geological and physical aspects of the ocean environment with particular emphasis on the importance of the oceans to human beings and the impact we have on them. Students may participate in an optional field trip highlighting estuarine/coastal biodiversity, aquacultural techniques and oceanographic sampling techniques.</p> <p><b>Prerequisite: 2 from the following: SCI 101, SCI 102, BIOL 101, BIOL 103, CHEM 101, CHEM 103, PHYS 101, or PHYS 201</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
BIOL 320	Intro to Biotechnology	<p>This course is an introduction to the field of biotechnology, one of the major technologies of the twenty-first century. Its wide-ranging, multi-disciplinary activities include recombinant DNA techniques, cloning, and the application of microbiology to the production of goods from bread to antibiotics. This course introduces both the principles and applications of Recombinant DNA technology to animals, plants and microbial organisms. Basic biotechnology, biology and bioprocessing topics will be combined to provide a complete overview of biotechnology. Students engage in ethical debate surrounding biotechnology. Students review employment and careers in the biotechnology and biopharmaceutical industries.</p> <p><b>Prerequisite: CHEM 104 (Minimum Grade D) and CHEM 104L (Minimum Grade D) and BIOL 104 (Minimum Grade C-) and BIOL-104L (Minimum Grade C-)</b></p>	<p>Credit Hours: 4.000  Schedule Types: Lecture/Lab  Course Attributes: Science Level II, Scientific Understanding</p>

BIOL 321	Immunology	<p>The objective of this course is to introduce students to the innate mechanisms by which the human body prevents infection, as well as those involved in specifically acquired immunity. Topics include the structural, functional and genetic aspects of a fully competent immune system that can successfully prevent attack by millions of microorganisms each day. Exploration of the many medical conditions which result from hyperactive- or impaired-immune responses including allergy, autoimmunity, cancer and AIDS are studied.</p> <p><b>Prerequisites:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) or BIOL 112 (Minimum Grade C-) and BIOL 112L (Minimum Grade C-) and WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D) or WRIT 217 (Minimum Grade D)</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes: Writing Intensive</p>
BIOL 322	Wildlife Ecology & Conservation	<p>This course is an international overview of current strategies used for wildlife conservation of mammals, birds, fish and other vertebrate species. Population ecology, habitat, disease, foraging and behavior will be covered in depth. Students will research the historical, legal and economic foundation for current best-management practices. Through intensive field studies, students will compare and contrast scientific-field techniques used in wildlife management.</p> <p><b>Prerequisites:</b> BIOL 301 (Minimum Grade D) and BIOL 301L (Minimum Grade D)</p>	<p>Credit Hours: 4.000  Schedule Types: Lecture/Lab</p>
BIOL 371	Selected Topics in Biology	<p>This course provides an opportunity to explore topics in biology not developed in other courses. Examples include specialized areas of organismal biology, conservation biology, developmental and molecular biology. Students may take this course more than once as the topics differ each time it is offered.</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade of C-)</p>	<p>Credit Hours: 0.000 to 3.000  Schedule Types: Lecture</p>
BIOL 371L	Selected Topics in Biology Lab	<p>This course is offered to compliment the Special Topics in Biology lecture as needed and with the focus on laboratory experiential learning to enhance what is taught and discussed in lecture. Students may take this course more than once as the topics differ each time it is offered.</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	<p>Credit Hours: 1.000  Schedule Types: Lab</p>
BIOL 391	Research in Biology I	<p>Independent research is taken under the guidance of a faculty member. The research will include a written proposal prior to initiation of the project, a literature search, experimental work, a written abstract and report upon completion of the semester and an oral presentation of the work. Guidelines for approval and for final evaluation are available in the College of Science, Health and the Liberal Arts office.</p>	<p>Credit Hours: 3.000  Schedule Types: By Appointment - 1 student, By Appointment - 2 students, By Appointment - 3 students, By Appointment - 4 students, Independent Study</p>
BIOL 392	Research in Biology II	<p>Continuation of BIOL 391</p> <p><b>Prerequisite:</b> BIOL 391</p>	<p>Credit Hours: 3.000  Schedule Types: Independent Study  Course Attributes: Honors Assignment</p>
BIOL 402	Genetics Seminar	<p>This writing intensive course will expose the student to the fields of population genetics and several emerging and important subdisciplines (behavioral, conservation, and evolutionary genetics). Human health will be a recurring theme. The seminar format will encourage an independent learning experience. Papers and presentations will build research, communication, and critical thinking skills.</p> <p><b>Prerequisites:</b> BIOL 207 (Minimum Grade D), BIOL 207L (Minimum Grade D), WRIT 211 (Minimum Grade D) or WRIT 215 (Minimum Grade D) or WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D)</p>	<p>Credit Hours: 3.000  Schedule Types: By Appointment - 1 student, By Appointment - 2 students, By Appointment, Lecture, On-Line  Course Attributes: Writing Intensive</p>

BIOL 404	Neuroscience and Anatomy	<p>Students will explore the dynamics of the nervous system across multiple levels of organization (from molecular to organismal). The connections among disease states, behavioral health, and clinical intervention methods will be a recurring theme. Students do hands-on work with models of the nervous system and with radiologic imagery. Assessment tools will include exams, research papers, and presentations.</p> <p><b>Prerequisite:</b> BIOL 201 (Minimum Grade B-) and BIOL 201L (Minimum Grade B-) and BIOL 202 (Minimum Grade B-) and BIOL 202L (Minimum Grade B-)</p>	Credit Hours: 3.000
BIOL 405	Human Gross Anatomy	<p>This lecture course will cover fundamental concepts in human gross anatomy. A regional approach will be used to study bones, muscles, arteries, veins, nerves, and organ systems.</p> <p><b>Prerequisite:</b> BIOL 201 (Minimum Grade B) and BIOL 201L (Minimum Grade B) and BIOL 202 (Minimum Grade B) and BIOL 202L (Minimum Grade B)</p>	Credit Hours: 3.000
BIOL 405L	Human Gross Anatomy lab	<p>This laboratory course supplements the BIOL 405 lecture course with hands on learning using cadaveric remains and virtual cadavers. Bones, muscles, arteries, veins, nerves, and organ systems will be studied using a regional approach.</p> <p><b>Prerequisite:</b> BIOL 201 (Minimum Grade B) and BIOL 201L (Minimum Grade B) and BIOL 202 (Minimum Grade B) and BIOL 202L (Minimum Grade B)</p>	Credit Hours: 1.000
BIOL 407	Comparative Vertebrate Anatomy	<p>A comparative study of the structure, function and evolutionary relationships of the major vertebrate groups.</p> <p><b>Prerequisite:</b> level BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
BIOL 409	Cellular Analysis	<p>This course will teach fundamental methods of contemporary cellular and biotechnology. Laboratory exercises focus on microscopic, biochemical and molecular analysis of cells and cell structures.</p> <p><b>Prerequisite:</b> BIOL 204 (Minimum Grade D) and BIOL 204L (Minimum Grade D)</p>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
BIOL 411	Life Science Seminar	<p>The course covers recent advances in the biological and medical sciences by way of formal presentations and discussions involving both students and invited faculty. In addition, students will learn techniques for the preparation of a research project involving a literature search. Students will be required to carry out a research project and present a formal seminar on this work to their peers.</p> <p><b>Prerequisite:</b> BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-)</p>	Credit Hours: 3.000 Schedule Types: Lecture
BIOL 413	Pathology	<p>Pathology represents an integrated perspective of how disease results from a series of common, underlying changes resulting from initial and continued cell stresses. Students will relate disease processes to the symptoms and signs reported by patients and interpreted by physicians through the use of case history presentation and will acquire a variety of light microscopy techniques routinely used in hospitals for the diagnosis and monitoring of abnormal pathology.</p> <p><b>Prerequisites:</b> BIOL 202 (Minimum Grade D) or BIOL 303 (Minimum Grade D)</p>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment

BIOL 413L	Pathology Lab	This laboratory course compliments lecture in that case studies will be given and working as a team, diagnostic and prognostic information is presented. Real-life applied case histories will be presented and analysis of the process taken to diagnose the condition presented will be looked at and presented. <b>Prerequisites: BIOL 202 (Minimum Grade D) or BIOL 303 (Minimum Grade D)</b>	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Honors Assignment
BIOL 415	Natural Resource Management	This course explores the existing state of the world's natural resources including forests, fisheries, rangeland, soil, water, wildlife, air and energy. Management options for each resource will be explored in depth. Field trips will compare cost, impact and implementation of different approaches used by environmental agencies. Students will write and present a resource-management plan for a key issue.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
BIOL 493	Preceptorship I	The preceptorship experience is designed to enhance the student's knowledge, technical skills and problem-solving abilities within the biomedical science realm. These studies will be performed off campus under the supervision of biomedical professionals and other practitioners in the medical sciences, previously approved by the program director. Designed to be taken as summer classes between the sophomore and junior years. A minimum of 54-hours required, preferably as six, one-week periods of nine hours per week.	Credit hours: 3.000 Schedule Types: Internship 3 Credits, Lecture Course Attributes: Co-operative Work Experience
BIOL 494	Preceptorship II	The preceptorship experience is designed to enhance the student's knowledge, technical skills and problem-solving abilities within the biomedical science realm. These studies will be performed off campus under the supervision of biomedical professionals and other practitioners in the medical sciences, previously approved by the program director. Designed to be taken as summer classes between the sophomore and junior years. A minimum of 54-hours required, preferably as six, one-week periods of nine hours per week.	Credit Hours: 3.000
<b>BIOLOGY/CHEMISTRY</b>			
BCHM 312	Biochemistry I: Proteins	Review of the biochemistry of proteins, including fundamental protein synthesis, structure/function relationship, consequences of mutations, equilibrium binding, use of antibodies as investigative tools, catalytic mechanisms, kinetics, and regulation of enzymes. Direct applications of course content to health and biotechnology fields are emphasized. Corequisite: BCHEM 312 <b>Corequisite: BCHEM 312</b> <b>Prerequisite: BIOL 104 (Minimum Grade C-) and BIOL 104L (Minimum Grade C-) and CHEM 202 (Minimum Grade C) and CHEM 202L (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture
BCHM 312L	Biochemistry I: Proteins Lab	This lab introduces some standard, basic techniques used routinely in the study of proteins. The techniques learned include spectrophotometric, chromatographic, electrophoretic, and enzymatic analysis. Students prepare lab reports and seminar presentations typical of real-world dissemination methods. <b>Corequisite: BCHEM 312</b> <b>Prerequisite: BIOL 104 and BIOL 104L and CHEM-202 (Minimum Grade C) and CHEM 202L (Minimum Grade C)</b>	Credit Hours: 1.000 Schedule Types: Lab
BCHM 313	Biochemistry II: Metabolism	Biochemistry II: Metabolism reviews the structures and metabolic transformations of carbohydrates, lipids, amino acids, and nucleotides. The regulation of metabolism by principles of protein function reviewed in BCHEM 312 is thematic throughout the course. Direct application of course content to health and biotechnology are emphasized. Direct applications of course content to health and biotechnology fields are emphasized. <b>Corequisite: BCHEM 313L</b> <b>Prerequisite: BCHEM 312 (Minimum Grade C) and BCHEM 312L (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture

BCHM 313L	Biochem II: Metabolism Lab	This lab includes analysis of metabolites and the regulation of metabolism by proteins. The techniques learned include spectrophotometric, chromatographic, electrophoretic, and enzymatic analysis. Students prepare lab reports and seminar presentations typical of real-world dissemination methods. <b>Corequisite: BCHEM 313</b> <b>Prerequisite: BCHEM 312 (Minimum Grade C) and BCHEM 312L (Minimum Grade C)</b>	Credit Hours: 1.000 Schedule Types: Lab
<b>BIOPROCESSING</b>			
BP 401	Basic Engineering for Scientists	This course introduces students to the basic underlying transport processes of momentum, mass and heat transfer pertinent to biopharmaceutical process development. The course will demonstrate the power of mathematical techniques, modeling and statistical methods to resolve practical issues in a biomanufacturing setting.	Credit Hours: 2.000 Schedule Types: Lecture, hybrid
BP 403	Introduction to Bio-pharmaceutical Processing	This course introduces students to basic principles and concepts in biochemistry and biology to high light the importance of proteins as the basis of disease and as therapeutics. The course will cover basic recombinant DNA technology as used in the production of therapeutic proteins and monoclonal antibodies. The course will cover basic properties of amino acids, peptides, proteins and monoclonal antibodies, structure-function of proteins and DNA, and cellular reactions involved in cell growth and metabolism, translation, transcription, and replication. Topics will cover different expression systems, basic design of vectors, cell transfection and protein expression and associated analytical methods and techniques.	Credit Hours: 2.000 Schedule Types: Lecture, hybrid
BP 404	Introduction to Downstream Unit Operations	This course introduces students to industrial applications of chromatography for purification and polishing and tangential flow filtration (TFF) for product formulation and concentration. The course will also introduce students to other key areas in downstream processing of therapeutic peptide, proteins and monoclonal antibodies including viral safety, active pharmaceutical ingredient (API) stability and API stability storage.	Credit Hours: 4.000 Schedule Types: Lecture, hybrid
BP 405	Introduction to Upstream Unit Operations	This course introduces students to the practical use of cells cultured in bioreactors to produce sophisticated biopharmaceutical medicine including peptides, proteins and monoclonal antibodies for variety of diseases including cancers, diabetes, rheumatoid arthrosis, scoliosis, to name but a few.	Credit Hours: 4.000 Schedule Types: Lecture, hybrid
<b>BIOTECHNOLOGY</b>			
BT 302	Molecular & Immuno Tech	<b>Prerequisites: LS 302</b>	Credit Hours: 4.000 Schedule Types: Lab
BT 303	Molecular Preparatory Techniques	Basic aspects of biotechnology laboratory work gel preparation, buffer composition, media preparation, streaking and isolating bacteria. Lecture and laboratory.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
BT 305	Survey of Biotechnical Applications	A systematic introduction to essential skills and applied theories pertinent of the training needs of biotechnologists. Topics to be covered include: Safety, Quality Control, GMPs/SOPs, Documentation, Regulatory Requirements in the Biotechnology Laboratory, and Applications of Biotechnology in the Workplace.	Credit Hours: 3.000 Schedule Types: Lecture
BT 310	Fundamental Molecular Techniques	Discussion, demonstration and practice of basic molecular techniques including DNA/RNA isolation, restriction digest, gel electrophoresis and blotting techniques. Lecture and laboratory. <b>Corequisite: BT 303</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
BT 320	Cell and Tissue Culture	Sterile technique, suspension and adherent culture, growth curve, cryopreservation, cell cycle analysis, imaging, laboratory safety and documentation. Lecture & laboratory.	Credit Hours: 4.000 Schedule Types: Lecture/Lab

BT 325	Product Development & Management	This course will cover the principles of product development and management in biotechnology with a focus on medical devices. All products undergo a product life-cycle from concept to marketplace. Students learn about the steps needed to develop and manufacture a product with all the necessary regulator mechanisms for the marketplace. Concepts covered include market analysis, feasibility testing, validation testing, the development of a quality management system, and the FDA approval process using good laboratory, clinical, and manufacturing practices.	Credit Hours: 3.000 Schedule Types: Lecture
BT 401	Systems Biology	Cross-disciplinary course combining flow cytometry, digital imaging technologies, bioinformatics and molecular modeling aimed at understanding organisms as a whole. Presents methods by which specific biological information relating to DNA, RNA, proteins, cells and tissues are integrated and modeled. <b>Prerequisite: MLS 301/501 or permission of Program Director</b>	Credit Hours: 2.000 Schedule Types: Lecture
BT 403	Human Genetics	This course will cover the principles and theory of human genetics. Specific topics to be covered include: introduction of human genetics, the genome structure and maintenance; review of DNA replication, RNA transcription, and protein synthesis; transmission of genes and genetic traits; population genetics; the role of genetics in immunity and cancer; applications of genome sequencing, diagnostic technology, and therapeutic technology; and the practice of the scientific communication of human genetic concepts via literature research and oral presentation. Lecture.	Credit Hours: 3.000 Schedule Types: Lecture
BT 405	Appld Microbial Biotechnology	Specialized topics in microbiology and molecular genetics. Examines the biology of human bacteria, yeast and viruses with special emphasis on their use in molecular genetics. Lecture/seminar. <b>Corequisite: MLS 301</b>	Credit Hours: 3.000 Schedule Types: Lecture
BT 406	Intro to Bioinformatics		Credit Hours: 2.000 Schedule Types: Lecture
BT 410	Molecular Diagnostic Technique	Introduces clinical applications of molecular techniques. Includes discussion, demonstration and practice of molecular techniques including detection of gene mutations, oncogene amplification and loss of tumor suppressor gene function. Covers advanced techniques such as forensics, probe development and cloning and sequencing. <b>Prerequisite: Biotechnology 310</b>	Credit Hours: 4.000
BT 411	Protein Purification & Charact	Introduction to theory and applications of protein purification, characterization, and enzymology. Students perform various types of chromatography, gel filtration, ion exchange chromatography, affinity chromatography, protein assays, protein analysis, SDS PAGE, spectroscopic methods, and enzyme kinetics. <b>Prerequisite: BT310</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab
BT 412	Biotechnology Practicum I	Undergraduate practical internships in biotechnology laboratories. Students participate in all phases of laboratory functions relating to the various applications of biotechnology including, but not limited to, molecular diagnostics, basic and applied research and forensics. As appropriate, students will also participate in relevant continuing education activities, attend seminars and engage in other professionally related activities. <b>Prerequisite: Completion of pre-practicum biotechnology and core curriculum coursework.</b>	Credit Hours: 3.000 Schedule Types: Practicum
BT 416	Comp-rehensive Exam	Background readings, comprehensive review and self-administered quizzes/exams in the discipline-specific body of knowledge and scope of practice necessary to prepare for national certification examination(s). Web-based course. <b>Prerequisite: Completion of at least two practicum courses.</b>	Credit Hours: 0.000 Schedule Types: Exam, On-Line, Seminar

BT 422	Biotechnology Practicum II	Undergraduate practical internships in biotechnology laboratories. Students participate in all phases of laboratory functions relating to the various applications of biotechnology including, but not limited to, molecular diagnostics, basic and applied research and forensics. As appropriate, students will also participate in relevant continuing education activities, attend seminars and engage in other professionally related activities. <b>Prerequisites: BT 320 and BT 411 and BT 411</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
BT 432	Biotechnology Practicum III	Undergraduate practical internships in biotechnology laboratories. Students participate in all phases of laboratory functions relating to the various applications of biotechnology including, but not limited to, molecular diagnostics, basic and applied research and forensics. As appropriate, students will also participate in relevant continuing education activities, attend seminars and engage in other professionally related activities. <b>Prerequisites: BT 320 and BT 411 and BT 410</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
BT 442	Biotechnology Practicum IV	Undergraduate practical internships in biotechnology laboratories. Students participate in all phases of laboratory functions relating to the various applications of biotechnology including, but not limited to, molecular diagnostics, basic and applied research and forensics. As appropriate, students will also participate in relevant continuing education activities, attend seminars and engage in other professionally related activities. <b>Prerequisites: BT 320 and BT 411</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
BT 503	Molecular Prep Techniques	Basic aspects of biotechnology laboratory work: gel preparation, buffer composition, media preparation, streaking and isolating bacteria. Lecture and laboratory.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
BT 510	Fundamental Molec Techniques	Discussion, demonstration and practice of basic molecular techniques including DNA/RNA isolation, restriction digest, gel electrophoresis and blotting techniques. Lecture and laboratory. <b>Corequisite: BT 303</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
BT 605	Appld Microbial Biotechnology	Specialized topics in microbiology and molecular genetics. Examines the biology of human bacteria, yeast and viruses with special emphasis on their use in molecular genetics. Lecture/seminar. <b>Corequisite: MLS 301</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>BUSINESS</b>			
BUS 200	Introduction to Sports Management	This course will provide students with an overview of the sports management. The topics covered include the following: history of sport management, youth, community and scholastic sport and recreation, sports industry opportunities, professional and international sports.	Credit Hours: 3.000 Schedule Types: Lecture
BUS 300	Business Tools for Healthcare	Students learn and apply current business perspectives and tools in order to address issues and problems in healthcare and the healthcare industry. The course leverages teamwork and innovative problem-solving approaches. Future curriculum development plans include adding additional electives to the minor and creating seamless pathways to relevant graduate programs in the spirit of offering opportunities for lifelong learning.	Credit Hours: 3.000 Schedule Types: Lecture
BUS 317	Opportunity Finding Emerging Markets	Students learn how to describe, visualize, develop and assess a business model by utilizing design thinking and qualitative research methods within a cultural immersion context and through a combination of classroom seminars and experiential instructions. Central to this learning process is identifying value propositions for a range of fields in the private sector and non-profit sectors. While abroad, students will have daily seminars from area experts and site visits to organizations representing diverse industry sectors. <b>Restrictions: Must be enrolled Junior or Senior</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses

BUS 499	Business Capstone Seminar	The process and techniques of strategy formulation, implementation and evaluation are studied and applied. Case studies of domestic and international companies and not-for-profit organizations will be used to integrate strategic management concepts with knowledge acquired in other classes. This course will include extensive written individual and team assignments and oral presentations.	Credit Hours: 3.000 Schedule Types: By Appointment - 2 students, By Appointment - 3 students, By Appointment - 4 students, Lecture, Online By Appointment 8 Week, On-Line
<b>BUSINESS LAW</b>			
BLAW 301	Business Law	Lecture, class discussion and case problems emphasizing legal principles on the following topics: the legal environment, government regulation of business, contracts, personal property, environmental liability as it relates to business transactions, bankruptcy, employment and human resources, and current legal issues. The legal environment as it impacts business decision making is addressed.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line Course Attributes: Honors Assignment, Writing Intensive
<b>CAD (COMPUTER AIDED DESIGN)</b>			
CAD 201	Intro to Digital Imaging	This course focuses on increasing the student's individual level of computer literacy through the exploration of the basic structure of the operating system, general internet skills and the fundamentals of both raster and vector based software. Course projects provide hands-on experience with Adobe Photoshop and Adobe Illustrator software.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
CAD 204	CAD for Fashion Design	Computer-aided design is utilized in every segment of the fashion industry from concept development, fabric design and illustration to line development, technical drawing, and presentations. Students learn CAD software and gain skills utilized in a variety of industry-related projects.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
CAD 206	CAD I for Industrial Design	The course introduces students to computer-aided design with a focus on the industrial design processes. In an intuitive fashion, students create and refine designs using a solids-modeling software package. In order to recognize the critical role CAD plays in the development of designs, students will use designs created in design studio courses as the subject matter of the CAD activities. Design-control drawings, three-dimensional rendered drawings and perspective drawings will be the course's output.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
CAD 206N	CAD I for Industrial Design	The course introduces students to computer-aided design with a focus on the industrial design processes. In an intuitive fashion, students create and refine designs using a solids-modeling software package. In order to recognize the critical role CAD plays in the development of designs, students will use designs created in design studio courses as the subject matter of the CAD activities. Design-control drawings, three-dimensional rendered drawings and perspective drawings will be the course's output.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
CAD 302	3D Virtual Fashion Design Essentials	3D Virtual Fashion Design Essentials will enable students to understand the basic requirements needed to be successful utilizing industry-adopted 3D applications through hands on experience. Building on their pattern development knowledge and technical skills in 2D, students will learn to build an entire 3D collection from simple silhouettes to complicated designs utilizing fabric, fit, patterns, colors, and textures. Students will learn successful communication of quality assurance to vendors and manufacturing personnel worldwide. <b>Prerequisites: CAD204, FASD311 grade of "C" or better.</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab



CAD 306	CAD II Dig Design Techniques	This course will build upon principles introduced in introductory CAD courses. It is primarily a laboratory course in which students will learn to take their early design concepts through to the final presentation using advanced digital design techniques. Students will use multiple digital design software packages across computer platforms with an emphasis on CAID packages such as NURBS modelers and animation software, as well as vector-based, desktop-publishing programs and bitmap-based programs.	Credit Hours: 3.000 Schedule Types: Lecture/Lab Course Attributes: Honors Assignment
CAD 401	Apparel CAD/CAM	A comprehensive course that incorporates software widely used in the apparel industry where patterns are created then graded and made into markers. Industry standards and specifications are followed for each area. Students use software to solve problems and increase productivity.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
<b>CARDIAC SONOGRAPHY</b>			
RSCS 302	Noninvasive Testing Principles and Procedure	Provides a foundation in the basic principles of electrocardiography. Presents an overview of the theory and diagnostic techniques utilized by technologists in a noninvasive laboratory. Emphasizes the development of a systematic approach to electrocardiographic interpretation, dysrhythmia analysis, exercise stress testing, Holter monitoring, nuclear medicine procedures, and pacemaker evaluation.	Credit Hours: 1.000 Schedule Types: Lecture
RSCS 311	Cardiovascular Physiology	Presents the construction and dynamics of the cardiovascular system in detail. Includes the development of the cardiovascular system, anatomical and physiological characteristics, heart sounds, biophysics of the cardiac cell, cardiac pumping action and its regulation, cardiovascular hemodynamics, coronary blood flow, systemic and pulmonary circulations, and the control of regional circulation.	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 312	Cardiovascular Pathophysiology	Continuation of Radiologic Sciences CS 311, Cardiovascular Physiology. Provides an examination of the structure and function of the cardiovascular system in health and disease. Emphasizes the pathophysiological mechanisms of acquired and congenital cardiovascular diseases as well as their clinical presentation, detection and treatment. <b>Prerequisite: RSCS 311</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 321	Patient Care & Services in Diagnostic Imaging	This course presents an introduction to basic medical techniques in patient care, safety, infection control, pharmacology, medico-legal issues, bioethics, health care delivery environments, diversity and an overview of the various imaging specialties in the Radiologic Sciences. Current issues in the Radiologic Sciences will also be addressed.	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 331	Cardiac Procedures I	Presentation and hands-on operation of equipment used in an echocardiography laboratory. Emphasizes the clinical application, operation, knobology, and instrumentation associated with such equipment. Provides guided practice in the performance of standard echocardiographic procedures. Topics include two-dimensional (2D) imaging, M-mode, and Doppler techniques (i.e., pulsed-wave Doppler, continuouswave Doppler, color Doppler).	Credit Hours: 2.000 Schedule Types: Lecture/Lab
RSCS 332	Cardiac Procedures II	This is a continuation of Cardiac Procedures I. Provides guided practice in the performance of standard cardiac procedures in a laboratory setting. Topics include two-dimensional imaging (2D), M-mode, and Doppler in the evaluation of abnormal cardiac pathology, as well as the appropriate calculations and analysis packages used. <b>Prerequisite: RSCS 331</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 351	Cardiac Principles I	Students will learn the fundamental skills and principles needed to perform echocardiography, including the implementation, evaluation, and relevance of two-dimensional imaging, M-mode, and Doppler techniques related to cardiac ultrasound. Course content will include the instruction, application, and assessment of normal and abnormal cardiac anatomy, physiology, and the pathophysiology of various disease processes. Students will utilize these fundamentals to evaluate selected cardiovascular disease states.	Credit Hours: 3.000 Schedule Types: Lecture

RSCS 352	Cardiac Principles II	This course is a continuation of Cardiac Principles I. Course content will emphasize the analysis and assessment of abnormal cardiac anatomy, physiology, and pathophysiology found in acquired and congenital cardiovascular disease states. Students will also learn advanced cardiac procedures and specialty applications of cardiac ultrasound, such as Transesophageal Echocardiography and Stress Echocardiograms. <b>Prerequisite: RSCS 351</b>	Credit Hours: 3.000 Schedule Types: Lecture
RSCS 400	Ultrasound Physics I	Presents general acoustic principles including energy transfer through wave propagation, surface reflection processes, transducer construction, beam profile consideration, image recording devices and an introduction to A-mode, B-mode, M-mode, Doppler, color Doppler, 3-dimensional ultrasound and real-time instrumentation. Emphasizes applied principles of instrumentation, knobology, acoustical artifacts, medical terminology, bioeffects and quality control relative to ultrasound.	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 403	Ultrasound Physics II	Continues discussion of properties of sound and presents advanced concepts including computer technology and the instrumentation used to create and store the ultrasound image, and introduction to fluid dynamics, spectral, color and amplitude Doppler. Emphasizes advanced principles of physics, knobology, acoustical artifacts, bioeffects/safety and quality assurance relative to ultrasound. <b>Prerequisite: RSCS 400</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 411	Clinical Cardiac I	Observing and applying clinical principles in an echocardiography laboratory. Emphasizes professional attributes and fundamental clinical skills necessary to perform and interpret transthoracic echocardiography. Synthesizes learning from didactic, laboratory, and instrumentation courses. Cognitive, affective, and psychomotor skill assessment is based on scanning protocol competencies and techniques, professionalism, and proficiency in patient care.	Credit Hours: 6.000 Schedule Types: Clinical
RSCS 412	Clinical Cardiac II	This is a continuation of RSCS 411 Clinical Cardiac I. Supervised clinical practice of cardiac ultrasound in an echocardiography laboratory. Emphasizes professionalism and clinical skills needed to perform and provide diagnostic information necessary for the evaluation of cardiac disease. Students will also observe and assist with stress echocardiography and transesophageal procedures. Synthesizes learning from didactic, laboratory, and instrumentation courses. Cognitive, affective, and psychomotor skill assessment is based on scanning protocol competencies and techniques, professionalism, and proficiency in patient care. <b>Prerequisite: RSCS 411</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSCS 413	Clinical Cardiac III	This is a continuation of RSCS 412 Clinical Cardiac II. Supervised clinical practice of cardiac ultrasound in an echocardiography laboratory focusing on identification and documentation of cardiac pathology. Emphasizes the clinical skills necessary to perform advanced techniques and specialty applications in acquired and congenital disease states. Presents the opportunity to work more independently in the performance of standard echocardiographic procedures. Cognitive, affective, and psychomotor skill assessment is based on scanning protocol competencies and techniques, professionalism, and proficiency in patient care. <b>Prerequisite: RSCS 412</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSCS 481	Cardiac Review Seminar	Presents a comprehensive review of the physical principles, instrumentation and clinical applications of echocardiography in preparation for the certification examination.	Credit Hours: 2.000 Schedule Types: Lecture
RSCS 491	Spec Topics in Cardiac Sonography I	Presents new techniques and information, clinical experiences and presentation of case studies in a weekly seminar format.	Credit Hours: 1.000 Schedule Types: Lecture
RSCS 492	Spec Topics in Cardiac Sonography II	Continuation of topics in new techniques and information, clinical experiences and presentation of case studies in a weekly seminar format.	Credit Hours: 1.000 Schedule Types: Lecture
		<b>CHEMISTRY</b>	

CHEM 101	General Chemistry	(for non-science majors) This course allows students to pursue further study of chemical issues as they relate to the consumer and to health. Students will become familiar with issues surrounding the use of everyday products such as laundry products, personal-care products, plastics, fibers and food additives. Also included are an introduction to organic chemistry, biochemistry and the chemistry of some health-related issues. Students should complete this course with an awareness of the complexities of the chemical structures in their daily lives and the issues involving their use and abuse, so that they may make more informed decisions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
CHEM 101L	General Chemistry I Lab	(for non-science majors) Laboratory sessions to accompany CHEM 101	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Science Level I, Science Level II, Scientific Understanding
CHEM 102	General Chemistry II	Examines areas of inorganic, organic and biological chemistry to reveal relationships among the three disciplines. Demonstrates chemistry's importance in normal biochemical function of the cell; normal functions of the body when the chemistry goes wrong; action of drugs on the body; and chemistry's role in alleviating disease and suffering.	Credit Hours: 0.000 to 4.000 Schedule Types: Lab, Lecture
CHEM 102L	General Chemistry II Lab	Laboratory sessions to accompany CHEM 102	Credit Hours: 0.000 Schedule Types: Lab
CHEM 103	Chemistry I	the properties of matter, chemical reactions and stoichiometry, energy and thermochemistry, atomic structure, the periodic table, and gases. Basic knowledge of algebra, geometry and trigonometry is presumed. Students enrolled in MATH-099 may not take this course. This course is not recommended for students enrolled in WRTG-099 or READ-099 fundamentals courses. Undergraduate Second Program, Undergraduate Third Program, Undergraduate <b>Corequisite: CHEM 103L</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
CHEM 103L	Chemistry I Lab	This hands-on laboratory-based course highlights concepts covered in Chemistry I Lecture. Emphasis is placed on developing good laboratory and data analysis skills. <b>Corequisite: CHEM 103</b> <b>Co/Prerequisite: MATH 102 or higher</b>	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Science Level I, Science Level II, Scientific Understanding
CHEM 104	Chemistry II	Continuation of CHEM 103 Chemistry I that provides applications of chemical bonding and molecular geometry to describe intermolecular attractions and solution formation, and studies of kinetics, chemical equilibrium, acids, bases and thermodynamics. <b>Corequisites: CHEM 104L</b> <b>Prerequisite: CHEM 103 (Minimum Grade C-) and CHEM 103L (Minimum Grade C-)</b>	Credit Hours: 3.000 Schedule Types: Independent Study, Lecture Course Attributes: Scientific Understanding
CHEM 104L	Chemistry II Lab	This hands-on laboratory-based course highlights concepts covered in Chemistry II Lecture. Analytical and data interpretation/ presentation skills are honed through a series of experiments. <b>Corequisite: CHEM 104</b> <b>Prerequisite: CHEM 103 (Minimum Grade C-) and CHEM 103L (Minimum Grade C-)</b>	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Scientific Understanding

CHEM 113	Chemistry I	<p>(required for biology, chemistry, and biochemistry majors) An introduction to the fundamental laws and theories of chemistry, including properties of matter, chemical reactions and stoichiometry, energy and thermochemistry, atomic structure, the periodic table, and gases. Basic knowledge of algebra, geometry and trigonometry is presumed. Students enrolled in MAT -099 may not take this course. This course is not recommended for students enrolled in WRTG-099 or READ 099 fundamentals courses. This course is a foundational course for biology, chemistry, and biochemistry majors. Co-requisite: CHEM 113L. Students must now earn a "C-" or better in both lecture &amp; lab to progress to CHEM 114 and CHEM 114L.</p> <p><b>Corequisite: CHEM 113L</b> <b>Co/ Prerequisite: MATH 102 or higher</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b> <b>Course Attributes: Science Level I, Science Level II, Scientific Understanding</b></p>
CHEM 113L	Chemistry I Lab	<p>(required for biology, chemistry, and biochemistry majors) Laboratory adjunct course to CHEM-113, Chemistry I for Life Sciences lecture. This course provides hands-on experience with topics addressed in lecture. Completion of lab exercises/experiments will provide useful reinforcement of topics presented in the lecture course component and provide valuable experience with lab techniques. This course is a foundational course in biology, biochemistry, and chemistry majors.</p> <p><b>Corequisite: CHEM 113</b> <b>Co/ Prerequisite: MATH 102 or higher</b></p>	<p><b>Credit Hours: 1.000</b> <b>Schedule Types: Lab</b> <b>Course Attributes: Science Level I, Science Level II, Scientific Understanding</b></p>
CHEM 114	Chemistry II	<p>(Required for biology, biochemistry, and chemistry majors) Continuation of CHEM 113 Chemistry I for Life Sciences that provides applications of chemical bonding and molecular geometry to describe intermolecular attractions and solution formation, and studies of kinetics, chemical equilibrium, acids, bases and thermodynamics.</p> <p><b>Corequisites: CHEM 114L</b> <b>Prerequisite: CHEM 113 (Minimum Grade C-) and CHEM 113L (Minimum Grade C-)</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Independent Study, Lecture Course</b> <b>Attributes: Scientific Understanding</b></p>
CHEM 114L	Chemistry II Lab	<p>(Required for biology, biochemistry, and chemistry majors) Laboratory adjunct course to CHEM-114, Chemistry II for Life Sciences Majors lecture. This course provides hands-on experience with topics addressed in lecture. Completion of lab exercises/experiments will provide useful reinforcement of topics presented in the lecture course component and provide valuable experience with lab techniques. This course is a foundational course in all biology, biochemistry, and chemistry majors.</p> <p><b>Corequisite: CHEM 114</b> <b>Prerequisite: CHEM 113 (Minimum Grade C-) and CHEM 113L (Minimum Grade C-)</b></p>	<p><b>Credit Hours: 1.000</b> <b>Schedule Types: Lab</b> <b>Course Attributes: Scientific Understanding</b></p>
CHEM 201	Organic Chemistry I	<p>The course introduces students to important concepts in organic chemistry. Nomenclature, stereochemistry, reactions and properties of organic compounds such as alkanes, alkenes, alkynes, and alcohols will be covered in depth. Development of reaction mechanisms in organic chemistry will be discussed. This course will prepare students for advanced courses in biochemistry and organic chemistry II</p> <p><b>Corequisite: CHEM 201</b> <b>Prerequisite: CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b></p>

CHEM 201L	Organic Chemistry I Lab	<p>This course is the laboratory component of CHEM 201, which is a required co-requisite. In this course, students will receive instruction in organic chemistry lab techniques such as melting and boiling point determination, recrystallization, distillation, reflux, extraction, chromatography and instrumental analysis of organic compounds. This will be followed by exercises involving representative organic chemical reactions, their workup, and the identification of the resulting products.</p> <p><b>Corequisite: CHEM 201</b>  <b>Prerequisite: CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-)</b></p>	Credit Hours: 1.000 Schedule Types: Lab
CHEM 202	Organic Chemistry II	<p>This course builds on the concepts learned in CHEM 201 and is a required course for chemistry, biochemistry, biology and pre-med majors. Major focal points of the course include the chemistry of alkynes, carbonyl compounds and carboxylic acids, as well as spectroscopy and bioorganic chemistry. This course will be taught from a largely mechanistic perspective with an emphasis on preparative organic synthesis and the role of organic chemistry in biological systems.</p> <p><b>Corequisite: CHEM 202L</b>  <b>Prerequisite: CHEM 201 (Minimum Grade C-) &amp; CHEM 201L (minimum grade D)</b></p>	Credit Hours: 3.000 Schedule Types: Lecture
CHEM 202L	Organic Chemistry II Lab	<p>This course is the laboratory component of CHEM 202, which is a required co-requisite. In this course, students will use the fundamental skills learned in CHEM 201L to synthesize and analyze organic molecules.</p> <p><b>Corequisite: CHEM 202</b>  <b>Prerequisite: CHEM 201 (Minimum Grade C-) and CHEM 201L (Minimum Grade C-)</b></p>	Credit Hours: 1.000 Schedule Types: Lab
CHEM 206	Forensic Chemistry	<p>Students will become acquainted with the various sub-disciplines of forensic science with emphasis on the chemical principles used to collect, process, identify, quantify and qualify crime scene/victim evidence. Through lectures and case studies, the scientific foundations for the examination of physical, chemical, and biological evidence will be explored.</p> <p><b>Prerequisite: BIOL 104 and BIOL 104L AND CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</b></p>	Credit Hours: 3.000 Schedule Types: Lecture
CHEM 206L	Forensic Chemistry Lab	<p>Laboratory sessions will provide hands on experience with modern forensic techniques used to analyze physical evidence such as blood, glass, and fibers. The course will culminate with a mock trial in which students present the results of their analytical investigations to a jury.</p> <p><b>Prerequisite: BIOL 104 and BIOL 104L AND CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</b></p>	Credit Hours: 1.000 Schedule Types: Lab

CHEM 214	Bioorganic Chemistry	<p>This course is a one-semester overview of organic chemistry and biochemistry for PA majors and open to those who meet the prerequisites. After introduction to different functional groups, the course provides a systematic study of the biologically important compounds, including amino acids, proteins, nucleic acids, enzymes, carbohydrates and lipids. Emphasis will be placed upon the structure, properties and functions of these compounds. The course will culminate in an overarching discussion of the intricacies of metabolism of some of these biomolecules.</p> <p><b>Prerequisite:</b> CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CHEM 303	Biochemistry Lab	<p>Laboratory sessions to accompany CHEM 304</p> <p><b>Corequisites:</b> CHEM 304</p>	<p>Credit Hours: 1.000 Schedule Types: Lab</p>
CHEM 304	Biochemistry	<p>Examines structure and function of biological macromolecules -- polysaccharides, proteins and nucleic acids; lipids; enzymes and metabolism; bioenergetics; control mechanisms; hormones; body fluids; nutrition and biochemical pathology.</p> <p><b>Prerequisites:</b> Biology 111 and Chemistry 102</p>	<p>Credit Hours: 3.000 Schedule Types: Independent Study, Lecture</p>
CHEM 305	Physical Chemistry I	<p>Fundamental topics in thermodynamics are covered, emphasizing the first three laws of thermodynamics. Applications of these principles and chemical equilibrium to ideal gases, real gases, solutions and solids are discussed. Chemical kinetics is covered in detail. A brief examination of the field of chemical dynamics is included. Where appropriate, current research in these areas will be discussed.</p> <p><b>Prerequisites:</b> CHEM 202 and CHEM 202L and PHYC 203 and PHYC 203L and MATH 112</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CHEM 305L	Physical Chemistry I Lab	<p>The laboratory will emphasize using chemistry techniques such as IR, UV-Vis, GC and computational programs to examine fundamental physical processes.</p> <p><b>Prerequisites:</b> CHEM 202 and CHEM 202L and PHYC 203 and PHYC 203L and MATH 112</p>	<p>Credit Hours: 1.000 Schedule Types: Lab</p>
CHEM 306	Physical Chemistry II	<p>Quantum mechanics is the fundamental theory underlying the description of atoms. It details how atoms can interact on the microscopic level. Quantum mechanics will be used to understand the observed spectroscopic properties of atoms and molecules. Statistical mechanics, which connects the macroscopic world of thermodynamics and kinetics with quantum mechanics, will also be covered.</p> <p><b>Co</b> or <b>Prerequisite:</b> MATH 331 <b>Prerequisite:</b> CHEM 305</p>	<p>Credit Hours: 4.000 Schedule Types: Lecture/Lab</p>
CHEM 306L	Physical Chemistry II Lab	<p>The laboratory is a continuation of CHEM-305 with an emphasis on spectroscopy.</p> <p><b>Corequisite:</b> MATH 331 <b>Prerequisite:</b> CHEM 305</p>	<p>Credit Hours: 4.000 Schedule Types: Lecture/Lab</p>
CHEM 309	Inorganic Chemistry	<p>This is an advanced survey of theoretical and descriptive inorganic emphasizing such topics as atomic and molecular structure, periodic trends, theory of bonding, symmetry, descriptive chemistry of transition metals and physical methods of examining inorganic compounds.</p> <p><b>Prerequisites:</b> CHEM 202 and CHEM 202L</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CHEM 309L	Inorganic Chemistry Lab	<p>This course is the laboratory component accompanying CHEM-309 lecture and is a required co-requisite. In this course, students will utilize wet-laboratory techniques to synthesize and characterize inorganic molecules.</p> <p><b>Prerequisites:</b> CHEM 202 and CHEM 202L</p>	<p>Credit Hours: 1.000 Schedule Types: Lab</p>

CHEM 323	Instrumental Meth of Analysis	This course provides an overview of the variety of analytical and instrumental methods for quantitative and qualitative chemical analysis. Topics include gravimetric and volumetric analysis; ultraviolet, infrared, and visible spectroscopy; gas and liquid chromatography; and mass spectrometry. <b>Prerequisites: CHEM 202 and CHEM 202L</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
CHEM 323	Instrumental Meth of Analysis Lab	Laboratory sessions hone students analytical- and critical thinking skills. Students are required to work on a group research project and present their findings at a local/regional scientific conference. <b>Prerequisites: CHEM 202 and CHEM 202L</b>	Credit Hours: 1.000 Schedule Types: Lab Course Attributes: Writing Intensive
CHEM 371	Selected Topics in Chemistry	A study of a specialized topic and/or recent developments in one of the fields of chemistry. Sample topics might include theoretical organic chemistry, spectroscopy, photochemistry, stereo-chemistry and computational chemistry. <b>Prerequisites: CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</b>	Credit Hours: 3.000 Schedule Types: Lecture
CHEM 391	Research in Chemistry I	Students interested in pursuing independent research in any field of chemistry or biochemistry under faculty supervision must submit a proposal to the dean of the School of Science and Health for approval at least two weeks before pre-registration. The research will include both literature search and experimental work in any current field of chemistry or biochemistry. At the end of the semester, students will be expected to do an oral presentation to the faculty during reading days and prepare a comprehensive written report as mandated by the American Chemical Society. <b>Prerequisites: CHEM 202 and CHEM 202L</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Independent Study
CHEM 392	Research in Chemistry II	Continuation of CHEM 391 <b>Prerequisites: CHEM 391</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Independent Study
CHEM 3XX	Intro to Pharmaceutical Industry	The goal of this course is to give a broad understanding of Pharmaceutical Industry and the many areas of the business. The course will cover the lifecycle overview of drug development and the organization that support each step of the lifecycle. This course will give an overview of drug development and a career in the pharma industry. Prerequisites: <b>Prerequisites: CHEM 202 (Minimum of C-) and CHEM 202L (Minimum of C-)</b>	Credit Hours: 3.000 Schedule Types: Lecture
CHEM 405	Advanced Organic Chemistry	An in-depth study of the factors that affect organic reactions such as solvent, energy, kinetic and steric factors. These are used to examine a variety of reaction mechanisms such as nucleophilic substitution, elimination, aromatic substitution and rearrangement reactions. <b>Prerequisite: CHEM 202 and CHEM 202L</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
CHEM 410	Polymer Chemistry	Physical and chemical study of natural and synthetic polymers based on the mechanism of polymer formation, including such topics as stereochemistry, cationic, anionic and free radical polymerization reactions and the formation of stereospecific polymers by use of heterogeneous catalysts. <b>Prerequisite: CHEM 405</b>	Credit Hours: 3.000 Schedule Types: Lecture
CHEM 417	Environmental Chemistry	Environmental Chemistry will allow students to develop a general understanding of the role of chemistry and physiochemical concepts in the development, identification and solution of environmental problems. <b>Prerequisite: CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</b>	Credit Hours: 3.000 Schedule Types: Lecture

CHEM 417L	Environmental Chemistry Lab	<p>This course will provide hands-on experiences such as conducting chemical analyses on water, air and soil samples. The skills learned in this course will be employed in learning more about the application of chemical principles in solving environmental problems.</p> <p><b>Prerequisite:</b> CHEM 104 (Minimum Grade C-) and CHEM 104L (Minimum Grade C-) OR CHEM 114 (Minimum Grade C-) and CHEM 114L (Minimum Grade C-)</p>	<p>Credit Hours: 1.000 Schedule Types: Lab</p>
CHEM 504	Biochemistry	<p>Examines structure and function of biological macromolecules -- polysaccharides, proteins and nucleic acids; lipids; enzymes and metabolism; bioenergetics; control mechanisms; hormones; body fluids; nutrition and biochemical pathology.</p> <p><b>Prerequisites:</b> BIOL 111 and CHEM 102</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Lab</p>
<b>GENERAL CHEMISTRY</b>			
CHE 101	General Chemistry I	<p>The goal of this course is to provide a detailed overview of fundamental concepts in biology including molecular and cell biology, microbiology, genetics and evolutionary biology. Lectures will be provided by the course director and faculty team during the 14-week course. In addition to lectures, students will participate in laboratory sessions reinforcing concepts reviewed in lecture. In addition to the assigned text, readings will be supplemented with selections from the primary literature to reinforce lecture concepts and provide insights into research methodology and key findings to support basic concepts. Emphasis will be placed upon relating basic biology to the health sciences.</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Lab</p>
CHE 102	General Chemistry II	<p>The goal of this course is to provide a detailed overview of fundamental concepts in chemistry including the classification of matter, measurement, electron structure, periodic trends, molecular structures, solutions chemistry, stoichiometry, and thermochemistry. Lectures will be provided by the course director and supplemented with guest lectures for key areas during the 14-week course. In addition to lectures, students will participate in laboratory sessions reinforcing analytical research techniques related to concepts reviewed in lecture. In addition to the assigned text, readings will be supplemented with selections from the primary literature to reinforce lecture concepts and provide insights into research methodology and key findings to support basic concepts. Emphasis will be placed upon relating basic chemistry to the health sciences. Undergraduate Second Program, Certificate-Undergraduate, Undergraduate, Undergraduate Non-Degree</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
CHE 103	General Chemistry I Lab	<p>This laboratory course, in conjunction with the General Chemistry I lecture, focuses on topics regarding the fundamental concepts of chemistry including: elements, compounds, mixtures, physical and chemical properties of matter, stoichiometry, limiting reagents, titration, solubility and precipitation, gas laws, acids and bases, and thermodynamics. These laboratory sessions reinforce analytical research techniques related to concepts reviewed in lecture. Emphasis will be placed upon relating basic chemistry to the health sciences. Undergraduate Second Program, Certificate-Undergraduate, Undergraduate, Undergraduate Non-Degree</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p>Credit Hours: 1.000 Schedule Types: Lab</p>



CHE 104	General Chemistry II Lab	<p>This laboratory course, in conjunction with the General Chemistry II lecture, focuses on topics regarding the fundamental concepts of chemistry including: thermochemistry, kinetics, acid-base equilibrium and titration, and electrochemistry. These laboratory sessions reinforcing analytical research techniques related to concepts reviewed in lecture. Emphasis will be placed upon relating basic chemistry to the health sciences. Undergraduate Second Program, Certificate-Undergraduate, Undergraduate, Undergraduate Non-Degree</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 1.000</b> <b>Schedule Types: Lab</b></p>
CHE 201	Organic Chemistry I	<p>This course is the beginning of an introduction into the study of organic molecules. Starting with the concept of organic functional groups the student learns why and how to classify organic compounds. Then from a handful of basic concepts like molecular structure, chemical bonding molecular and electronic geometry, and acid-base chemistry the student will learn about the structure and reactivity of alkanes alkenes, alkynes, and organo-halides. Lectures will be provided by the course coordinator during the 14-week course. In addition to lectures, students will participate in laboratory sessions reinforcing research techniques related to concepts reviewed in lecture. In addition to the assigned text, readings will be supplemented with selections from primary literature to reinforce lecture concepts and provide insights into research methodology and key findings to support basic concepts. Emphasis will be placed upon relating basic chemistry to the health sciences. Undergraduate Second Program, Certificate-Undergraduate, Undergraduate, Undergraduate Non-Degree</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lab, Lecture, Lecture/Lab</b></p>
CHE 202	Organic Chemistry II	<p>This course is the second in a series of introductory courses in organic molecules. The course will begin with description of analytical techniques and their uses in identification and characterization of organic molecules. These techniques will include IR spectroscopy, Mass Spectrometry, NMR spectroscopy and UV spectroscopy. The student will then learn about the structure and reactivity of aromatic compounds, alcohols, phenols, ethers, epoxides, aldehydes, ketones, carboxylic acids and their derivatives. Numerous "name-reactions" will be introduced. The students will also study reactions involving biomolecules. Lectures will be provided by the course director during the 14-week course. In addition to lectures, students will participate in laboratory sessions reinforcing research techniques related to concepts reviewed in lecture. In addition to the assigned text, readings may be supplemented with selections from the primary literature to reinforce lecture concepts and provide insights into research methodology and key findings to support basic concepts. Emphasis will be placed upon relating basic chemistry to the health sciences.</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lab, Lecture, Lecture/Lab, Seminar</b></p>
CHE 203	Organic Chemistry I Lab	<p>This course, in conjunction with Organic Chemistry I lecture, is the beginning of an introduction into the study of organic molecules. Starting with the concept of organic functional groups the student learns why and how to classify organic compounds. Then from a handful of basic concepts like molecular structure, chemical bonding, molecular and electronic geometry, and acid-base chemistry the student will learn about the structure and reactivity of alkanes, alkenes, alkynes, and organohalides. Students will participate in laboratory sessions reinforcing research techniques related to concepts reviewed in lecture. Emphasis will be placed upon relating basic chemistry to the health sciences.</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 1.000</b> <b>Schedule Types: Lab</b></p>

CHE 204	Organic Chemistry II Lab	<p>This course, in conjunction with Organic Chemistry II lecture, is the second in a series of introductory courses in organic molecules. The course will begin with description of analytical techniques and their uses in identification and characterization of organic molecules. These techniques will include IR spectroscopy, Mass Spectrometry, NMR spectroscopy and UV spectroscopy. The student will then learn about the structure and reactivity of aromatic compounds, alcohols, phenols, ethers, epoxides, aldehydes, ketones, carboxylic acids and their derivatives. Numerous "name-reactions" will be introduced. The students will also study reactions involving biomolecules. Students will participate in laboratory sessions reinforcing research techniques related to concepts reviewed in lecture. In addition to the assigned text, readings may be supplemented with selections from the primary literature to reinforce lecture concepts and provide insights into research methodology and key findings to support basic concepts. Emphasis will be placed upon relating basic chemistry to the health sciences.</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 1.000</b>  <b>Schedule Types: Lab</b></p>
CHE 301	Biochemistry	<p>This course provides an overview of the principles of biochemistry related to molecular interactions that govern biological processes in living organisms. Classroom discussions will focus on structure/function relationships of the major classes of biomolecules with an emphasis on proteins, including non-enzymatic and enzymatic protein function, kinetics, and regulation. The major metabolic pathways and the regulation of these pathways will also be examined as well as the thermodynamic principles governing molecular stability, interaction, assembly, and energy flow within the cell. The genetic foundations of biochemistry will be explored to demonstrate information transfer and storage, as well as to elucidate molecular mechanisms underlying human disease. Certificate, Graduate, Certificate-Undergraduate, Undergraduate, Undergraduate Non-Degree</p> <p><b>Registration for non-postbaccalaureate students is by arrangement. Please contact Dr. Byrne at 215-503-6905.</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Clinical, Lab, Lecture</b></p>
<b>COMMUNICATION</b>			
COMM 101	Introduction to Communication & Media Studies	<p>This course introduces students to the history, theory, practices, institutions, and impact of modern communications media. We will examine both print and non-print media and address the media's impact on society, how audiences respond to media, how people produce and consume media, and media industries and careers.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Independent Study, Lecture</b>  <b>Course Attributes: Honors Assignment</b></p>
COMM 102	Introduction to Public Speaking	<p>This course is designed to expand your public speaking "tool box". By preparing and performing a range of speaking assignments, engaging in in-class activities, and reading the assigned textbook, each student should leave this course with an increased comfort in expressing ideas before various audiences. These skills will not only be useful in larger, formal public speaking settings, but also for small group and interpersonal communications, and for constructing, analyzing and criticizing claims, arguments and rhetorical techniques more generally.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
COMM 107	Radio Production	<p>This course provides a brief introduction to the principles, tools, and techniques of digital audio recording, editing and production. Through discussion, demonstrations, and hand-on experiences in the studio and the field, students will gain an understanding of the nature of sound, basic microphone usage, digital audio recording equipment and techniques, digital sound editing using Audacity software, writing, narration, and production techniques used in music, news and audio documentaries.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>

COM 3XX	Audio Production: Podcasting	This course provides a brief introduction to the principles, tools, and techniques of digital audio recording, editing and production. Through discussion, demonstrations, and hand-on experiences in the studio and the field, students will gain an understanding of the nature of sound, basic microphone usage, digital audio recording equipment and techniques, digital sound editing, writing, narration, and production techniques used in news, podcasting, and audio documentaries.	Credit Hours: 3.000 Schedule Types: Lecture
COMM 200	Visual Media	The description to COMM 200 should be modified in the following way: Students will analyze various visual genres (e.g., photography, graphics, videos, films, television shows) to learn how the visual elements of texts affect understanding. Students will produce a multimedia project and a final researched project. [Writing Intensive] <b>Prerequisites: WRIT 101 (Minimum Grade D) or WRIT 101G (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
COMM 201	Intercultural Communication	An experiential approach to developing intercultural awareness. Presents three aspects of intercultural communication: (1) knowledge of culture and cultural differences; (2) attitudes and feelings about those who are culturally different; and (3) skills or new behaviors to improve effective communication when living and/or working with people of other cultures. Uses videos, classroom guests and field trips to ethnic museums, restaurants and festivals, as well as in-class exercises, readings and discussions.	Credit Hours: 3.000 Schedule Types: Lecture
COMM 202	Responsible Newsgathering and Research	Students in this course analyze and design survey instruments, polls, samples, and other quantitative and qualitative research methods. Students learn about the ethics of research, especially as regards human subjects.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
COMM 2XX	Digital Communication and Culture	Students will consider communication technologies and how and what people communicate using those technologies. We'll examine the role of communication technologies in society and culture, with an emphasis on how they function in the information age. This will include both the social and cultural influences that have shaped the development of various emerging media, information, and communication technologies.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
COMM 206	Public Relations/Strategic Communication	The tools and tactics of strategic communication are changing dramatically as a result of the constantly transforming digital media environment. Because of this, organizations in both the for-profit and non-profit world find themselves constantly facing the challenge of determining what communication strategies and products will set them apart? This course incorporates lecture, class speakers and a significant group project for an outside organization to provide students with an overview of what's involved in the strategic communications industries, how the campaign development process works, and some of the challenges facing the field.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
COM 2XX	Introduction to Video Production	This course is designed to help students think about and experiment with the components of documentary video production. Throughout the course, students will develop the skills to produce, film, and edit video for promotional, news, or documentary purposes.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
COMM 306	Social Media Strategies	This course investigates how social media platforms and personal digital technologies have radically shifted the way that businesses, politicians, and other meaning makers circulate their messages. Students will work on a social media messaging campaign, carefully tailoring the content and form of the message to the appropriate audience and social media platforms.	Credit Hours: 3.000 Schedule Types: Lecture

COMM 307	Media Writing	Students in this course learn the fundamentals of writing for multiple public audiences in multiple communication formats and genres. Students will also learn to judge the importance of information as well as set priorities and tailor writing to meet the needs of different audiences.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
COMM 312	Fashion Communication	Fashion is one of the fundamental ways in which humans communicate about themselves and their desired self-image. Students will examine the intersection between fashion, media, personal identity, and image management in today's society. They will learn how the fashion industry creates powerful and persuasive messages through channels, and how those images are reinforced through media. Guest speakers, industry-based learning projects, and field trips will aid students in transforming theory into fashion communication practice.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
COMM 314	Sports Communication	In today's media based world there is little that divides the fields of Communication and Sports. Students will explore their intersection through examination of journalism, social media, media relations, sports information production and advertising. By critically analyzing actual media coverage of sporting events, addressing social and ethical issues involved in college and professional sports, meeting professionals in the field and developing an understanding of sports promotion and advertising processes, students gain an in-depth understanding of not only the professional issues involved in sports communication, but their larger importance in our society.	Credit Hours: 3.000 Schedule Types: Lecture
COMM 316	Multimedia Journalism	Students will learn reporting and storytelling techniques across several media including text, video, audio, and social platforms. They will also learn how to utilize digital sources to gather and verify information. <b>Prerequisite: COMM 101; WRIT 201/2, COMM 1XX Intro to Video Production; COMM 200 Visual Communications; and COMM 3XX Audio Production</b>	Credit Hours: 3.000 Schedule Types: Lecture
COMM 318	Crisis Communication	Crises are a fact of life in organizations, whether it is in business, fashion, politics, sports or others, and being able to navigate through them is a crucial skill for all communication professionals. Building on much of what students have learned in their previous communication classes, this course will be an introduction to crisis communication theory and application. The class time and readings will cover crisis management approaches, classic cases and the influence of culture on crisis communication. Additionally, throughout the semester students will engage in group simulations, field trips and individual projects to master the tools of the trade. <b>Prerequisite: COMM 101 and COMM 206</b>	Credit Hours: 3.000
COMM 322	Writing for Non-Profit	While academic writing courses are designed to prepare you for the writing required as a university student, this course prepares students for writing and communication in a professional setting. In particular, this course focuses on the specific demands of communicating and writing for non-profit organizations. We study the audiences you may encounter in the field and the diverse writing tasks that you may be asked to complete. The numerous writing workshops and peer group tasks make this a very collaborative course and will prepare students for a career at a non-profit organization. Therefore, the course will run, as much as is possible, as a non-profit writing consultancy.	Credit Hours: 3.000 Schedule Types: Lecture
COMM 402	Professional Ethics in Communication	This course, designed for the senior in Professional Communication, will focus on important ethical issues facing the profession and its practitioners. The course will not advocate for particular ethical standards, but it will strive to motivate students to critically and analytically think about standards are germane to their personal and professional lives, to consider reasons why current standards are in place, and to evaluate whether current ethical standards are sufficient, workable, and understood by communication professionals.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive

COM 404	Professional Comm Capstone	This course, designed for the senior in Professional Communication, will focus on integrating your college course work through developing a capstone project portfolio. By working on a capstone project that draws on prior course work and that culminates in an oral presentation and a written project, students will use critical thinking skills in synthesizing previous course work to extend and develop original ideas.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>COMMUNITY &amp; TRAUMA COUNSELING</b>			
CTC 200	Relating Trauma to Typical Childhood Development	This course integrates an understanding of typical processes and stages of childhood growth and development with an appreciation for the impact interactions by caregivers can have on the development of healthy/positive physical, intellectual, emotional, social and relational outcomes for infants, toddlers and children. Exploring what can influence positive outcomes opens minds to new awareness that in turn leads to discussions around the potential for negative outcomes, such as those connected with adverse childhood experiences and other forms of trauma. Students will identify and understand some causes of trauma and the impact of trauma on the growth, development and functioning of the brain. Discussion provides an overview of practices that influence healthy growth and development to inspire and inform such practices that can lead to the prevention of adverse experiences in childhood. An additional focus is the preparation for future exploration around the causes and impact of childhood adversity, and appropriate interventions for children and families who have experienced adversity.	Credit Hours: 3.000 Schedule Types: Lecture
CTC 202	The Impact of Trauma in Childhood: Enhancing Trauma Awareness	This course provides vital information on the causes of trauma, the complexity of trauma's presentation in children, and the impact of trauma on development. Common trauma-related responses in children will be explored, and suggestions for trauma-sensitive behaviors on the part of professionals and others who serve as caregivers of children will be provided. This course aims to develop a greater awareness of the potential impact of trauma on a myriad of related developmental processes.	Credit Hours: 3.000 Schedule Types: Lecture
CTC 204	Applying Trauma Principles in Childhood	This course focuses on trauma knowledge and skill acquisition, coupled with reflective practice to enhance students' progression toward trauma competence. Special attention is paid to the application of trauma principles within real-life situations to promote transfer of training. <b>Prerequisites: CTC 200 &amp; CTC 202</b>	Credit Hours: 3.000 Schedule Types: Lecture
CTC 230	Enhancing Capacity for Applying Trauma Principles in Childhood	Enhancing Practical Application of Childhood Trauma Principles This course builds upon previous learning in childhood trauma, and expands upon the practical application of childhood trauma knowledge and skills through a practicum approach. Students engage in observations, planning, implementation and evaluation, and participate in Reflective Processing to enhance their development and competence.	Credit hours: 3.000 Schedule Types: Lecture
<b>COMPUTATION</b>			
COMP 101	Introduction to Coding	This course is designed to introduce students to the process of coding. It assumes no background in programming or computer science and is intended for students of all majors who want to learn more about computation. Students will learn the basic syntax of the python programming language and apply that syntax to basic coding problems involving text and data manipulation. Students will learn to solve their own coding problems by consulting online resources and will take the first steps towards learning how to define a computational problem.	Credit Hours: 1.000 Schedule Types: Lab

COMP 102	Introduction to Scientific Computing	<p>This course is designed to introduce students to scientific computing in python. It assumes some prior experience with the python language and is intended for students of all majors who want to learn more about scientific computing. Students will learn to use common python libraries for working with data. Students will solve instructor-provided scientific problems by first defining those problems computationally and then applying tools from the aforementioned libraries to solve the problems and visualize the results.</p> <p><b>Prerequisite: COMP 101 (Minimum Grade B-) or ENGR 104, OR demonstrated python proficiency as determined by instructor</b></p>	<p><b>Credit Hours: 0.500</b>  <b>Schedule Types: Lecture, On-Line</b></p>
COMP 103	Data Analysis and Visualization	<p>This course is designed to facilitate continued development of student scientific computing skills in the field of data visualization and analysis. It assumes some prior experience with the python language and its scientific computing libraries. The course will provide an introduction to parametric statistical techniques including the calculation of variance and variance ratios, the implementation and interpretation of correlation and regression analysis, the student t-test, and Chi-square analysis. Students analyze instructor-provided data sets by summarizing data using computational techniques and applying visualization tools in order to communicate the results.</p> <p><b>Prerequisite: COMP 102 (Minimum Grade B-)</b></p>	<p><b>Credit Hours: 0.500</b>  <b>Schedule Types: Lecture, On-Line</b></p>
<b>COMPUTED TOMOGRAPHY</b>			
RSC 400	CT Physics & Instrumentation	<p>In-depth study of the physical principles and instrumentation in computed tomography. Covers the production of x-rays and their interactions with matter. Provides information on data acquisition and image reconstruction, processing and quality. Addresses CT scanner components and operation, scanning factors and their applications.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
RSC 401	Cross Sectional Anatomy I	<p>The study of human anatomy as seen in axial, sagittal and coronal planes. Presents correlations to cadaver slides as well as CT and MR images. Anatomical regions studied include the central nervous system, neck and thorax.</p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Lecture</b></p>
RSC 402	Cross Sec Anatomy II	<p>Continuation of Radiologic Sciences C 401, Cross-Sectional Anatomy I. Anatomical regions studied include the musculoskeletal system, abdomen and pelvis.</p> <p><b>Prerequisite: RSC 401</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Lecture</b></p>
RSC 412	Clinical Computed Tomography I	<p>Students participate in the diagnostic process of performing CT imaging examinations at clinical sites. Students image anatomic structures and pathology and record the information needed to provide optimal examinations. Provides intensive, hands-on practice under the supervision of the clinical staff. Evaluation is based on clinical competency in all aspects of CT imaging procedures and patient care.</p>	<p><b>Credit Hours: 6.000</b>  <b>Schedule Types: Clinical</b></p>
RSC 413	Clinical CT II	<p>Continuation of Radiologic Sciences C 412, Clinical CT I. Students participate in the diagnostic process of performing CT imaging examinations at clinical sites. Students image anatomic structures and pathology and record the information needed to provide optimal examinations. Provides intensive, hands-on practice under the supervision of the clinical staff. Evaluation is based on clinical competency in all aspects of CT imaging procedures and patient care.</p> <p><b>Prerequisite: RSC 412</b></p>	<p><b>Credit Hours: 6.000</b>  <b>Schedule Types: Clinical</b></p>
RSC 414	Clinical CT III	<p>Continuation of Radiologic Sciences C 413, Clinical CT II. Students participate in the diagnostic process of performing CT imaging examinations at clinical sites. Students image anatomic structures and pathology and record the information needed to provide optimal examinations. Provides intensive, hands-on practice under the supervision of the clinical staff. Evaluation is based on clinical competency in all aspects of CT imaging procedures and patient care.</p> <p><b>Prerequisite: RSC 413</b></p>	<p><b>Credit Hours: 8.000</b>  <b>Schedule Types: Clinical</b></p>

RSC 431	CT Procedures I	This course provides an introduction to the basic CT imaging protocols for the head & neck, abdomen & pelvis, and musculoskeletal regions of the human body. Course content will include discussion on positioning and scanning protocols, patient preparation, radiographic technique, slice thickness, reconstruction methods, matrix size, field of view, and artifacts. Normal and pathological anatomy will be included.	Credit Hours: 3.000 Schedule Types: Lecture
RSC 432	CT Procedures II	This course provides an introduction to the basic CT imaging protocols for the skeletal/chest regions of the human body and CT interventional/special procedures. Course content will include discussion of the guidelines & contraindication of IV contrast, positioning, & scanning protocols, patient preparation, radiographic technique, slice thickness, reconstruction methods, matrix size, field of view, and artifacts. Normal and pathological anatomy will be included. Also includes illustration of the various special procedures which are offered in the daily workplace of CT. <b>Prerequisite: RSC 431</b>	Credit Hours: 3.000 Schedule Types: Lecture
RSC 433	CT Procedures Simulation Lab I	The CT simulator allows for the instruction of clinical computed tomography procedures in the classroom. Students will acquire clinical experience and confidence with life-like CT operator's console. Students will gain knowledge, scanner operations, imaging procedures, imaging parameters & trade-offs, pressure injector operation, and anatomical positions.	Credit Hours: 1.000 Schedule Types: Lab
RSC 434	CT Procedures Simulation Lab II	Continuation of Radiologic Sciences RSC 433, CT Procedures Simulation Lab I. The CT simulator allows for the instruction of clinical computed tomography procedures in the classroom. Students will acquire clinical experience and confidence with life-like CT operator's console. Students will gain knowledge, scanner operations, imaging procedures, imaging parameters & trade-offs, pressure injector operation, and anatomical positions. <b>Prerequisite: RSC 433</b>	Credit Hours: 1.000 Schedule Types: Lab
RSC 451	Imaging Informatics	Digital electronics, computers, and information technology are fundamental to medical imaging practice in the 21st century. This course presents an introductory overview of the science and technology underlying the information systems that are pervasive in modern diagnostic imaging. Topics include digital image acquisition, reconstruction, and post-processing, advanced visualization, decision support, computer networking and PACS, information systems, and industry standards such as DICOM, HL7, and IHE.	Credit Hours: 1.000 Schedule Types: Lecture
RSC 473	Computed Tomography Seminar	The course provides a review of the fundamental principles of CT system operation, image processing image quality, image artifacts, patient care, and imaging procedures.	Credit Hours: 2.000 Schedule Types: Lecture
RSC 498	Special Topics in CT	A research project/special topics course taught in an independent study/seminar manner. Students will produce a written literature review paper and present research projects on CT topics agreed to by the instructor	Credit Hours: 1.000 Schedule Types: Lecture
RSC 499	CT Independent Study	A research project taught in an independent study manner. Students will produce a written literature review paper and present research projects on CT topics agreed to by the instructor.	Credit Hours: 1.000 to 4.000 Schedule Types: Independent Study
<b>CONSTRUCTION MANAGEMENT</b>			
CMGT 101	Construction Graphics	Students will be introduced to the graphical language of construction and design through a combination of interactive lecture\demonstration classes, graphic exercises, and hands on exercises. The hands on exercises will include the reading and interpretation of graphics. Graphic and field exercises will present a variety of opportunities for student understanding and expression of both visible field conditions and conceptual details as well as immersing the students in the use of graphics to accurately describe existing built conditions. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details. <b>Restrictions: Must be enrolled in one of the following Majors: Construction Management</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab Course Attributes: Honors Assignment

CMGT 102	Intro the Construction Industry	This course introduces students to the basic process and pathways of a construction project. The course will explore the various types of construction along with identifying terms and specific industry vocabulary, participants and their roles. The course will include discussions on the methods of contracting used by Construction Managers and there will be group classroom activities simulating real-life construction management challenges. Students will be introduced to topics including planning, programming and documentation from pre-construction to project close-out in a lecture/discussion format. The principles will be reinforced through individual and group classroom activities and exercises.	Credit Hours: 3.000 Schedule Types: Lecture
CMGT 200	Construction Project Planning & Scheduling	This course teaches the study and application of the tools and concepts used in planning and controlling construction projects. Students will employ the Critical Path Method (CPM) of project scheduling, resource leveling, and time-cost analysis using manual and computer-based methods to develop and maintain working project schedule models. The course will broaden the student's understanding and use of construction scheduling methods pertinent to the management of a construction project. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details. <b>Prerequisites: CMGT 104 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab
CMGT 202	Construction Cost Estimating & Budgeting	This course will broaden and deepen the student's understanding of construction cost estimating. Topics include general principles of measuring work and preparing quantity takeoffs. Step-by-step methods of estimating to produce an accurate construction cost estimate using the latest in electronic takeoff technology are covered. The course culminates with the students preparing a complete cost estimate for a specific project. <b>Prerequisites: CMGT 104 Minimum Grade of D</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
CMGT 204	Behavior of Materials	external forces systems acting on structural elements and strength of materials-the internal forces and deformations that result from external forces. <b>Prerequisites: MATH 103 (Minimum Grade D) or MATH 111( Minimum Grade D) and PHYC 101 (Minimum Grade of D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
CMGT 206	Building Systems	Through analysis of relevant case studies, this course examines building mechanical and electric systems from the construction manager's point of view. The class will review how the basic design calculations are performed to determine how building systems are selected and designed. Student will review design documents including drawings and specifications on how the subcontractor bid packages are determined and how the subcontracts are purchased. Assessment of the shop drawing process including the review of the mechanical systems shop drawing coordination process, construction of systems, turn-on and energization, start-up, testing, systems balancing, commissioning of systems, final turn-over, training, and demonstration to the Owner and close- out will be included. <b>Prerequisites: CMGT 104 (Minimum Grade D)</b>	Credit hours: 3.000 Schedule Types: Lecture/Lab
CMGT 208	Materials & Methods of Construction	This course is intended to broaden and deepen the student's understanding of building systems, material science, important to students of construction management, architecture and engineering. Emphasis is placed on exploring the impact of design decisions with construction scenarios on the final product. Topics include site work, foundation, and structural framing systems of concrete, reinforced concrete, site cast and pre-cast concrete; brick and concrete masonry, reinforced masonry, roofing, cladding systems and interior and exterior finishes. <b>Restrictions: Must be enrolled in one of the following Campuses:East Falls</b> <b>Prerequisites: CMGT 104 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab



CMGT 302	Construction Contract Administration	<p>This course explains the various facets of construction contract administration from both the contractor's and construction manager's point of view. The student will be introduced to the construction contract documents typically used for effective project management. Topics will include contract components, types of construction contracts, subcontracts and supply contracts, design/build contracts, bidding and award of contracts, negotiation, claims and disputes, changes to the work, time and cost, correction of the work and contract completion.</p> <p><b>Prerequisites: CMGT 200 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CMGT 304	Construction Safety & Risk Management	<p>This course familiarizes students with best practices for risk identification, assessment, and mitigation for construction businesses and projects. Students will examine case examples of construction industry businesses and construction project site conditions, identify and assess specific risks, and formulate management plans to mitigate and manage the risks. Particular emphasis is placed on Occupational Safety and Health Administration (OSHA) compliance and worksite safety management. The course will broaden the student's understanding of risk and safety issues pertinent to the management of construction projects. The course will look at qualitative and quantitative risk and safety management techniques, the impact of human relations in risk management, financial options, and safety and environmental management systems.</p> <p><b>Prerequisites: CMGT 200 (Minimum Grade D) and CMGT 202 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab</p>
CMGT 306	Construction Site Operations	<p>This course familiarizes students with methods, procedures, and practices required for the effective management of field operations preparing students to assess construction project sites and prepare comprehensive site management plans. The course explores aspects of site management such as layout, logistics, sustainable practices, administration, and false work in a hands-on collaborative environment.</p> <p><b>Prerequisites: CMGT 200 (Minimum Grade D) and CMGT 202 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CMGT 310	Construction Surveying	<p>This course introduces the theory and practice of surveying through lectures and labs. Students are introduced to modern surveying instruments like Total Station and are expected to use them during labs to perform fieldwork. Fieldwork addresses the topics discussed in class to give students hands-on experience with surveying.</p> <p><b>Prerequisites: CMGT 202 (Minimum Grade of D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab</p>
CMGT 401	Codes and Specifications	<p>This course offers an introduction to building code requirements, material specifications and performance standards, and their application to the building design and construction process. Students develop an appreciation for and understanding of how building codes seek to ensure building performance and occupant safety and how related standards and specifications support these goals.</p> <p><b>Prerequisites: By permission of Program Director</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CMGT 402	Special Topics in Construction	<p>This course addresses pertinent issues relative to construction. Special issues related to construction will be investigated by individual or groups of students based on a discussion with the instructor. The course is designed to broaden the Construction Management topics to include enhanced research opportunities.</p> <p><b>Prerequisites: By permission of Program Director</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>

CMGT 403	Introduction to BIM	<p>This course introduces students with the basic concepts of Building Information Modeling (BIM) with practical applications of Autodesk Revit. The sequence will include starting a project, adding basic building elements, modifying elements as needed, and creating a 3D Revit model. Students will be able to get used to the Revit interface and explore how information and building components are integrated in BIM. The course will also introduce utilizing Revit for purposes in addition to modeling, such as estimating. Students will develop the Revit model of an actual building to strengthen their BIM knowledge. The required software should be installed in students' personal laptops. See CABE Laptop Requirements for details.</p> <p><b>Prerequisites:</b> By permission of Program Director</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture/Lab, On-Line</p>
CMGT 410	Heavy Construction Principles & Practice	<p>This course is intended to provide students with an introduction to the principles and practices employed in heavy/civil infrastructure and marine construction. The course content is presented from a practical perspective focusing on the management of heavy/civil construction projects. The course is designed for construction management majors as well as those majoring in related fields and is intended to provide a broad understanding of heavy construction techniques and contracting.</p> <p><b>Prerequisites:</b> By permission of Program Director</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
CMGT 450	Construction Project Management Seminar	<p>It is a seminar intended to prepare students for professional practice through a survey of the current and future state of the industry. This course is intended to provide students with an overview of the world of construction through the portal of Engineering News-Record (ENR). Current and future industry trends and challenges will be examined throughout the course. Topics include emerging technologies, business trends, project case studies, construction economics, legal issues, legislative and political activities affecting construction, building information modeling (BIM), sustainable construction, and environmental concerns.</p> <p><b>Prerequisites:</b> CMGT 302 (Minimum Grade D) and CMGT 300 (Minimum Grade D)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, On-Line Course Attributes: Honors Assignment, Writing Intensive</p>
<b>CONTEMPORARY GLOBAL ISSUES</b>			
CGIS 300	Contemporary Global Issues	<p>Contemporary Global Issues is a writing-intensive course that examines current global social, political and economic trends from multiple competing perspectives, and evaluates their impacts on world societies. Students will complete individual and collaborative projects that explore the intercultural and ethical dimensions of today's most pressing international issues. As a Touchstone course in the Hallmarks Core curriculum, the course includes an upper-level review and assessment of each student's Hallmarks Folio, and addresses many of the eight Hallmarks competencies. CGIS 300: Contemporary Global Issues was DBTG 300: Debating Global Issues prior to Fall 2019.</p> <p><b>Prerequisites:</b> WRIT 201/202 and GCIT or GDIV</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Contemporary Global Issues, Honors Assignment</p>
<b>CYTOTECHNOLOGY</b>			
CT 301	Principles of Cell Analysis	<p>Cell identification methods and morphologic criteria used in the evaluation of cytology specimens. Emphasis on manual and automated microscopy for detection and interpretation of basic cell types and changes found in conventional and liquid-based cytology specimens. Lecture and laboratory.</p>	<p>Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
CT 302	Cytoprep Techniques		<p>Credit Hours: 1.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
CT 303	Histo & Elec Micros Tech		<p>Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
CT 304	General Histology		<p>Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
CT 307	Cellular & Molecular Lab Techn		<p>Credit Hours: 4.000</p>

CT 310	Cyto-preparatory Techniques and Surgical Pathology	Technical preparation of tissue specimens for microscopic examination, including gross dissection of tissues, paraffin processing, sectioning and routine and special staining. Microscopic analysis of the tissue specimens and preparation of a histopathologic report.	Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab
CT 311	Cytopathology I	Study of the anatomy, physiology, cytology and pathophysiology of the female genital tract and corresponding cellular manifestations which provide diagnostic information. Lecture. <b>Prerequisite:CT 301</b>	Credit Hours: 5.000 Schedule Types: Lecture
CT 312	Cytopathology I Laboratory	Integration of didactic information pertaining to the female genital tract, with application of diagnostic criteria to develop practical analytical expertise. Students interpret laboratory data, explain the significance of the data to a patient's condition and offer diagnoses and/or recommendations for further testing. Laboratory sessions include independent microscopy following by the evaluation of the students' diagnosis/readouts via one-on-one and multi-head sessions. <b>Prerequisite: CT 301</b>	Credit Hours: 3.000 Schedule Types: Lab
CT 315	Cytopathology II	study of the anatomy, physiology, cytology and pathophysiology of the respiratory tract (including lung FNA's), fine needle aspiration cytology of mediastinum, breast, liver, pancreas and salivary glands, kidney and adrenals, with application of cytohistologic and molecular diagnostic criteria to develop practical analytical expertise. Students interpret laboratory data, explain the significance of the data to a patient's condition and offer diagnoses and/or recommendations for further testing. Lecture & Laboratory. <b>Prerequisite: Cytotechnology 311/511, 312/512</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
CT 317	Cytopathology III	study of the anatomy, physiology, cytology and pathophysiology of the gastrointestinal tract (brushes), urinary tract, effusions including CSF, fine needle aspiration cytology of thyroid, lymph nodes, bone and soft tissue, with application of cytohistologic and molecular diagnostic criteria to develop practical analytical expertise. Students interpret laboratory data, explain the significance of the data to a patient's condition and offer diagnoses and/or recommendations for further testing. Lecture and Laboratory <b>Prerequisite: CT 315</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
CT 319	Nongyn Cyto/Histocor III	<b>Prerequisites: CT 315 and CT 317</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
CT 325	Cellular Molecular & Immuno Diagno	Review, microscopic examination and comprehensive analysis of selected cases in gynecologic, nongynecologic and fine needle aspiration cytology. Special emphasis on differential diagnosis, clinical correlations, decision-making algorithms and diagnostic pitfalls. Differential diagnostic panels based on molecular and immunologic ancillary technologies are discussed with stress on the laboratory diagnostic triaging and tumor markers. Course is provided based on interactive learning modules.	Credit hours: 3.000 Schedule Types: Lab
CT 412, 3,14,15	Cyto-technology Practicum I	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisite: Completion of pre-practicum cytotechnology and core curriculum coursework.</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
CT 416	Comp-rehensive Exam	Background readings, comprehensive review and self-administered quizzes/exams in the discipline-specific body of knowledge and scope of practice necessary to prepare for national certification examination(s). Web-based course. <b>Prerequisite: Completion of at least two practicum courses.</b>	Credit Hours: 0.000 Schedule Types: Exam, On-Line

CT 421	Clinical Practicum I	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisites: Completion of pre-practicum Cytotechnology and Core Curriculum coursework</b>	Credit Hours: 8.000 Schedule Types: Clinical
CT 422	Clinical Practicum II	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisites: Completion of pre-practicum Cytotechnology and Core Curriculum coursework</b>	Credit Hours: 8.000 Schedule Types: Clinical
CT 425	Cytotech Practicum IV	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisites: Completion of pre-practicum Cytotechnology and Core Curriculum coursework</b>	Credit Hours: 4.000 Schedule Types: Clinical
CT 431	Clinical Practicum III	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisites: Completion of pre-practicum Cytotechnology and Core Curriculum coursework</b>	Credit hHours: 8.000 Schedule Types: Clinical
CT 435	Clinical Practicum IV	Undergraduate clinical internships in a variety of cytopathology laboratories. Students participate in all phases of diagnostic service work and laboratory functions (preanalytical, analytical, postanalytical) that may include continuing education activities, adjunct diagnostic technologies and seminar attendance. <b>Prerequisites: Completion of pre-practicum Cytotechnology and Core Curriculum coursework</b>	Credit Hours: 2.000 Schedule Types: Clinical
CT 440	Pathology Lecture		Credit Hours: 2.000 Schedule Types: Lecture
CT 441	Pathology Lab		Credit Hours: 1.000 Schedule Types: Lab
CT 455	Senior Cytology Seminar		Credit Hours: 2.000 Schedule Types: Seminar
CT 460	Effusions Lecture		Credit hours: 1.000 Schedule Types: Lecture
CT 461	Effusions Lab		Credit Hours: 1.000 Schedule Types: Lab
CT 492	Senior Cytology Seminar		Credit Hours: 2.000 Schedule Types: Seminar
CT 493	Advanced Diagnostic Cytology		Credit Hours: 2.000 Schedule Types: Lecture
CT 495	Applied Cytopathology		Credit Hours: 2.000 Schedule Types: Lecture
		<b>DEC CORE</b>	

DECF 102	Finding and Shaping Opportunity	This course introduces principles of design thinking as a key element of innovation. Students will learn how parts of traditional design process can be used to reveal opportunity, and how to shape that opportunity by critically and creatively evaluating its components as part of a larger system. As a culminating assignment, students will work collaboratively with peers from other disciplines to create real-world value in an economic, social, and environmental context by innovating a new model for business that is both desirable and viable. This course is designated as creativity intensive.	Credit Hours: 3.000 Schedule Types: Lecture
DECF 209	Systems Thinking and Sustainability	The field of sustainability will be surveyed using the lens of Systems Thinking. Students will be introduced to the rate and scale of environmental impacts resulting from climate change, our industrial food system, and waste accumulation in linear models of production, with case studies considered from multiple perspectives and disciplines. Students will develop systems models to identify key feedbacks and interactions among factors. A final team-based inquiry-driven project will involve analysis of a focal area of choice, to characterize sustainability challenges and opportunities for focused interventions, with consideration of social equity dimensions and model limitations.	Credit Hours: 3.0000 Schedule Types: Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
DECG 230	Design Process Procedures Through History & Cultures	Design thinking is a shared process and key component of innovation for all fields within the College of Design, Engineering and Commerce. This study abroad course will focus on how the design process can transform history and culture, and the influence that history and culture have on the design process. Students will examine how design thinking has shaped movements within art and design, services, or enterprises, and the impact of these movements within history and culture.	Credit Hours: 3.000 Schedule Types: Study Abroad
DECG 480	Inter-disciplinary Integrative Project	This course provokes interdisciplinary activity through a client-centered team project focused on designed systems, requiring inputs from multiple disciplines for success. Types of projects might include: Interactive design + corporate brand experience, Physical design + materials science, Service/business platform design, Entrepreneurial design (design + engineering + business plan), and Software/hardware systems. <b>Prerequisite: DECF 102, DECS 209, DECMTHD 300</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lecture, Lecture/Studio Combination, Studio
DECM 300	Ethnographic Research Methods	This course explores a range of ethnographic research tools to analyze human belief, behavior and cultural practices. Students learn to formulate better research questions and conduct ethnographic research to address a contemporary social problem, and will become equipped to analyze and communicate the findings. Students reflect upon their impact in the community and on other ethical questions as part of conducting ethnographic research. <b>Prerequisite: WRIT 201/202 and GCIT or GDIV</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Lecture Course Attributes: Junior Seminar Course
DECM 300X	Ethnographic Research Methods	This writing intensive course explores a range of ethnographic research tools to analyze human belief, behavior, and cultural practices. Students will learn to formulate appropriate research questions and conduct field-based research to address a contemporary social problem. As they conduct their research, students are required to assess and consider contextual sensitivities and to analyze and communicate their findings. In this course, students reflect upon their impact in the community and on other ethical questions as part of conducting ethnographic research. <b>Prerequisite: WRIT 201/202 and GCIT or GDIV</b>	Credit Hours: 3.000 Schedule Types: Lecture/On-Line Course Attributes: Junior Seminar Course

DECS 208X	Sustainability & Eco-Innovatn	The emerging fields of sustainability and environmental sciences will be surveyed to highlight how entrepreneurs are capitalizing on rapid environmental transformation. The rate, scale and degree of global environmental change, key scientific feedback loops the regional differences in terms of impacts and opportunities will be analyzed. Case studies of eco-innovation strategies employed by businesses and designers will be explored so that students can create their own scientific monitoring and evaluation plan for implementing a simple eco-innovation.	Credit Hours: 3.000 Schedule Types: Lecture/On-Line Course Attributes: Science Level I, Science Level II, Scientific Understanding
<b>DESIGN FOUNDATIONS</b>			
VDES 101	Design Essentials	This foundation design course explores the basic elements and principles of 2D and 3D form, and their application in the design process. Line, shape, mass, space, texture, value and color are introduced as fundamental and interrelated components necessary in structuring solutions to problems in design. Students will engage in projects that encourage creative expression in a visual and tactile context, while exploring the interaction of ideas and materials. The course is an introduction to the design process as an integral part of Animation and Digital Media, Fashion Design, Textile Design, and Visual Communication Design, and is a prerequisite to those majors.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DSGF 423	Design Concepts	Students are introduced to basic design theory as it relates to apparel design and merchandising including hands-on exercises in color, composition, presentation and critique skills. Trend forecasting and brand analysis provides an overview of the product development process. May not be taken by fashion design majors. <b>Prerequisite:FASM101</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
<b>DIGITAL DESIGN</b>			
DIGD 103	Principles of User Experience	The purpose of this new course is to create an essential understanding of the User Experience (UX) design process which is a key component to becoming an Interactive Designer. This course, which is the first core-course in the newly revised Interactive Design & Development program will serve to give students an understanding of design workflow, developing sitemaps & navigation, information architecture, storyboarding, wireframes, prototyping, feature definition, documentation, and user-testing. This skill set is a fundamental requirement which will continue to be reinforced and utilized throughout all of their courses in the program.	Credit Hours: 3.000 Credit hours: Schedule Types: Lecture, Studio
DIGD 200	Fundamentals of Web Programming	The purpose of this new course is to create an essential understanding of the HTML and CSS markup languages which is a key component to becoming an Interactive Designer. This course, which is a sophomore level core course in the newly revised Interactive Design & Development program will serve to give students a comprehensive understanding of how to produce functional web pages using HTML and CSS. Additionally, they will be instructed on how to debug their code, validate code, and cross-browser/device check for integrity across all platforms. These skills are a fundamental requirement which will continue to be reinforced and utilized throughout all of their courses in the program. <b>Minimum Grade C</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DIGD 206	Foundation in Web Design & Strategy	This course will be an exploration into the design process and techniques for creating interactive experiences. This will be first step in learning to think and work as a web designer. We will cover a basic understanding of information architecture, usability, front end programming logic, and design literacy. We will also discuss the principles of raster and vector electronic imaging as a means to provide a solid foundation needed to succeed in the digital design field <b>Prerequisites: ARFD 102(Minimum Grade C) or DSGF 203 (Minimum Grade C) or GRPH 102 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio

DIGD 305	Theory of Electronic Communication Seminar I	This seminar course provides students with a theoretical understanding of the role of the digital designer within the constantly evolving electronic marketplace. Issues of e-commerce, digital communication, electronic ethics and professional practice will be discussed. Special focus will be placed on how our existing culture has been, and is currently being, revolutionized by the information explosion.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
DIGD 307	Advanced Web Design & Strategy	This course exposes students to conceptual and technical aspects of Web design. Information architecture, semiotics, storyboarding and site management are taught; in addition to learning technical skills in Web production software and HTML. Additional areas of focus include typography, color theory, composition and motion graphics for the Web. The final project requires the publication of a Web site that pushes the boundaries of traditional interactive media. <b>Prerequisites: DIGD 206 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DIGD 314	User Interface Design	This course provides students with a general introduction to the theory and practice of creating 2D graphical user interfaces. Students will explore the various components of user interface design for a wide range of basic interaction devices available. Emphasis will be put on usability and design standards. The course will cover effective layouts, best practices for navigation, search, registration/account management, and shopping carts. The final project requires a complete design series of a web-based or mobile application of the student's choosing. <b>Prerequisites: DIGD 307 (Minimum Grade of C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DIGD 316	Web Performance & Optimization	Creating effective user experience means having a comprehensive understanding of performance and optimization for internet based technologies. Students will learn how to effectively maintain their own webserver, address performance related issues, optimize delivery of web-based content, debug scripting errors, and optimize delivery across desktop, tablet, and mobile platforms including cross-browser testing.	Credit Hours: 3.000 Schedule Types: By Appointment, Studio
DIGD 318	Media Production	This course exposes students to principles of basic digital photography, audio editing, and digital video design and production. Students will become versed in non-linear, video-editing software as a means to create effective digital media presentations. A series of projects develop essential skill sets such as storyboarding, basic photography & composition, audio/video capture, and editing	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
DIGD 320	Javascript Programing	This course will explore the ways in which JavaScript can be applied to websites to develop greater interaction with users, aid in design, and create better user experiences overall. Students will work with libraries like jQuery as well as many other plugins and extensions that aid in the development of web applications and websites. This will include using third party API's (Application Programming Interfaces) to retrieve and manipulate JSON objects to help users interpret data. This course will consist of several small projects leading to a final project at the end of the semester. <b>Prerequisite: DIGD 307 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio
DIGD 370	Portfolio Development Seminar	This course provides students with an active and deep survey of constructing an effective design portfolio through various means including: print, electronic PDF, community websites, and independent websites. Students will also develop resume & portfolio and participate in presentation and interviewing exercises. This course is recommended for design students in their junior year seeking internship and seniors seeking professional employment following graduation.	Credit Hours: 1.000 Schedule Types: Studio

DIGD 403	Web Development	This course will explore the Web markup languages, HTML, CSS and Java Script, required for advanced control of Web design. Students will be introduced to these languages through lectures, demonstrations and practical exercises. The focus will be on writing, testing and de-bugging the code and its appropriate application. A series of increasingly complex exercises will gradually build the student's knowledge and understanding of these languages. <b>Prerequisites: DIGD 307 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture
DIGD 415	3-D Modeling	This course exposes students to the conceptual and technical aspects of three-dimensional modeling, animation, and virtual environments. Students will complete a series of specifically designed exercises of increasing difficulty leading to a final project of the student's choosing. The class will cover the basic principles of 3D modeling and animation including polygonal modeling, texturing, lighting and animation. An emphasis will be placed on clear and concise communication of information and ideas expressed through a visual medium.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DIGD 417	Content Management System & E-Commerce	This course introduces students to a wide variety of content management systems (CMS) that have become commonplace in the web design industry. Students will be introduced to best development practices and system architecture among several popular platforms. Additionally, advanced topics such as e-commerce platforms and application development will be explored. This course will include a series of progressively more difficult and technically complex projects leading toward a larger and more in depth final project. <b>Prerequisite: DIGD 403</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DIGD 498	Inter-disciplinary Capstone Project Preparation	This course requires students to identify and analyze potential capstone projects through a number of lenses including technical feasibility, marketability and design potential. With faculty guidance, students will form interdisciplinary teams that reflect the specific requirements of the chosen capstone project. To complete this course, a project proposal must be submitted documenting the factors that will allow the development of a successful capstone project. Research and presentation skills are a major focus of this course. <b>Prerequisites: DIGD 314 (Minimum Grade of C)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>DRAWING</b>			
DRAW 101	Drawing Essentials	Drawing Essentials introduces the student to the process of visual communication using basic drawing techniques and concepts. Students will develop sound observational skills through visualization using a variety of marking tools. Students will learn the fundamentals of drawing (line weight, proportion, rendering and perspective techniques) and understand how it applies to design development. <b>Mutual Exclusion: you may not enroll in this course if you have completed ARFD 103</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DRAW 201	Drawing II for Graphic Design	Advanced drawing experiences continue the study of form and structure begun in Drawing I. In addition, students are encouraged to develop individual expression in a variety of graphic media. Drawing as a means of developing graphic ideas is stressed. <b>Prerequisite: DRAW 101</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DRAW 206	Drawing II: Figure Drawing	In this course, students acquire special knowledge of the human figure and anatomy. A variety of media and methods of graphic representation are explored. Perceptual skills, as well as cognitive aspects of drawing the human form, will be studied. Live models, both clothed and nude, charts, skeleton model and the self will be used as sources for study. <b>Prerequisites: DRAW 101 (Minimum Grade D) or VDRW 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 4 students, By Appointment - 5 students, By Appointment, By Appointment/Lecture/Studio, Lecture, Studio



DRAW 303	Drawing: Materials/ Techniques	This course further develops the students drawing skills by introducing a variety of mark-making tools and techniques. Students will learn both traditional and experimental drawing processes within the context of historical and contemporary movements in art and design. Students will use drawing as a vehicle for design development, visual communication and creative expression.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
<b>ECONOMICS</b>			
ECON 111	Principles of Economics	This course introduces the discipline of economics and provides a basic understanding of how markets function, how prices are determined and how resources are allocated. This requires a blend of economic theory, institutional material, and real-world applications. International examples will be included throughout the course.	Credit Hours: 4.000 Schedule Types: Lecture
ECON 201	Principles of Macro- economics	capitalistic and socialistic economics and considers the role of government in each. Emphasizes U.S. economy and macroeconomic factors that determine employment, inflation, the gross national product and money supply. Compares Classical, Keynesian and post-Keynesian perspectives.	Credit Hours: 3.000
ECON 202	Principles of Micro- economics	Examines economic behavior and problems of the individual consumer and the individual business firm. Includes theory of consumer behavior, production costs and price and output determination in pure competition, pure monopoly, monopolistic competition and oligopoly.	Credit Hours: 3.000
ECON 205	Macro- economics	Introduction to the overall functioning of an economic system with a view toward understanding the factors underlying income, employment and prices on the aggregate level. Topics include monetary and fiscal policy with primary emphasis on the impact of international trade and policy implications.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/On-Line, On-Line
ECON 206	Micro- economics	Introduction to the principles underlying the behavior of business firms, resource owners and consumers within a system of markets. Introduces the theory of value and distribution and the implications of international trade on autarchy value and distribution.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
ECON 401	International Economics	The theoretical basis for international trade is examined, as well as the economic impact of such trade on participating nations.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, On- Line
<b>ENGINEERING</b>			
ENGR 101	Introduction to Engineering	This course is an introduction to engineering through hands on use of design, build and test modules in mechanical, industrial and textile fields. The course helps the students to relate basic sciences to engineering applications. The course makes an introduction to programming logic, engineering design, materials, workshop skills, engineering ethics and technical presentation. Visits to engineering industries and professional society meetings will be arranged.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
ENGR 102	Engineering Drawing	This course introduces students to engineering drawing, descriptive geometry, design and problem solving. Engineering drawing is a graphic language that can convey, with exactness and detail, ideas from the design engineer to the fabricator. Thus, the emphasis of the course is on communicating design ideas through engineering drawings. <b>Corequisites: MATH 102 or MATH 110 or MATH 111</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab
ENGR 104	Introduction to Computing	An introductory course which provides a coherent and comprehensive treatment of fundamental concepts of computer science. It describes how computing systems work and how they are applied to solve real-world problems. The main emphasis is on the design of algorithms and procedural abstraction. High-level, language-programming projects.	Credit Hours: 3.000 Schedule Types: Lecture

ENGR 210	Intro to Materials Science	A study of the relationship between structures and properties for common engineering materials, including metals, polymers, ceramics, and composites. Mechanical behavior temperature effects, heat treatment, corrosion, electrical, and other properties are covered. <b>Prerequisite:</b> CHEM 103/103L, MATH 110 or 111	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 215	Engineering Statics	Engineering statics describes the mechanical behavior of materials and systems in equilibrium using Newton's laws of motion. In this course, students will learn the principles of force equilibrium, how to construct free-body diagrams, understanding distributed forces, friction and introductory structural response. <b>Prerequisites:</b> PHYC 201, PHYC 201L, MATH 111	Schedule Types: By Appointment, Lecture, Lecture/On-Line, On-Line Course Attributes: Honors Assignment
ENGR 218	Engineering Dynamics	Engineering dynamics describes the motions of particles and rigid bodies and the forces that accompany or cause those motions. Basic methods include Newton's laws, the work and energy principle, and the impulse and momentum principle. <b>Prerequisites</b> ENGR 215, MATH 112, PHYC 201/201L	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
ENGR 301	Mechanics of Materials	Internal forces; stress, strain and their relations; stresses and deformations in axially loaded members; stresses and deformations in torsionally loaded members; stresses and deformations in flexural members; combined stresses; column analysis; statically indeterminate members; introduction to member design.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Honors Assignment
ENGR 302	Design for Manufacturability	This course focuses on the design process; interaction of materials, processes and design; economic considerations; design considerations for machining, casting, forging, extrusion, forming, powder metallurgy; designing with plastics; design for assembly; projects and case studies. <b>Prerequisite</b> ENGR 102	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 303	Engineering Economics	This course is designed to provide the engineering student with the decision-making skills necessary to evaluate the monetary consequences of the products, processes and projects that engineers design. Decisions must balance economics, performance, aesthetics and resources. As the capital outlays may be significant and affect the productive potential of a firm over the long term, it is important to understand the time value of money. The course emphasizes calculations of present values, future worth, internal rates of return and replacement analysis. In addition to the specific financial concepts covered, the student will construct computer spreadsheets to do sensitivity analysis and generate graphs to enhance presentation skills. <b>Prerequisite</b> ENGR 305	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 304	Operations Research I	This course addresses the philosophy and techniques of operations research. Emphasis is placed on elementary model building and concepts of optimization; structure of problem solving; linear programming, transportation and assignment algorithms; game theory; network analysis, branch and bound theory. <b>Prerequisites</b> ENGR 305, MATH 112	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 305	Engineering Statistics	This course addresses the fundamentals of probability and distribution theory with application to various branches of engineering; basic probability theory, discrete random variables, continuous random variables, independent random variables, covariance and correlation and linear combinations of random variables. Statistical decision theory including significance testing and estimation, confidence intervals, design and perform tests of hypotheses on population means, standard deviations and proportions. <b>Prerequisite</b> MATH 112	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 307	Engineering Statistics II	This course is a continuation of EN505 Engineering Statistics, and it is required for the BSISE and the BSE with minor in ISE. Application of statistical techniques to industrial problems; relationships between experimental measurements using regression and correlation theory and analysis of variance models; design of experiments with one and more than one levels; emphasis on inherent variability of production processes; control chart techniques and the use of exponential and Weibull models in reliability analysis; statistical process control. <b>Prerequisite</b> ENGR 305	Credit Hours: 3.000 Schedule Types: Lecture

ENGR 308	Integrated Engineering Product Development	The IEPD two-course sequence combines the perspectives of design, engineering and marketing in the product development process in a hands-on, collaborative environment. Throughout the course students will be working in groups to design, develop, prototype and analyze economic and marketing aspects of engineered products. Students will be prepared to use modern engineering tools including rapid prototyping, CNC machine tools, CAD based product lifecycle analysis and management, costing and market data analysis. <b>Prerequisites</b> MATH 112, ENGR 104, ENGR 102	Credit Hours: 3.000 Schedule Types: Lecture/Lab
ENGR 311	Fluid Mechanics	The fundamentals of fluid mechanics. Topics include fluid statics, control-volume analysis, the Navier-Stokes equations, similitude, viscous, inviscous and turbulent flows and boundary layers. <b>Prerequisites:</b> ENGR 218	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 314	Numerical Methods for Engineers	Numerical methods are used to solve mathematical problems that are often impossible to solve analytically. Numerical methods enable formulating engineering problems so that they can be solved by arithmetic operations. Problems with large systems of equations, nonlinearities and complicated geometries that are encountered in engineering can be solved by the use of numerical methods and programming using computers. The emphasis of this course is the use of personal computers to solve mathematical problems. <b>Prerequisites</b> MATH 225, ENGR 104	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 316	Intr & Materials for Composites	An overall introduction to composites will be presented including their mechanical properties and advantages. Fiber reinforcements will include pre-pregs and textile composites. Composites design and various molding techniques will be covered. The laboratory will have various manufacturing and experimental exercises. <b>Prerequisites:</b> ENGR 215	Credit Hours: 3.000 Schedule Types: Lecture/Lab
ENGR 317	Composites Manufacturing	This course will be a laboratory intensive course that will include material selection and tooling types. Materials will include pre-pregs and woven and braided performs. Key issues in tool design, bond assembly jigs and secondary tooling, hand layup, tape layup and fiber placement, bag molding and autoclaving, compression molding, pultrusion, RTM, VaRTM, mechanical property tests, manufacturing defects and quality control will be covered. <b>Prerequisite</b> ENGR 316	Credit Hours: 3.000 Schedule Types: Lecture/Lab
ENGR 322	Fundamentals of Electrical Engineering I	This course explores the analysis of circuits; transient and steady state phenomena; and general analysis techniques; and the fundamentals of direct and alternating circuits, transformers rotating machinery, electrical and electronic control, and electrical energy. <b>Prerequisites:</b> PHYC 203 and PHYC 203L and MATH 111 and MATH 112	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
ENGR 371	Special Topics	An upper-level course designed to take advantage of resident/adjunct/visiting faculty members' expertise or a special focus wanted by the School for one or two terms. These courses might provide an in-depth treatment of recent advances in subjects of current interest in a given field whose subject matter is not necessarily needed to be offered long term. A specific "topic" may be delivered a maximum of two term.	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 399	Engineering Design Seminar	The purpose of the Engineering Design Seminar is to support student success as Engineering students prepare to move into their senior design experience. As a pre-requisite for the Engineering senior design experience, the course is built around didactic and experiential educational components, pre-project research assignments, and independent research. Included in the course are elements that teach and reinforce the project proposal process, refine technical report writing skills, and promote lifelong learning and continuing professional development. <b>Prerequisites:</b> ENGR 31 and ENGR 322	Credit Hours: 0.500 Schedule Types: Lecture

ENGR 404	Composites Design Analysis	The factors which govern analytical composite design will be discussed. Two dimensional stress strain relationships along the planar axes of the composites, orthotropic material constitutive relationships will be investigated. The course includes instruction in finite element analysis for composites including complex structures which include core materials. The various accepted failure criteria including maximum stress, Tsai-Hill, and Tsai-Wu criterion will be compared. A procedure for laminate strength analysis and failure envelopes will be introduced. <b>Prerequisite ENGR 316</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture
ENGR 406	Composites Structure Industrial & Consumer Application	Analysis of composites for use in automotive, other mechanical structures will be addressed. The focus will be on system design, structure design and engineering economics associated with actual composite structures and systems. <b>Prerequisites: ENGR 303 and ENGR 316 and ENGR 404</b>	Credit Hours: 3.000 Schedule Types: Lecture
ENGR 498	Senior Design Project I	This course exposes the students to a series of real-world industry problems that require applications of Industrial Engineering principles. A preliminary analysis of various selected problems will be performed collectively. The students will then form a team and select their senior design project. The course also covers (through invited speakers) topics related to the engineering profession such as ethics, intellectual property, project management and social responsibility. Students will present a written and oral proposal of their senior design project preparation. <b>Prerequisites: WRIT 211 or WRIT 215 or WRIT 217 or WRIT 201 or WRIT 202, and MENG 399</b>	Credit Hours: 3.000 Schedule Types: Lecture/Lab
ENGR 499	Senior Design Project II	Students in this course will apply engineering principles to solve a real-world problem. Student works as member of a team assigned to a problem in a manufacturing, processing, service or government organization. The capstone senior design project will consist of a project that builds on engineering, business, ethics and social issues. This course requires a professional written and oral report and will serve as the program's major writing intensive course. <b>Prerequisite ENGR 498</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture Course Attributes: Writing Intensive
<b>ENGLISH</b>			
ENGL 100	Fundamentals of Writing	Addresses the most common writing problems. Develops skills in grammar and usage, clarity, effective wording of sentences and paragraphs, punctuation, and mechanics. Focuses on practical writing situations like essays, essay exams, research papers, and business correspondence. Prepares students for English 101. Cannot be used to fulfill degree or certificate requirements	Credit Hours: 3.000 Schedule Types: Lecture
ENGL 101	Composition I	Develops basic writing skills, including a review of grammar. Includes frequent writing assignments.	Credit Hours: 3.000 Schedule Types: Lecture
ENGL 102	Composition II	Continuation of English 101. Applies principles of effective written communication. Introduces the methodology of the research paper. <b>Prerequisite: ENGL 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
ENGL 221	Understanding Literature	Examines three prominent forms of literary expression fiction, poetry and drama with attention to literary devices and cultural context of selected works of world literature from the classics to the modern era. Provides experience in discussion written analysis and interpretation of literature. Builds on critical writing skills learned in college composition. Assumes basic mastery of fundamentals of writing, including rhetoric, grammar and basic mechanics. <b>Prerequisite: ENGL 102</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>ENGLISH AS SECOND LANGUAGE (ESL)</b>			
ESL 101	Into Listening /Speaking	Introductory course for students whose first language is not English. Aims to develop all four language skills listening, speaking, reading and writing, with emphasis on listening comprehension and speaking. <b>Prerequisite: ESL placement test</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 102	Introductory Written Skills	Aims to develop all four language skills - listening, speaking, reading, and writing, with emphasis on reading and writing. <b>Prerequisite: ESL placement test and/or ESL 101</b>	Credit Hours: 3.000 Schedule Types: Lecture

ESL 201	Intro Listening/ Speaking B	Aims to develop all four language skills - listening speaking, reading, and writing, with emphasis on listening comprehension and speaking. <b>Prerequisite: ESL placement test and/or ESL101</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 202	Introductory Written Skills B	Aims to develop all four language skills-listening, speaking reading, and writing, with emphasis on reading and writing. <b>Prerequisite: ESL placement test and/or ESL 102 or ESL 201</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 301	Intermediate Oral Skills	Develops and strengthens fluency and accuracy when speaking and understanding spoken English. Students are exposed to authentic English discourse and academic lecture material so as to develop both conversational and academic oral skills; refines critical thinking skills such as synthesizing information and reacting to different viewpoints. <b>Prerequisite: ESL placement test and/or English As A Second Language 101 or 201</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 302	Intermediate Written Skills	Instructs students in the basic elements of academic reading and writing. Includes reading strategies for academic texts, colloquial materials and culturally-based selections to help students read with increased comprehension and speed, vocabulary expansion and development of critical thinking skills. Reviews grammar, sentence structure and punctuation used in academic writing skills. <b>Prerequisite: ESL placement test or ESL 02 or ESL 202</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 401	Advanced Oral Skills	Assists students in developing the listening and speaking proficiency required in advanced academic settings. Students are taught methods of question and response and will learn how to effectively manage particularly problematic areas such as interpretation of social and cultural norms non-verbal language, and question and answer sessions following oral presentations. <b>Prerequisite: ESL placement test or ESL 301</b>	Credit Hours: 3.000 Schedule Types: Lecture
ESL 402	Advanced Written Skills - Read/Write	Offers students the opportunity to practice a variety of advanced writing tasks, including abstracts, reviews, critical analysis and synthesis, and research. <b>Prerequisite: ESL placement test or ESL 302</b>	Credit hours: 4.000 Schedule Types: Lecture
ESL 410	Accent Reduction	Assists learners in improving overall intelligibility through accent modification. Targets individual pronunciation problems to achieve improvements in English speech and communications. Builds confidence in social and academic speaking situations. <b>Prerequisite: ESL 301 or Departmental permission</b>	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
<b>ETHICS</b>			
ETHC 200	Bioethics	This philosophy course covers ethical issues in biological research, medical research, the practice of medicine, the allocation of medical resources, public health policy, and related issues. Students will gain fluency in the basic language and tools of philosophy and will study several theories of ethical decision-making. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Ethics
ETHC 201	Honors Moral Philosophy	This course provides an introduction to moral philosophy. We focus on normative ethics (the study of what theory provides the best account of right and wrong) and applied ethics (application of ethical theories to particular cases). We will also cover a few topics in metaethics (the study of the ultimate nature of moral concepts, values, and language). The course will always provide extensive coverage of the three most important ethical theories: utilitarianism, deontology, and virtue ethics. The remaining topics will vary by semester and according to student interest. Honors Program membership required. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Ethics

ETHC 202	Environmental Ethics	<p>This course will cover contemporary topics in environmental ethics from a philosophical perspective. Students will gain fluency in the basic language and tools of philosophy. We will study several theories of ethical decision-making and apply them to real world situations, with a focus on issues in environmental ethics (including professional ethics, civic responsibility, and public policy).</p> <p><b>Prerequisites: WRIT 101 and AMST 114</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Ethics</b></p>
ETHC 204	Ethics of the Apocalypse	<p>The Ethics of Apocalypse: Dystopian Film &amp; Literature This course studies ethical issues of human social interaction in literature, culture, and film. The concepts of utopia and dystopia - from planned society to zombies - offers a range of topics like civilization and liberty, social control, technology and human relationships. Students will investigate social life using key philosophical concepts as a basis for study. The course emphasizes evaluation of assumptions and reasoning behind solutions and the impacts of world belief systems on moral values and behavior. Students will reflect on their own personal ethics, and apply ethical reasoning to realworld problems.</p> <p><b>Prerequisites: WRIT 101 and AMST 114</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Ethics</b></p>
ETHC 215	Evil and Good	<p>A study of evil and good in art, literature, religion and philosophy,with attention to actual issues of evil and good in human social life. Concepts of evil and good in both Western and non-Western cultures will be surveyed. The course will also provide an introduction to strategies for ethical decisionmaking.</p> <p><b>Prerequisites: WRIT 101 and AMST 114</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Ethics</b></p>
<b>EXERCISE SCIENCE</b>			
EXSC 110	Introduction to Exercise Science	<p>In this course students are introduced to the discipline of exercise science. The scope of the topics covered in the course include professionalism, ethics, certification and licensure, employment opportunities and scientific foundations of the various sub-disciplines. Students will complete online search activities to explore these topics. This course sets the foundation for discipline specific coursework. This course is appropriate for students wishing to explore the discipline of exercise science and is required for students in the major.</p>	<p><b>Credit Hours: 1.000</b>  <b>Schedule Types: Lecture/online</b>  <b>Course Attributes: Exercise science</b></p>
EXSC 210	Developing the Interprofessional Team	<p>In this course students are introduced to the healthcare disciplines that encompass the interprofessional team. The scope of the topics covered in the course include the scope of practice, licensure and certifications, specialty training, and the role in the interprofessional team for each of the healthcare disciplines. Students will hear directly from professionals in each of the disciplines and be involved in case-based learning activities to help understand the optimal team approach to patient care. This course expands on the foundation for discipline specific coursework and allows students to understand the unique roles and responsibilities of each member of the interprofessional team to allow for improved patient care. This course is required for students in the exercise science major.</p>	<p><b>Credit Hours: 1.000</b>  <b>Schedule Types: Lecture/online</b>  <b>Course Attributes: Exercise science</b></p>
EXSC 301	Biomechanics	<p>This course focuses on the foundational principles in biomechanics that influence physical movement and activity. Student will learn these principles through both mathematical and conceptual concepts. This course is appropriate for students wishing to explore the discipline of exercise science and is required for students in the undergraduate major.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture, inclass lab activities</b>  <b>Course Attributes: Exercise science</b></p>
EXSC 306	Introduction to Exercise Physiology	<p>This course provides the student with applied knowledge relative to the human's physiologic responses to exercise and other environmental stresses. Topics include nutrition, energy metabolism, respiratory, cardiovascular, and neuromuscular physiology, environmental factors, and applied physiology. Basic laboratory procedures and tests in the field of exercise physiology are designed to complement the lecture area.</p> <p><b>Prerequisites: BIO 103 or BIO 112 (Minimum Grade C-)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture, inclass lab activities</b>  <b>Course Attributes: Exercise science, Exercise science minor</b></p>

EXSC 307	Introduction to Kinesiology	This course introduces students to the discipline of kinesiology and examines the study of physical activity from the perspectives of experience, research, and professional practice. The student will gain knowledge relevant to fundamental biophysical principles of human movement and their relationship to fitness and activity. The students are introduced to the sub-disciplines of Kinesiology including Sport Psychology/Sociology, Motor Behavior/Motor Learning, Biomechanics, and Exercise Physiology among other topics.	Credit Hours: 3.000 Schedule Types: Lecture, inclass lab activities Course Attributes: Exercise science, Exercise science minor
EXSC 311	Sports Nutrition	This course focuses on basic nutritional principles including the specific considerations for various types of healthy and injured athletes. Student will learn the material through both didactic and practical approaches. This course is appropriate for students wishing to explore the discipline of exercise science and is required for students in the undergraduate major.	Credit Hours: 3.000 Schedule Types: Lecture, inclass lab activities Course Attributes: Exercise science
EXSC 312	Psychological Theory of Health & Exercise	This course examines theories and models of the psychology related to health and exercise. Topics include mind-body integration, psychophysiological effects of exercise, behavior change, motivation, arousal, stress and anxiety, and psychological well-being. Students will also gain experience in scientific inquiry and writing through case studies and a research review paper. The course meets the requirements for a writing intensive (WI).	Credit Hours: 3.000 Schedule Types: Lecture, inclass lab activities Course Attributes: Exercise science, Writing Intensive
EXSC 313	Safety, First Aid & Injury Prevention	This course focuses on the principles of first aid and professional life support as prescribed by the National Safety Council. The course is designed to provide the student with the knowledge and skills necessary to develop injury prevention strategies and act as a first responder in an emergency situation until more advanced medical help arrives. The course will consist of lectures and practical hands on activities that will mimic actual emergency situations.	Credit Hours: 3.000 Schedule Types: Lecture, inclass lab activities Course Attributes: Exercise science
EXSC 330	Internship I	This course focuses on real world application of knowledge and skills in the workplace under the day-to-day supervision of an experienced exercise science professional. Potential internship settings include personal training studios, strength and conditioning facilities, corporate fitness programs, and cardiac rehabilitation programs. Students will expand their exercise science knowledge through practical (hands-on) approaches, working with real clients, athletes, or patients. They will become familiar with the day-to-day responsibilities, practices, policies, and professional conduct of exercise science professionals. Students will be evaluated based on their applied knowledge as well as their compliance with the rules and norms of their internship site. This course will help students transition to becoming practicing exercise science professionals, as well as set the foundation for further advanced study. This course is required for and restricted to students in the undergraduate Exercise Science	Credit Hours: 3.000 Schedule Types: Internship Course Attributes: Exercise science
EXSC 401	Exercise Prescription	This course focuses on designing comprehensive exercise programs to elicit a wide range of physiological adaptations. The scope of the topics covered in the course include initial goal meetings and assessments, movement patterned-based exercise classification, and exercise progression and regression. Student will learn the material through both didactic (lecture- and discussion-based) and practical (lab-based) approaches. This course sets the foundation for careers in health and fitness as well as further advanced study in therapeutic exercise. This course is required for students in the undergraduate Exercise Science major.	Credit Hours: 3.000 Schedule Types: Lecture, inclass lab activities Course Attributes: Exercise science
<b>FASHION DESIGN</b>			
FASD 111	Studio I	Students in FASD111 Studio I will be introduced the fundamentals of the apparel construction process. Students will learn the operation of industrial machinery, appropriate seaming, finishing techniques and end use of textiles. In addition, a research project will explore the application of these skills to a design project. This course is open to Fashion Design majors only. <b>(Minimum grade "C" or better to move onto FASD211 Studio II).</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio

FASD 205	Fashion Designers 20th Century	From Coco Chanel to Issey Miyake, 20th-century designers played an integral role in the development of the fashion industry. Through the use of the Textile and Costume Collection, students will have the opportunity to learn first hand from the work of these designers, while an emphasis on historical evidence will improve analytical and writing skills. Students will leave the course with a thorough understanding of key designers and their influence on 20th-century fashion and culture. <b>For FD student only or by permission of the FD program director.</b>	Credit Hours: 1.000 Schedule Types: Lecture
FASD 211	Garment Structures	This is the initial course in the fashion design technical studio sequence. This course focuses on the study and production of apparel construction methods. Students have the opportunity to produce garments and design them through the imaginative use of construction details. A sample book of various industrial construction methods is developed. Note: A minimum grade of "C" will be required in order to continue in the design studio sequence. Admission into the Fashion Design Program. Fashion Industry majors need approval from FMM program director.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
FASD 213	Studio III	This course covers the fundamentals of the flat-pattern method. Students will draft bodice, sleeve and skirt blocks to be used in creating various styles. Some patterns are cut and sewn in muslin to test fit and further enhance sewing skills. A sample book of flat-pattern techniques will be produced. In addition, two ensembles will be designed and produced. <b>Prerequisites: FASD 211 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio
FASD 250	Fashion Studies Abroad	A "short course" that enables students to study various aspects of fashion design, production and merchandising in a major region of the world. Through a series of lectures, guided tours and visits to couture and ready-to-wear establishments, design studios, retailers, production plants and museums, students have the opportunity to experience a segment of the global fashion industry. Students carry a journal and write about their own experiences abroad. A visual record of design inspirations is required as part of the research assignments. Oral and written reports, including visuals, explore the design and business practices of apparel firms. Students also experience cooperative design and merchandising as a result of team assignments.	Credit hours: 3.000 Schedule Types: Study Abroad
FASD 252	Fashion Design Research	This required course focuses on methods of research and development of original concepts in the fashion design field. Visual sensitivity to the environment as a source for building observational skills, design literacy, visual documentation, and concept development skills will be addressed. Visits to design resources such as museums, architectural sites, analysis of trend forecasts and current influences will provide inspiration for development of a journal for application in future courses. <b>Corequisites: DRAW 101</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
FASD 254	Fash Design: Families of Florence	Florence Italy is home to some of Europe's most enduring Fashion Design brands; Gucci, Ferragamo, Pucci. While in Florence students will study the historic rise of these fashion families through archival museums (Gucci Museo, Museo de Ferragamo, Palazzo Pucci) as well as the thriving modern brands they have become through their flagship stores along the Via Tornabuoni. Students will also research the historical and cultural impact the city of Florence has had on the development and rise of these luxury designer brands.	Credit Hours: 3.000 Schedule Types: Study Abroad



FASD 300	Technical Design	<p>This course will enable the student through hands on experience to understand the basic requirements needed to be successful in the area of technical design. Building on their knowledge of pattern, construction and design, students will learn to create technical specifications packages used for product data management. Students will further acquire an advanced understanding of terminology and technical vocabulary needed to communicate with manufacturing facilities throughout the world. Students will learn the process of developing garment specifications, conducting fittings and successful communication for quality assurance issues to vendors and manufacturing personnel worldwide.</p> <p><b>Prerequisites: FASD 311 (Minimum Grade C) and CAD 204 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio</p>
FASD 301	Diversity in Design	<p>Students in the FASD 301 Diversity in Design course will examine and study the market in design inclusivity. As a part of the research, students will frame the question and engage with focus groups to identify areas of need in underserved populations. Students will utilize their findings to develop a fashion design product that solves a need in the inclusivity market. During the final presentation, students will present the products to the focus groups, potential investors and industry professionals. <b>Prerequisite: FASD311 (Minimum grade "C" or better). Cross list with FDMXXX Diversity in Design.</b></p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio</p>
FASD 311	Studio IV	<p>Students learn to drape basic bodice and skirt variations on standard industrial dress forms. Original garments are designed, draped and sewn using industrial machinery. Accurate patternmaking, sewing and attention to design fundamentals are stressed throughout the course.</p> <p><b>Prerequisites: FASD 213 (Minimum Grade C)</b></p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio</p>
FASD 315	Advanced CAD	<p>Computer-aided design is used in every segment of the fashion industry from Concept through to design and presentation. Students will learn how to develop industry standard presentations through a variety of projects, including research and analysis of various presentation styles, advanced design and trim detail focus, incorporating technical draping and rendering of multiple fabric manipulation techniques, type tool exploration, advanced knit and textile print development, along with skills to develop a "look book" used as a Buyer resource guide.</p> <p><b>Prerequisites: CAD 204 (Minimum Grade C) and FASD 252 (Minimum Grade C)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab</p>
FASD 316	Fashion Design Development	<p>This course focuses on the key components of the fashion design process including research, trend forecasting, materials investigation and presentation of valuable, market-specific collections. Designers consider current market trends and design concepts as influences on merchandising. Extensive opportunities for the development and communication of a personal design vision in illustrated presentations helps students build portfolio-ready collections. Industry directed projects also provide opportunities to develop brand-conscious yet creative concepts and designs. CAD skills are utilized in a variety of presentational techniques.</p> <p><b>Prerequisites: FASD 252 (Minimum Grade D) and CAD 204 (Minimum Grade D) and FASR 207 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio</p>
FASD 317	Hand Knitting for Fash Desg	<p>This elective course is offered to expand construction skills and design possibilities. By hand knitting and/or crocheting, students will design and produce marketable garments to augment other collections or as individual pieces. For Fashion Design Majors Only.</p> <p><b>Prerequisites: FASD 311 (Minimum Grade D) and TEXT 101 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture, Studio</p>

FASD 322	Sustainable Concepts for Fashion Design I	<p>This course focuses on the impacts of the mainstream fashion industry on the planet and its people and how sustainable concepts can be utilized to build a better future. In addition to gaining a comprehensive overview of the problems the industry creates, students will also learn about the key organizations, technologies, trends and designers that are paving the way for a sustainable fashion industry. With contextual understanding, students will be empowered to explore strategies to incorporate sustainable design concepts into their work through responsible use of materials, upcycling and innovative approaches to patterning and construction. With these tools, students are provided the opportunity to consider new and alternative solutions to addressing real world sustainable design challenges.</p> <p><b>Prerequisites:</b> FASD 252 (Minimum Grade D) and FASR 207 (Minimum Grade D) and FASD 311 (Minimum Grade D)</p>	<p>Credit Hours: 3.000  Schedule Types: By Appointment, Lecture, Lecture/Studio Combination, Studio</p>
FASD 335	Studio V	<p>In preparation for the Capstone courses, students will apply concept development skills in the creation of a two-piece capsule collection. Emphasis will be placed on industry standards as they apply to fit and construction techniques.</p> <p><b>Prerequisite:</b>FASHDES-311 (Min grade of C)</p>	<p>Credit Hours: 3.000  Schedule Types: By Appointment, Lecture, Studio</p>
FASD 371	Special Topics in Fashion	<p>A topic of special interest to fashion students and faculty will be explored in a studio/lecture format. Topic will vary, to be chosen by the instructor.</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture, Studio</p>
FASD 3XX	Fashion Design Elective	<p>This course is a placeholder. choose one Fashion Design Elective in consultation with advisor</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture, Studio</p>
FASD 415	Studio VI Fashion Design Capstone	<p>A capstone course for senior fashion designers to develop and produce a portfolio of original designs. The collection is designed, merchandised and produced by the student in collaboration with the instructor and a visiting critic.</p> <p><b>Prerequisites:</b>FASD 316 (Minimum Grade D) and FASD 322 (Minimum Grade D) o and FASD 335 (Minimum Grade C)</p>	<p>Credit Hours: 4.000  Schedule Types: Lecture, Lecture/Studio Combination, Studio</p>
FASD 416	Studio VII Fashion Design Capstone	<p>Students will further develop the concepts from their original sources of inspiration from FASHDES-415, Collection Development I, creating a cohesive collection of clothing. This is also an opportunity for the student who wishes to investigate designing for a different market from a new inspirational source.</p> <p><b>Prerequisites:</b> FASD 415 (Minimum Grade C) and FASD 335 (Minimum Grade C)</p>	<p>Credit Hours: 4.000  Schedule Types: Lecture, Lecture/Studio Combination, Studio</p>
FASD 433	Fashion Layout & Portfolio Development	<p>This elective course provides fashion design students with a professional portfolio of original work showcasing their design abilities and illustration finesse. The concept of layout and design will be presented as it relates to newspaper advertisements, editorial illustration and brochure development. Various presentational techniques will also be addressed as an effective sales tool for seasonal collections.</p> <p><b>Prerequisites:</b> FASR 207 (Minimum Grade D)</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture, Studio</p>
<b>FASHION DRAWING</b>			
FASR 207	Fashion Figure Drawing	<p>Students review basic forms of the figure in an anatomical, gestural and design sense. In a studio setting, students develop the skills and vocabulary of design room and presentation sketching by drawing from live models, developing designer croquis and technical drawings, exploring various media and rendering fabrics.</p> <p><b>Prerequisite:</b> DRAW 206</p>	<p>Credit Hours: 3.000  Schedule Types: By Appointment, By Appointment/Lecture/Studio, Lecture, Lecture/Studio Combination, Studio</p>
FASR 317	Fashion Illustration I	<p>An elective for students who are interested in further developing their illustration skills and their applications in the field of fashion design. Students do extensive fashion model studies and develop several visual presentations related to concepts and techniques presented in class. Presentation techniques and portfolio presentation will also be addressed.</p> <p><b>Prerequisite:</b> FASR 207</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture, Studio</p>

FASR 319	Fashion Illustration II	This sequel to FASR 317 is an elective course to challenge and refine the fashion design student's illustration skills as they relate to the professional job market. Extensive fashion-model studies will be combined with assignments similar to those found in today's industry. Professional presentation skills and portfolio development will be emphasized. <b>Prerequisite: FASR 317</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture, Studio
<b>FASHION MANAGEMENT</b>			
FASM 101	Global Fashion Insight	Survey of the apparel industry presents a comprehensive overview of one of the most dynamic industries in the world including marketing strategies, product-line development, pre-production and production processes, quality assurance, international sourcing, supply chain management and distribution strategies. This course investigates the application of technology in all areas of the operations of an apparel enterprise. Survey establishes the basis for further study of the apparel industry. The term project, which simulates the formation and operation of an apparel enterprise, provides a theoretical as well as a practical learning experience.	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lab, Lecture, Lecture/Lab
FASM 201	Prototyping	Students will have a basic understanding of garment construction combined with flat-pattern concepts. The use of industrial equipment and basic slopers will be utilized to produce a sample book of construction details and garments. Any student who has received credit for FASD S211 or FASD-213 may not take this course.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
FASM 211	Fashion Immersion	Students will experience the fashion value chain by participating in a range of activities based in a major fashion city. Through a series of industry visits and activities they will be immersed in processes related to concept/design, product development, production, merchandising and customer relationship management. Students will integrate the knowledge they have gained and apply it to the development of a product. This course is for sophomores. Students with at least 30 completed credit hours and a 2.75 GPA or higher may apply to participate; seats are limited. <b>Corequisite: DECFRM 200, DECSYS 206, MKTG 217</b>	Credit Hours: 3.000 Schedule Types: Lecture
FASM 304	Visual Merchandising	Visual merchandising facilitates the communication of the retail brand to the consumer. In this course, students will learn the basic concepts, techniques and applications of visual merchandising for various retail venues.	Credit Hours: 3.000 Schedule Types: Lecture
FASM 305	Apparel Production	Basic operations in all segments of an apparel plant are studied from the initial receipt of raw materials through storage, inspection, marker making, spreading, cutting, sewing, pressing, warehousing, shipping and customer returns. Latest technological advances in each of these areas will be discussed with marker making performed on a Gerber Accumark 300 System. Inventory management, labor issues, ergonomics and relevant public policies are also studied. <b>Prerequisite: FASM 101 and FASM 201 or FASM 211</b>	Credit Hours: 4.000 Schedule Types: Lecture
FASM 305N	Production	Basic operations in all segments of an apparel plant are studied from the initial receipt of raw materials through storage, inspection, marker making, spreading, cutting, sewing, pressing, warehousing, shipping and customer returns. Latest technological advances in each of these areas will be discussed with marker making performed on a Gerber Accumark 300 System. Inventory management, labor issues, ergonomics and relevant public policies are also studied. <b>Prerequisite: FASM 101 and FASM 201 or FASM 211</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture

FASM 308	Global Product Management	Global Product Management is a combination of classroom lectures and experiential instruction in a global environment. Student's tour design houses, mills, dye houses, production facilities, and examine international retailers. Students learn how to assess manufacturers for compliance and engage in cultural activities. Another major component of the course is to observe the economic state of the apparel industry in the specified country and study sustainable methods for manufacturing apparel, home textiles and other products. <b>Prerequisite:TEXT 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
FASM 319	Fashion Journalism	Formerly JSINT-311: This course introduces students to the field of fashion journalism and supports the development of creative writing styles. Students will examine reporting, criticism and commentary about fashion published in newspapers and magazines; displayed on websites and blogs; and aired on radio and television. This course also analyzes the types of publications, writers, the audience that is targeted, the subjects covered and the purpose and function of coverage. Prerequisites: WRIT 201 or WRIT 202 or WRIT 211 or WRIT 215 or WRIT 217	Credit Hours: 3.000 Schedule Types: Lab, Lecture
FASM 360	The Business of Licensing	Licensing, building brand extensions, and adding services to the merchandise mix are strategies to enhance the brand's position at leading fashion companies. Licensing is a growing business format that has growing applications in many diverse markets. Fashion brands are identifying ways to maintain their intellectual property through copyrights, trademarks, and patents to support the brand's culture. This course will examine the laws and regulations for fashion licensing, assess the components of a license agreement, and present strategies for extending the product or service offerings in retailing.	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lecture
FASM 401	Apparel/ Textile Quality Assurance	This course will develop an understanding of the intricate interdependence of fiber content, yarn properties, fabric structure and applied finish required to produce saleable products offering to the purchaser 'fair' value per dollar expenditure. Apparel Quality Assurance integrates the knowledge gained in textile, apparel, business and humanities courses to develop managerial talent in any 'cut and sew' aspect of the fashion industry. Fall only. <b>Prerequisite:FASM 305 or FASM 305N and STAT 201 and TEXT 301</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
FASM 408	Apparel/ Textile Sourcing	Execution and delivery of a product in today's apparel supply chain occurs within a global environment. Understanding the complexities in establishing and maintaining sourcing strategies is a critical element in a student's portfolio of course work. <b>Prerequisite:FASM 101 or FASM 316</b>	Credit Hours: 3.000 Schedule Types: Lecture
FASM 437	Integrated Technology	The course will analyze the various manufacturing technologies and their implications on management philosophy, employee relations and profitability through lectures and literature searches. The student will be a member of a team that will analyze and present to top management a feasible plan for integrating manufacturing technology.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
FASM 438	Integrated Fashion Technology	The course will analyze technology utilized throughout the global supply chain process at leading and start-up fashion companies. The latest developments in technology used in the design process, digital merchandising, product development, and the retail environment are assessed. Students will examine case studies, conduct a cost benefit analysis, study white papers, view videos, and engage in project based learning methodologies.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line

FASM 451	Operations & Supply Chain Management	This course provides a comprehensive survey of production and service operations management with an emphasis on the fashion/retail industry supply chain. It focuses on mathematical methods and the Case study approach to formulate, analyze and solve various supply chain problems. Areas of study include Decision Analysis, Forecasting techniques, Inventory and Scheduling models, Statistical Quality Control, Aggregate Planning, Material Requirements Planning, Linear Programming, Transportation and Transshipment problems. MS Excel will be used extensively in this course. <b>Prerequisites</b> MGMT 104 or MGMT 301, STAT 201	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
FASM 470	Global Fashion Value Chain	This course is designed to demonstrate agile techniques for students to examine the interrelationship between sourcing, production, and quality assurance. The course will focus on selecting the appropriate partners and suppliers for producing products in various production environments. Students will also identify the proper protocol for instituting quality assurance and quality control processes such as standards for testing throughout the supply chain process. Further topics for improving customer satisfaction through quality assurance, sustainability and social compliance will be investigated.	Credit Hours: 3.000 Schedule Types: Lecture
FASM 499	Apparel Merchandising Mgmt	Management of the merchandising function in an apparel company, including the development of a product line, design coordination, costing, sample making, specifications, resource selection, forecasting sales and planning inventory levels, promotion and coordination with sales and production are included.	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lecture
FASM 4XX	FMM Specialization Course	Choose 1 FMM Specialization course in consultation with advisor.	Credit Hours: 3.000 Schedule Types: Lecture
<b>FINANCE</b>			
FIN 101	Principles of Finance	Examines principles of financial management in five major areas: (1) financial analysis and planning (ratio analysis, cash budgeting, pro-forma financial statements, and operating and financial leverage); (2) working capital management (the financing decision, sources of short-term financing and controlling assets including cash, receivables, and inventory); (3) capital budgeting (time value of money annuities, determining investment yields, valuation of securities, rates of return, cost of capital, risk and methods of evaluating capital expenditure alternatives); (4) long-term financing (structure of capitol markets, public and private placements, debt and lease financing, common and preferred stock as financing methods); (5) review of mergers acquisitions; international-financial management concepts. <b>Prerequisites:</b> ACCT101, ECON 201	Credit Hours: 3.000 Schedule Types: Independent Study, Lecture
FIN 120	Entrepreneurial Accounting & Finance	This course introduces students to accounting and financial skills necessary for entrepreneurial ventures. Fundamental accounting concepts include understanding financial statements and performing basic financial statement ratio analysis. Managerial accounting concepts useful in management decision-making will be introduced including the preparation of operating and capital budgets and cost-volume-profit (break-even) analysis. The course also addresses objectives of financing, internal and external sources of financing, forms of financing, short-term vs. long-term financing, role of stock exchanges, Islamic financing, defining working capital, and managing of working capital.	Credit Hours: 3.000 Schedule Types: Lecture

FIN 301	Financial Management	<p>This course provides an introduction to finance that examines the role of the financial decision maker at the corporate level. Four basic questions are examined: the goal of the firm, investment decisions of the firm, financing decisions of the firm and dividend decisions of the firm. The technique of discounted cash-flow analysis is developed and emphasized as it relates to corporate financial decisions.</p> <p><b>Restrictions: Must be enrolled in Campuses: East Falls</b>  <b>Prerequisites: ACCT 101 (Minimum Grade D) and STAT 201 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
FIN 303	Intermediate Financial Management	<p>An in-depth study of financial analysis and planning, asset management and capital structures. Financial decision making is studied by means of finance cases. Computerized financial analyses are part of the course.</p> <p><b>Prerequisite: FIN 301</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
FIN 318	International Finance and Development	<p>This course explores interrelations between the economic theory of growth/development and financial applications in emerging countries. Case studies are used to analyze financial issues faced by corporations operating in a global environment. Main topics covered include balance of payments, exchange rate determinants, international financial markets, managing exchange rate risk exposure using derivatives, and foreign direct investment.</p> <p><b>Prerequisite: FIN 301</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes: Global Courses</p>
FIN 321	Investments & Portfolio Management	<p>This course explores the process of comparative security valuation analysis. The emphasis is on risk-return trade-off, principles of portfolio management and the process of security analysis.</p> <p><b>Prerequisite: FIN 301</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
FIN 322	Capital Market and Financial Institution	<p>This course explores depository and non-depository financial intermediaries, flow of funds into the money and capital markets.</p> <p><b>Prerequisite: FIN 301</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
FIN 381	Independent Study in Finance	<p>This course is an intensive independent study of a chosen subject. The student is expected to read a substantial number of major works in the field, may be required to do primary research and must prepare a critical documented paper. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b></p>	<p>Credit Hours: 3.000  Schedule Types: Independent Study</p>
FIN 411	Personal Fin Planning & Risk Mgt.	<p>In a seminar setting, drawing on the knowledge of the fundamentals and advanced concepts studied in finance classes, skills will be developed to become a better decision maker by learning how to integrate the various topics of finance. Through problem-oriented exercises, an appreciation of the importance and know-how of anticipating, recognizing and adapting to external forces in the decision-making process and organization will be developed. Finance as a functional area is dynamic, and emphasis will be placed on incorporating the most recent academic and practitioner literature, which is of theoretical and practical importance in the decision-making process. This challenging course is built around readings, finance cases, research papers and problem sets; and includes group and individual assignments and written and oral presentations.</p> <p><b>Prerequisite: FIN 321 and FIN 322</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture</p>
FIN 412	Financial Modeling	<p>This course develops and applies several data-driven financial models, including capital budgeting and cash flow estimation, stock and bond valuation, option pricing, and portfolio optimization, among others.</p> <p><b>Prerequisites: FIN 301</b></p>	<p>Credit Hours: 3.000  Schedule Types: Lecture, On-Line</p>
<b>FIRST YEAR EXPERIENCE</b>			

FYS 100	Pathways Seminar	The Pathways Seminar provides the opportunity for all first-time freshmen to learn and practice strategies that will enable their success at Philadelphia University and beyond. Students will create personal, professional, and academic goals, as well as success strategies for learning and career development. Each course section will engage with a specific theme determined for the entering class of that year. Through engagement with these themes, students will explore the role of the professional in the community and the world, and engage with the mission and goals of a Philadelphia University education.	Credit Hours: 1.000 Schedule Types: Lecture
<b>FRENCH</b>			
FREN 101	French I	A beginner's course designed for students with very little or no knowledge of the language. The focus is on basic oral expression, listening comprehension and acquiring simple reading and writing skills, so that students can gain confidence in the language and to begin to have conversations. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: French Language, Global Citizenship, Global Diversity, Global Courses
FREN 201	French II	A beginner's course designed for students who have completed one semester of college-level language or the equivalent. The focus is on oral expression, listening comprehension and the acquisition of simple reading and writing skills, so that students can gain confidence in the language and conduct conversations and other social interactions in the language with some level of ease. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions. <b>Prerequisites: FREN 101</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: French Language, Global Citizenship, Global Diversity, Global Courses
FREN 301	French III	An intermediate course designed for students who have completed two semesters of college-level language or the equivalent. The focus is on advancing oral expression, listening comprehension and the development of reading and writing skills, so that students can gain confidence and express themselves fluidly entirely in the target language. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: French Language, Global Citizenship, Global Diversity, Global Courses
FREN 401	French IV	An intermediate course that provides students with the opportunity to communicate in a fluent and sophisticated manner. The focus is on expanding the knowledge of structures and vocabulary that students have acquired in levels I-III. In addition to constant attention to speaking, writing, listening and reading, more complex ways of expression are also emphasized. Contemporary culture is explored through authentic visual media and written materials.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: French Language, Global Citizenship, Global Diversity, Global Courses
<b>GENERAL SONOGRAPHY</b>			
RSS 321	Patient Care & Services in Diagnostic Imaging	Presents basic concepts of the healthcare delivery system and an introduction to medical imaging and radiation sciences with a focus on sonography. Emphasizes patient care, diversity, sterile procedure, ergonomics and body mechanics, communication, essential sonographer skills, professional ethics and medicolegal issues.	Credit Hours: 2.000 Schedule Types: Lecture
RSS 400	Ultrasound Physics I	Presents general acoustic principles including energy transfer through wave propagation, transducer construction, spatial and temporal resolution, beam steering and focusing, imaging modes, and 3D/4D ultrasound. Emphasizes applied principles of instrumentation, including knobology and image optimization.	Credit Hours: 2.000 Schedule Types: Lecture

RSS 402	Abdominal Sonography I	Presents normal abdominal anatomy, physiology, related vasculature, cross sectional relationships, and scanning techniques regarding the abdominal sonographic examination. This course is designed to introduce students to the various imaging planes and correlative methods that are used to assess the abdomen.	Credit Hours: 2.000 Schedule Types: Lecture
RSS 403	Ultrasound Physics II	Presents properties of ultrasound's interaction with tissue and instrumentation of the ultrasound machine. Topics include computer technology, creation and storage of the ultrasound image, hemodynamics, spectral, color and power Doppler, acoustic artifacts, bioeffects & safety, and quality assurance/quality improvement relative to ultrasound. Advanced topics such as new imaging methods and new developments in ultrasound technology will also be introduced. <b>Prerequisite: RSS 400</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSS 404	Pelvic Sonography	This course is designed to present female pelvis anatomy, physiology, pathology, related vasculature, scanning techniques and protocols regarding the pelvic sonographic examination. Normal and abnormal first trimester pregnancy is also included in this course.	Credit Hours: 3.000 Schedule Types: Lecture
RSS 405	Obstetrical Sonography	Presents obstetrical applications of diagnostic ultrasound. Reviews the anatomy and physiology of fetal development including embryology and genetics. Presents normal and abnormal second and third trimester sonography as well as scanning protocols. Course includes obstetric biometry, screening and diagnostic testing.	Credit Hours: 3.000 Schedule Types: Lecture
RSS 408	Sonography Review Seminar	Presents a comprehensive review of physics, abdominal, pelvic, obstetrical and high resolution imaging applications of general sonography in preparation for the diagnostic medical sonography national certification examinations.	Credit Hours: 2.000 Schedule Types: Lecture
RSS 412	Clinical Sonography II	Students perform sonographic procedures during clinical rotations at affiliate sites under the supervision of designated clinical instructors. Evaluation of cognitive, effective and psychomotor skills is based on competency in scanning protocols and techniques, professionalism and proficiency in patient care.	Credit Hours: 6.000 Schedule Types: Clinical
RSS 413	Clinical Sonography II	Continuation of Radiologic Sciences S 412, Clinical Sonography I. Provides supervised clinical practice of diagnostic medical sonography in a university laboratory and clinical setting. Students are responsible for imaging and recording anatomic structures and pathology needed to perform optimal examinations. Requires intensive, hands-on clinical practice. <b>Prerequisite: RSS 412</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSS 414	Clinical Sonography III	Continuation of Radiologic Sciences S 413, Clinical Sonography II. Continuation of Radiologic Sciences S 413, Clinical Sonography II. Students will increase proficiency in identification of pathology and improve ability to perform complete studies with supervision. <b>Prerequisite: RSS 413</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSS 415	Sonography Procedures I	Presents, demonstrates and guides hands-on practice on equipment utilized in a general sonography laboratory to evaluate general sonography anatomy. Emphasizes the clinical application, operation, knobology, applied ultrasound physics, and instrumentation associated with such equipment combined with two-dimensional imaging of abdomino-pelvic organs, regions and related vasculature.	Credit Hours: 2.000 Schedule Types: Lecture, Lab
RSS 416	High Resolution Sonography	This course presents the latest techniques in high resolution ultrasound imaging, including but not limited to breast, thyroid, male pelvic, pediatric examinations, soft tissue structures, interventional procedures and elastography. Includes discussion of anatomy, physiology, pathology, and related vasculature of high resolution sonography examinations.	Credit Hours: 2.000 Schedule Types: Lecture



RSS 417	Sonography Procedures II	Presents, demonstrates, and guides hands-on practice on equipment utilized in a general sonography laboratory to evaluate general sonography and obstetrical anatomy. Emphasizes the clinical application, operation, knobology, applied ultrasound physics, and instrumentation associated with such equipment combined with two-dimensional imaging of abdomino-pelvic organs, obstetrics, and related vasculature. <b>Prerequisite: RSS 415</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSS 422	Abdominal Sonography II	This course is designed to present abdominal pathology, benign and malignant lesions, inflammation, infections, metastatic lesions, vasculature lesions, scanning techniques and protocols regarding the abdominal sonographic examination as it relates to pathology. <b>Prerequisite: RSS 402</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSS 498	Special Topics in General Sonography	Presents new techniques and information, clinical experiences and presentation of case studies in a weekly seminar format. Includes an overview of sonographic contrast agents, musculoskeletal sonography, threeand four-dimensional sonography, and new advances in ultrasound technology.	Credit Hours: 2.000 Schedule Types: Lecture
<b>GERMAN</b>			
GER 101	German I	A beginner's course designed for students with very little or no knowledge of the language. The focus is on basic oral expression, listening comprehension and acquiring simple reading and writing skills, so that students can gain confidence in the language and to begin to have conversations. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Citizenship, Global Diversity, German Language, Global Courses
GER 201	German II	Beginner's course designed for students who have completed one semester of college-level language or the equivalent. The focus is on oral expression, listening comprehension and the acquisition of simple reading and writing skills, so that students can gain confidence in the language and conduct conversations and other social interactions in the language with some level of ease. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Language/Area Studies, Global Citizenship, Global Diversity, German Language, Global Courses
<b>GLOBAL CITIZENSHIP</b>			
GCIT 200	War & Political Violence in Global Society	This course introduces students to the study of political violence with a particular focus on war. Understanding the motivations behind acts of violence, societal and human costs of violence, types of violence used by state and nonstate actors and its physical, psychological and emotional effects on everyday people across different global societies allows us to learn more about the world we live in. This course explores historical and contemporary cases of gang violence, conflicts, terrorism, torture, civil wars, revolutions, riots and militarism from around the world. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship
GCIT 210	Human Rights	The course will examine the question of whether there are certain rights that we all possess as human beings and the prominence of these rights in international relations. Students will monitor human-rights violations in the United States and other countries in order to determine how much we have achieved as a world community and how far we have yet to go. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Courses, Junior Seminar Course, Writing Intensive

GCIT 211	The Global Economy: Power, Poverty, and Politics	The course will emphasize the intersection between global political relations and global economics, and how the two together impact social relations worldwide. Various complementary and competing political and economic perspectives (from capitalist to socialist) will be used to address recent trends in the development of a global economy, international trade, the formation of regional blocs such as NAFTA and the EU, and North-South political/economic relations. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit hours: 3.000 Schedule Types: Lecture, Study Abroad Course Attributes: Global Citizenship, Social Science I
GCIT 214	Global Environmental Citizenship	What are our obligations as global citizens for addressing environmental issues that threaten Earth's ecosystems and climate? The Environment and Global Citizenship examines the causes, development and current impacts of major environmental problems and considers the possibilities and challenges of addressing them through global cooperation and technological innovation. Students will apply concepts of equity and environmental justice as they analyze the international dynamics responsible for the unequal distribution of responsibility and suffering related to environmental degradation around the world. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship
GCIT 215	Global Immigration	This course provides an overview of the forces that are shaping international politics and economics. This course will help students understand the roles of international institutions such as the United Nations, the World Trade Organization and the International Monetary Fund, as well as non-governmental actors such as Amnesty International and al Qaeda. Students will also examine the process of economic globalization in order to understand its varying impacts on different world regions. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture
GCIT 225	Global Politics	This course provides an overview of the forces that are shaping international politics and economics. This course will help students understand the roles of international institutions such as the United Nations, the World Trade Organization and the International Monetary Fund, as well as non-governmental actors such as Amnesty International and al Qaeda. Students will also examine the process of economic globalization in order to understand its varying impacts on different world regions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Courses, Science Level II, Social Science I
<b>GLOBAL DIVERSITY</b>			
GDIV 221	The Environment & World Cultures	Global religions, cultures, and philosophies, both past and present, have interpreted the relationship between human society and the natural environment in a variety of ways. In this course we will study attitudes towards the environment, its protection, and sustainability through the lenses of several major religions and philosophies, and will compare how these worldviews offer differing perspectives on the role of "Nature" in everyday life.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity, Global Courses
GDIV 229	Intercultural Encounters	The twentieth and twenty first centuries have produced an unprecedented level of global migration. As individuals and groups have moved around the world, different cultures have come into close, and often uncomfortable, contact. Through the concepts of migration, diaspora, and exile this course examines the literature, film, and music that express the challenges of these encounters. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity

GDIV 231	The Spanish Speaking World	This course examines the roles of literature, cinema, and other cultural forms in expressing Latin American and Hispanic cultures. Through direct examination of cultural artifacts, students gain insight into diverse cultures and experience different perspectives. As well as investigating specific cultures and cultural production, students will explore the interaction of distinct groups and societies to discover the dynamics and effects of cross-cultural interactions. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity, Global Courses
GDIV 233	World Cinemas	This course examines cinematic works from around the world in order to gain insight into the social and cultural values of diverse societies. After acquiring some of the basics of film theory and considering how to watch and analyze a film, we will analyze films from a variety of world regions. Students will identify how cultural differences are reflected in cinematic works while also considering the impact of cross-cultural influences in the world of filmmaking. The focus on the cultural dimensions of cinema in this Global Diversity course is designed to help students fulfill the Empathy outcome in the Hallmarks Program. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity, Global Courses
GDIV 235	World Religions	This course provides an introduction to the historical development, scriptures, practices, and contemporary cultural influence of various world religions. It will cover some selection of Hinduism, Daoism, Confucianism, Judaism, Christianity, Islam, and other religious traditions. Students will explore the role of religion in shaping different cultures. This Global Diversity course is designed to help students fulfill the Empathy outcome in the Hallmarks Program. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity, Global Courses
GDIV 333	Pop Culture in Global Society	This course focuses on the various ways in which popular culture, expressed through film, television, social media, and print media and other realms are used as rhetorical devices, employed to shape how peoples around the world view one another. Through the reading and analysis of a variety of images from the U.S. and abroad, students will gain a better understanding of how popular media serve to build and express national identity; further, they will also gain substantive knowledge about some of the political, social, economic, religious, and other factors which underpin relations between peoples around the globe. <b>Prerequisites: WRIT 101 and AMST 114</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Diversity
<b>GRAPHIC DESIGN</b>			
GRPH 102	Intro to Graphic Design	This course is an introduction to the design process through methods, materials and vocabulary used in the Graphic and Web Design professions. This studio course emphasizes form analysis; visual abstraction; communication methods; visual metaphor, and concepts in design.	Credit Hours: 3.000 Schedule Types: Studio
GRPH 110	Digital Imaging for Graphic Design	This course introduces Adobe Illustrator, Adobe InDesign and Adobe Photoshop as they are used in the graphic design industry. Students work through a series of exercises and projects exploring the image creation and manipulation abilities of Photoshop and Illustrator followed by an introduction of InDesign as a page layout program.	Credit Hours: 3.000 Schedule Types: StudioLecture, Lecture/Studio Combination,
GRPH 201	Design III for Graph Design Communication	This course introduces the student to typography and its uses through sequential studies to support the building of a visual vocabulary. Students will examine the individual letterform, letters in combination, and large bodies of text with a concentration on the grid, hierarchy, legibility, and clarity of conceptual communication. <b>Prerequisite: GRAPH 102 and DSGN 203 and ADFND- 02 or INDD 102 (Min grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Honors Assignment, Nexus Design Experience
GRPH 202	Design IV for Graph Dsgn Comm	This course will build on learning objectives and typographic skills. Emphasis will be placed on the complex interplay of visual meaning and form and typographic sensitivity within a historical context. <b>Prerequisite:GRAPH 201 (minimum grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Honors Assignment

GRPH 206	Design History Study Abroad	Design History Study Abroad will provide students with the opportunity to experience first-hand and in person, accounts of extraordinary international designers, important design movements and architecture dating from the mid-1700's to the present day. Learning about these contributions to international culture, art and design history-outside of the textbooks, outside of the classroom, and in full color-will help to bring the foundation of understanding of design to life. Studying abroad will allow the student to experience the past while obtaining inspiration and insight into the future. <b>Prerequisite: VDES 101 or ADFND 101 or DRAW 101 or VDRW 101 and HIST 114 or DBTU 114; and WRIT 101 or WRTG 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
GRPH 208	History of Graphic Design	This course will chronicle the evolution of modern Graphic Design through an in-depth survey of human visual communication, beginning with the invention of writing and communication, through the creation of the Gutenberg Press and culminating with the study of the contemporary digital age. Discussion will focus on the function of Graphic Design to communicate and meet human needs with an emphasis on the influence of technology and the evolving role of design in business. <b>Prerequisite: WRTG 101 and ARTH 101 or ARTH 102</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lecture Course Attributes: Honors Assignment, Writing Intensive
GRPH 301	Design V for Graph Design Comm	This course will focus on the understanding and creation of cohesive corporate identity systems through a systems approach to design with application to such items as a logo, stationery system, packaging, advertisement and other related collateral. The continued investigation of typography and its application will be stressed. <b>Prerequisite: GRPH 202 (Minimum grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Nexus Design Experience
GRPH 302	Design VI for Graph Design Comm	This course will build upon knowledge and skills obtained in GRPH-301. Students will respond to complex corporate identity projects through a systems approach. Students will consider solutions that work across multiple media and experiment with unconventional points of contact with the desired target market. <b>Prerequisite: GRPH 301 (Minimum grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Nexus Design Experience
GRPH 305	Exhibit Design and Signage	This course concentrates on the adaptation of graphic skills to three-dimensional structures and environments. Students will study structures and commercial systems available for product display, exhibit design and signage. <b>Prerequisite: GRPH 202</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 308	Graphic Design Theory	The Design Theory course will introduce students to contemporary Graphic Design theories and discourse. It will include theoretical aspects of design, including: making, visualizing and reading. Graphic Design and visual communication theories will be compared to those in other design disciplines. Students will use a case study approach to investigate contemporary design and to write critically about it from their point-of-view.	Credit Hours: 3.000 Schedule Types: Lecture, Studio Course Attributes: Honors Assignment, Writing Intensive
GRPH 320	Package Design	This course will allow students to apply graphic knowledge to dimensional structures. Emphasis will be placed on the interplay between graphics and structures and the ability of structural design and materials to enhance conceptual communication. <b>Prerequisite :GRPH 202</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 341	Illustration	This course includes original image making in a variety of techniques and media, including exploration of both computer design and traditional methods. Emphasis is placed on unity of concept and media and effective use of visual translation and metaphor. <b>Prerequisite:GRPH 202</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 381	Independently Study: Computer Graphics	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b> <b>Prerequisite: GRAPH 301</b>	Credit Hours: 3.000 Schedule Types: Independent Study

GRPH 401	Design VII for Graph Dsgn Comm	This course will focus on developing design concepts and establishing a visual language that will be applied to various formats while utilizing a systems design approach. The character of the project will support a unified theme/concept/idea for an identified client that is geared to a specific market or interest group. There will also be research and conceptual development work towards a written proposal for faculty review in preparation for the following semester's Capstone in Graphic Design project. <b>Prerequisite: GAPH 302 (Minimum Grade C)</b>	Credit Hours: 6.000 Schedule Types: Studio Course Attributes: Writing Intensive
GRPH 407	Philadelphia University Design Workkshop	This course will provide students with an opportunity to work on real projects for real clients (University, non-profit and/or industry), thus offering a chance to gain valuable, practical experience while still in school. Students will work in interdisciplinary teams, gain exposure to client relations and the professional presentation of their work and be exposed to all levels of production as it relates to these projects. The course is open to junior and senior-level Graphic Design Communication and Interactive Design and Media students only upon prior portfolio review by the instructor. <b>Prerequisite: GRPH 301 or DIGD 301 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 408	Advanced Publication Design	This course will focus on publication design and the continued development of projects with increased conceptual and physical complexity. The relationship between editorial content and design format will be explored. Original image-making through illustrative, photographic or any other means will be encouraged. The application of charts, graphs, tables and quantitative information will be investigated. <b>Prerequisite: GRPH 202</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 409	Issues in Information Design	This course introduces issues in the design and communication of typical information categories through a range of design, media, and scales. Topics are raised in the categories of cartography, comparative data and diagrams. Emphasis is placed on exploration, understanding and process rather than on finished design and craft. <b>Prerequisite: GRAPH 202 or INDD 202</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
GRPH 499	Cap in Graph Design Comm	Students develop projects independently and are required to demonstrate ability and understanding of communication design theory, process and principles. The final project requires research of topic, design exploration, development and final professional presentation. The syllabus also requires the development and presentation of a resume and a final portfolio of work selected from projects students have produced during their studies in the program.	Credit Hours: 6.000 Schedule Types: Studio
<b>HALLMARK CORE</b>			
FYS 100	First Year Seminar	This one-credit course introduces first-time freshmen to university life and academic strategies that will enable their success at Thomas Jefferson University and beyond. Students will create personal, professional, and academic goals, as they plan for effective learning and career development in their majors.	Credit hours: 3.000 Schedule Types: Lecture
WRIT 101	Written Communication	In Writing Seminar I: Written Communication, students develop skills and practices vital to the writing process: reading, synthesizing, outlining, drafting, and revising. Written Communication asks students to anticipate the needs of an audience and create academic arguments to address those needs. To achieve these goals, students write in a variety of academic genres. Through the theme of "Finding Philadelphia," students analyze both published and student texts. This course is the first in two writing-specific courses at the University, and it helps students develop their Contextual Communication competency.	Credit Hours: 3.000 Schedule Types: Lecture

AMST 114	Topics in American Studies	<p>In Topics in American Studies, students examine a series of pressing current political, economic and/or social issues in the United States. Using perspectives from fields such as history, sociology, ethnic studies, religious studies, and political science, students and faculty will work together to trace the longer-term developments that have shaped the modern United States, and to examine competing interpretations of and responses to them. Topics may include current issues in areas such as healthcare, immigration, race, foreign policy, gender, economic inequality, sexuality, electoral politics, criminal justice, the environment, and religion. This is the first Touchstone course in the Hallmarks Core, where students will learn about the Hallmarks Pathway process and post artifacts and reflections from their first-year course work.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
MATH XXX	MATHEMATICS	<p>In the Mathematics requirement, students learn the language of mathematics so that they can manipulate mathematical symbols correctly, translate words into mathematical forms and translate mathematical forms into words. The Mathematics requirement helps students to develop their Critical Analysis competency as they apply mathematical reasoning to answer real-world questions. Depending on the requirements of the majors, students take a minimum of one course with a MATH prefix and a maximum of two courses in this category to fulfill the Hallmarks Core requirements (the majors may require additional math training beyond this).</p> <ul style="list-style-type: none"> <li>&gt; MATH 100/1 College Algebra</li> <li>&gt; MATH 102 Pre-Calculus</li> <li>&gt; MATH 103 Applied Calculus</li> <li>&gt; MATH 104 Analytical Geometry</li> <li>&gt; MATH 110 Pre-Calculus for Science and Engineers</li> </ul>	
SCI XXX	Scientific Understanding	<p>In the Scientific Understanding category, students apply scientific methods to problem solving, investigate the functioning of the natural world, and assess the validity of scientific information presented in written and graphic formats. This requirement helps students develop their Rigorous Inquiry competency as they learn how to generate data and test ideas in a systematic way. Depending on the requirements of the majors, students take a minimum of one and a maximum of two courses in this category to fulfill the Hallmarks Core requirements (the majors may require additional science training beyond this). These courses are typically in the first two years, but this can vary by major.</p> <ul style="list-style-type: none"> <li>&gt;SCI 101 Environmental Science</li> <li>&gt;SCI 102 Exploring Science</li> <li>&gt;SCI 106 Biology for Design</li> <li>&gt;SCI 108 Sustainability and Eco-Innovation</li> <li>&gt;SCI 110 Landscape Ecology</li> <li>&gt;SCI 112 Materials Selection</li> <li>&gt;BIOL 101 Current Topics in Biology</li> <li>&gt;CHEM 101 General Chemistry</li> <li>&gt;PHYS 101 General Physics</li> <li>&gt;CHEM 103 Chemistry I (4 cr.)</li> <li>&gt;BIOL 103 Biology I (4 cr.)</li> <li>&gt;PHYS 201 Physics I (4 cr.)</li> </ul>	

WRIT 2XX	Writing Seminar II: Multimedia Communication	<p>In this course, students produce collaborative and individual projects to develop critical reading, writing, thinking and researching skills. Through analyses of professional communication, students consider the rhetorical framework and strategies for effective, ethical communication. Student projects include written, oral and visual presentations, with particular emphasis on project management and process as well as the final products of their work. In the Hallmarks Program, this course also serves as a Touchstone course in which each student's Hallmarks Pathway is reviewed and assessed at its sophomore-level stage of development. There is also a 4-credit version of the course for all incoming transfer students; this version will be a residency requirement that introduces new students to the Hallmarks Pathway and helps them "backfill" it with artifacts and/or reflections from previous course work or life experiences.</p> <p>&gt;WRIT 201 Writing Seminar II: Multimedia Communication &gt;WRIT 202 Writing Seminar II for Transfer Students: Multimedia Communication</p>	
Ethics		<p>Courses in the Ethics category provide frameworks for moral decision making in students' professional, civic, and personal lives. By debating contemporary ethical issues in everyday life and in their professions, critically analyzing their own ethical commitments, and studying different approaches to ethical decision making, these courses help students develop their Ethical Reflection competency.</p> <ul style="list-style-type: none"> <li>&gt; ETHC 200 Bioethics</li> <li>&gt; ETHC 201 Honors Moral Philosophy</li> <li>&gt; ETHC 202 Environmental Ethics</li> <li>&gt; ETHC 204 The Ethics of Apocalypse: Dystopian Film and Literature</li> <li>&gt; ETHC 206 Applied Professional Ethics</li> <li>&gt; ETHC 215 Evil and Good</li> </ul>	
GDIV XXX	Global Diversity	<p>In the Global Diversity category, students explore the cultural and social dynamics of various world societies. Students enhance their ability to understand others by experiencing the perspectives of societies and value systems from around the world through the analysis of a variety of cultural artifacts. This requirement helps students develop their Empathy competency by raising their awareness of ethnocentrism and building their intercultural understanding.</p> <ul style="list-style-type: none"> <li>&gt; GDIV 221 The Environment and World Cultures</li> <li>&gt; GDIV 229 Intercultural Encounters</li> <li>&gt; GDIV 231 Cultures of the Spanish Speaking World</li> <li>&gt; GDIV 233 World Cinemas</li> <li>&gt; GDIV 235 World Religions</li> <li>&gt; GDIV 333 Pop Culture in Global Society</li> <li>&gt; FREN-101/201/301/401: French I-IV</li> <li>&gt; GER-101/201: German I-II</li> <li>&gt; ITAL-101/201/301/401: Italian I-IV</li> <li>&gt; JAPN-101/201/301/401: Japanese I-IV</li> <li>&gt; SPAN-101/201/301/401: Spanish I-IV</li> <li>&gt; SPAN-202: Medical Spanish</li> <li>&gt; SPAN-302: Intermediate Medical Spanish</li> </ul>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b></p>

ADIV 1XX	American Diversity	<p>issues, past and present, in the United States. Using close reading, critical thinking, and the analysis of primary texts and cultural artifacts, students strengthen their information literacy skills as they find, consider and evaluate multiple perspectives on course topics. The requirement helps students develop their Critical Analysis competency by using reasoning and evidence to challenge arguments and reach conclusions.</p> <ul style="list-style-type: none"> <li>&gt; ADIV 200 American Social Justice</li> <li>&gt; ADIV 201 Defining American Voices</li> <li>&gt; ADIV 202 Immigrant America</li> <li>&gt; ADIV 204 Red and Blue America</li> <li>&gt; ADIV 206 Gender and Diversity in the U.S.</li> <li>&gt; ADIV 211 African American Studies</li> <li>&gt; ADIV 212 Asian American Studies</li> <li>&gt; ADIV 213 Jewish American Studies</li> <li>&gt; ADIV 214 Race in America</li> <li>&gt; ADIV 215 Latinx American Studies</li> <li>&gt; ADIV 216 LGBTQIA American Studies</li> <li>&gt; ADIV 217 Muslim American Studies</li> <li>&gt; ADIV 218 Studying Philadelphia: Diversity in the City of Brotherly Love</li> </ul>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
GDIV 2XX	Global Citizenship	<p>sociological issues at the international level to consider the meanings and obligations of global citizenship. These courses address various dimensions of the modern globalization trend and their impacts on cross-cultural understanding. This requirement helps students develop their Global Perspectives competency.</p> <ul style="list-style-type: none"> <li>&gt; GCIT 200 War and Political Violence</li> <li>&gt; GCIT 210 Human Rights</li> <li>&gt; GCIT 211 The Global Economy</li> <li>&gt; GCIT 214 Global Environmental Citizenship</li> <li>&gt; GCIT 215 Global Immigration</li> <li>&gt; GCIT 225 Global Politics</li> <li>&gt; FREN-101/201/301/401: French I-IV</li> <li>&gt; GER-101/201: German I-II</li> <li>&gt; ITAL-101/201/301/401: Italian I-IV</li> <li>&gt; JAPN-101/201/301/401: Japanese I-IV</li> <li>&gt; SPAN-101/201/301/401: Spanish I-IV</li> <li>&gt; SPAN-202: Medical Spanish</li> <li>&gt; SPAN-302: Intermediate Medical Spanish</li> </ul>	
ISEM XXX	Integrative Seminars	<p>integrative seminars provide an in-depth examination of specific topics or themes related to one or more of the University's professional majors. Geared for a general audience, these courses evaluate their topics from a variety of perspectives, including those from the disciplines of history, the social sciences and/or the humanities. These junior-year, writing-intensive courses help students develop their Initiative competency by encouraging them to take intellectual risks as they explore real-world issues using advanced research, communication and critical-thinking skills.</p> <ul style="list-style-type: none"> <li>&gt; ISEM 300/DECM 300 Ethnographic Research Methods</li> <li>&gt; ISEM 300 Animals and Society</li> <li>&gt; ISEM 302 Telling Stories, Selling Stories</li> <li>&gt; ISEM 303 Perspectives on Psychoanalysis</li> <li>&gt; ISEM 304 Cultures of Health and Illness</li> <li>&gt; ISEM 305 Healthcare Economics and Policy</li> <li>&gt; ISEM 313 Conspiracy Theories</li> <li>&gt; ISEM 340 Sustainability and Development in the Non-Western World</li> <li>&gt; ISEM 360 Human Behavior and the Physical Environment</li> </ul>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>



CGIS 300	Contemporary Global Issues	Contemporary Global Issues is a writing-intensive course that examines current global social, political and economic trends from multiple competing perspectives, and evaluates their impacts on world societies. Students will complete individual and collaborative projects that explore the intercultural and ethical dimensions of today's most pressing international issues. As a Touchstone course in the Hallmarks Core curriculum, the course includes an upper-level review and assessment of each student's Hallmarks Pathway, and addresses many of the eight Hallmarks competencies.	Credit Hours: 3.000 Schedule Types: Lecture
PHIL 499	Philosophies of the Good Life	The final course in the Hallmarks Core, "Philosophies of the Good Life" invites Jefferson seniors to define their personal values and to plan for how they might pursue and practice them in their post-college life. Students will survey philosophical understandings of "the good life" and consider how various world cultures and spiritual traditions have answered questions about the meaning of life. The course also covers topics in happiness studies and examines the roles that work and profession can play in a meaningful life. In a final project, students will draw upon course topics to reach their own conclusions about "the good life," expressing these in both academic and creative formats. As the last Touchstone course in the Hallmarks Core curriculum, the course guides students in reviewing and completing their Hallmarks Pathway.	Credit Hours: 3.000 Schedule Types: Lecture
<b>HEALTH SCIENCES</b>			
HSCI 100	Intro to Health Professions	This course familiarizes the student with the scope, education, certification, legislation, and roles of a variety of health care professions. The structure of the U.S. health care system, along with current issues and trends related to that system, is discussed. Students review requirements for completing clinical hours in HSCI-230 and HSCI-320.	Credit hours: 1.000 Schedule Types: Lecture
HSCI 225	Applied Statistics	This course provides an introduction to statistics concepts and reasoning. It represents an introduction to the field of epidemiology in the context of health science. Students explore the basics of descriptive and inferential statistics with an emphasis on interpretation of statistical results, data management and generation of tables and graphs that can inform reports, evaluations, and quality improvement efforts. Applications include estimation of confidence intervals; testing statistical hypotheses for population means, proportions, and variances; and use of non-parametric tests. Students learn to use MS Excel as a software tool to enter and analyze data. <b>Prerequisite: MATH 1XX</b>	Credit hours: 3.000 Schedule Types: Lecture Attributes: Honors Assignment
HSCI 230	Intro to Healthcare	This course introduces students aspiring to health careers to the basic principles of human interaction in the clinical setting. Ethics and current issues related to healthcare delivery are discussed. This course requires patient contact experience in a healthcare facility. Students may be required to obtain legal and health clearances to complete clinical hours. The costs for these clearances are the student's responsibility. Not to be taken concurrently with HSCI-320 except by permission of program director.	Credit hours: 2.000 Schedule Types: Hybrid, Lab, Lecture, Lecture/Lab
HSCI 231	Intro to Health Care & Comm	This course explores current issues in health care, and principles of patient-provider communication in clinical settings. Designed for pre-health profession students, this course includes required patient contact experience in a healthcare setting. Restricted to Honors students.	Credit hours: 3.000 Schedule Types: Lecture, Seminar
HSCI 301	Health, Law & Ethics	This course provides students with the foundation to recognize, understand, and resolve legal and ethical issues associated with contemporary healthcare. It represents an introduction to the US legal system and the basics of ethical and bioethical issues. Students explore liability, conflict management, the consent process, and the business of medicine, privacy and the role of an ethics. Additionally, students debate the ethical and legal consequences of contemporary health-related issues (such as end-of-life dilemmas, surrogacy, and organ donation). <b>Prerequisites: WRIT 201 (Minimum Grade D)</b>	Credit hours:3.000 Schedule Types: Lecture

HSCI 302	Clin Research in Emerg Med	<p>This course, designed for students in undergraduate health science programs, trains students to conduct clinical research studies using a combination of didactic and hands-on learning. Students will develop the necessary skills to identify potential candidates, perform interviews, obtain informed consent, carry out data collection, and process specimens according to study protocols. Students work closely with emergency physicians, nursing staff, and research coordinators on a wide range of studies including multicenter NIH-funded and industry-sponsored clinical trials. In addition, students will participate in a variety of clinical skills sessions taught by emergency medicine faculty, including wound management, ultrasonography, as well as workshops on design in medicine hosted by JeffDESIGN faculty.</p> <p><b>STUDENTS MUST OBTAIN PERMISSION FROM THE HSCI PROGRAM DIRECTOR FOR ENROLLMENT.</b> Students will be invited for a brief interview with the Course Director to receive approval to register for the course. During the interview, students will need to show proof of completion and approval of hospital credentialing requirements at least 8 weeks prior to the start of the term.</p> <p><b>Prerequisite: BIOL 202 BIOL 202L; (Minimum grade B- )</b></p>	<p>Credit hours: 3.000 Schedule Types: By Appointment - Lecture</p>
HSCI 304	Nutrition and Health	<p>This lecture and case-based discussion course provides students with an overview of principles of nutrition and the role health care providers play in the support of healthy eating goals. It has been estimated that over 1/3rd of the U.S. population is obese, with children becoming increasingly susceptible. Through lecture, research, and presentations, the concepts of the life cycle, growth and development, and how nutrition interfaces with all aspects of these processes will be presented. The major determinants of health, the causes of disease, and the impact of nutrition counseling on disease prevention and treatment will be discussed with an emphasis on supportive nutritional counseling.</p> <p><b>Prerequisite BIOL 103, BIOL 103L or BIOL 112, BIOL 112L</b></p>	<p>Credit hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment</p>
HSCI 305	Concepts in Fitness & Wellnes	<p>The link between exercise and disease prevention or progression has been well established. Yet while most Americans believe that physical activity can promote better health, approximately half of all US adults do not achieve the recommended amount of daily physical activity. Through lecture, research, and hands-on skills this course aims to give students in health and science majors the background in exercise physiology, fitness and wellness principles, and measure of physical fitness in order to recommend and implement a sound fitness and wellness program for people of all ages to prevent or limit progression of a variety of medical conditions.</p> <p><b>Prerequisites: BIOL 103 (Minimum Grade D) and BIOL 103L (Minimum Grade D) or BIOL 112 (Minimum Grade D) and BIOL 112L (Minimum Grade D)</b></p>	<p>Credit hours: 3.000 Schedule Types: Lecture</p>
HSCI 308	Women's Health	<p>Students will look at the intersection of gender, health, and illness through different disciplinary perspectives. Health is conceptualized not only as the absence of disease, but as the result of individual, cultural, social, legal, and environmental influences. Illnesses that disproportionately affect women are examined through a variety of lenses. The course provides for focused exploration of social determinants of health and cultural considerations with a special emphasis on gender throughout the lifespan.</p> <p><b>Prerequisites: WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D)</b></p>	<p>Credit hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive, Honors</p>
HSCI 309	Children's Health	<p>This course examines contemporary trends in the delivery of children's healthcare. Students will explore how social and environmental factors affect health, and the impact that allocation of healthcare resources has on health delivery.</p> <p><b>Prerequisite: WRIT 2XX</b></p>	<p>Credit hours: 3.000 Schedule Types: Hybrid, Lecture/On-Line</p>

HSCI 310	Emergency Medical Technician	This hybrid course prepares students to handle emergencies using basic-life support equipment in accordance with objectives of the US Department of Transportation National Standard Curriculum. It includes training in American Heart Association (AHA) Basic Cardiac Life Support (BLS), and prepares students for the Pennsylvania Department of Health Emergency Medical Technician-Basic (EMT) examination process. Lab fee will be assessed. Enrollment restricted to 3+2 HSCI BS/Physician Assistant and HSCI BS/Pre-Physician Assistant majors.	Credit hours: 3.000 Schedule Types: Hybrid Course Attributes: Honors Assignment
HSCI 311	Intro to Nursing	This course introduces students to the nursing profession by exploring the evolution of nursing practice, and the profession's values such as empathy, professionalism, and human dignity. Students will explore reflective practice, time management, and becoming self-motivated learners as they relate to the student nurse role. This hybrid course uses multiple teaching-learning strategies to prepare pre-nursing students to seamlessly transition into their professional nursing education. Prerequisite: WRIT 2XX	Credit hours: 2.000 Schedule Types: Hybrid
HSCI 313	Cur Issues in Comm Hlth	Students will learn to assess the causes and conditions that impact health across diverse communities. This course will discuss topics such as social determinants of health, health disparities and inequities, program planning and evaluation, and moral and ethical decision making in community health. <b>Prerequisite: WRIT 2XX</b>	Credit hours:3.000 Schedule Types: Hybrid, Lecture
HSCI 314	Medical Cannabis	In this course students learn about the cultural and social history of cannabis; some of the rapidly developing trends in cannabis business, laws and regulations; and major aspects of cannabis science, from a layman's perspective. <b>Prerequisites: WRIT 2XX (or permission of instructor)</b>	Credit hours:3.000
HSCI 315	Health & Wellness Coaching	Students will learn about and engage in course activities related to health and wellness coaching through a lifespan health perspective. In particular, students will consider the mind and body as a whole, review coaching and behavioral change theories, and develop individual health and wellness plans. This course fulfills the Health Sciences major writing intensive requirement. <b>Prerequisites: WRIT 2XX (or permission of instructor)</b>	Credit hours:3.000 Course Attributes: Writing Intensive
HSCI 320	Clinical Interactions	Clinical Interactions This experiential, independent-study course includes an extended community-service volunteer experience (150 hours) in a health care setting. Students are required to complete and submit activity logs, a final paper, and an evaluation from their supervisor. Students may require background check and other clearances to complete clinical hours. <b>Prerequisite: HSCI-230 (Minimum Grade D)</b>	Credit hours:3.000 Schedule Types: On-Line Course Attributes: Honors Assignment
HSCI 330	Medical Terminology	This hybrid course is designed for students in undergraduate health science programs and focuses on the structure and use of medical language and common documentation formats. It also includes an introduction to medical informatics. Clinical cases are utilized to illustrate the use of medical terminology in the health care setting. <b>Prerequisite: BIOL-201 (Minimum Grade D); BIOL 201L (Minimum Grade D)</b>	Credit hours: 3.000 Schedule Types: On-Line Course
HSCI 371	Special Topics	This course explores topics in health sciences not developed in other courses. Examples include health and technology, women's health, children's health, healthy aging, and special population health. Students may take this course more than once as the topics differ each time it is offered. <b>Prerequisite: WRIT 2XX</b>	Credit hours: 1.00-3.000 Schedule Types: Variable
		<b>HONORS</b>	

HONR 300	Honors: Study Abroad	This non-credit option allows a student to earn Honors credit while completing a semester in another country. Students interested in pursuing Honors Study Abroad work with their academic advisor and/or school faculty to prepare a proposal to study/observe a facet of the host country's culture. Upon return to campus, students will offer a presentation of their observations to the campus community.	Credit Hours: 0.000 Schedule Types: Study Abroad Course Attributes: Honors
HONR 310	Honors Summer Readings	This non-credit option is a very popular option. Exclusively on BlackBoard, students read, discuss, and complete assignments of selected books under the guidance of a faculty member. The course counts toward one of the seven courses required for the honors certificate. To enroll, students must be in good standing in the Honors Program. This is a noncredit option.	Credit Hours: 0.000 Schedule Types: On-Line Course Attributes: Honors
HONR 355	Honors: Community Service	Students interested in pursuing Honors Community Service work with the Honors director and/or campus Community Service coordinator to: 1) identify a local service effort, and 2) prepare a proposal to earn honors credit. This is a noncredit option.	Schedule Types: Internship Course Attributes: Co-operative Work Experience, Honors
HONR 381	Honors Independent Study I	Students interested in pursuing Honors Independent Study should meet with the faculty member with whom they want to study to prepare an outline of the topic, goals and objectives for the semester's work. Proposals should be turned in to the Honors director three weeks before preregistration. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b>	
HONR 391	Honors Research I	Students interested in pursuing Honors Research should meet with the faculty member to plan a research project outlining the topic and inquiry. Proposals should be turned in to the Honors director three weeks before pre-registration.	Credit Hours: 3.000 Schedule Types: Independent Study Course Attributes: Honors
<b>INDUSTRIAL DESIGN</b>			
INDD 101	Design 1 for Industrial Design	This studio is an introduction to design for undergraduate majors in industrial design. The course will provide an intensive introduction to design as an iterative problem-solving process. It will also introduce strategies for making and analyzing form, and present basic techniques of two-dimensional visualization and documentation of three-dimensional objects and principles of design critique, testing and research.	Credit Hours: 4.000 Schedule Types: Studio
INDD 102	Design 2 for Industrial Design	This studio introduces methods, materials and vocabulary of the industrial design profession, as well as design as a rational, iterative process of problem solving based on working creatively within constraints. Working with materials, digital and hand tools, shop processes and presentation techniques used by professionals are emphasized. It is intensive in industrial design drawing, including sketches, development drawings, orthographic, axonometric and perspective renderings, as well as beginning drafting as used in industrial design, with dimensioned assembly and parts drawings. <b>Restrictions: Must be enrolled in Industrial Design</b>	Credit Hours: 4.000 Schedule Types: Studio
INDD 106	Materials & Processes for Fabrication	This course introduces shop techniques as they pertain to industrial design model-making and prototype construction. All industrial design students must take this course for shop equipment safety training and pass a safety test. Throughout the semester, attention is given to safety precautions for the shop, along with demonstrations of shop equipment and fabrication processes. A major portion of the course will consist of developing an understanding of the materials and machinery commonly used by industrial designers for producing both working and appearance models.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
INDD 201	Design 3 for Industrial Design	This course focuses on creative problem-solving techniques using drawing, sketch modeling and basic shop skills. Students are exposed to a wide choice of materials, which industrial designers use to move their projects forward. Students will use several media for the purpose of documenting projects in progress, for duplication and for presentation purposes. Emphasis is placed on the improvement of craft in the execution of projects. <b>Prerequisites: INDD 102 (Minimum Grade C)</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Honors Assignment, Nexus Design Experience

INDD 202	Design 4 for Industrial Design	During the fourth in a series of eight studios, designs are conceived which explore the dynamics between objects and the user's senses and emotions. Students are challenged to improve their ability to define problems, generate concepts, evaluate these and offer refinements of solutions. Students will use basic imaging techniques in the presentation of design solutions. <b>Prerequisite: INDD 201</b>	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Honors Assignment, Nexus Design Experience
INDD 203	Lighting Design for Luminaires	This course focuses on luminaire design, specifically for the lighting trade market, which requires knowledge of codes and regulations, lighting metrics, and fundamentals of lighting design. Included is a review of the lighting design market, including residential, corporate, industrial, retail, as well as interior vs. exterior lighting. Students will increase their knowledge of how light is used in the built environment, and the different types of lamp sources, luminaires, and their functions. Emphasis will be placed on recent developments in solid state lighting and controls.	Credit Hours: 3.000 Schedule Types: Lecture
INDD 204	Lighting Design As Public Experience	This course focuses on lighting in public space, in the form of large scale installations of light,digital projection, media façades, and other means of place-making which transform our cities into digital urban design. We will review how historically light has shaped the landscape of our public environments, with a focus on new technologies that allow for the rapid upgrade we are seeing in urban areas. Students will learn software that allows them the ability to program light shows, and use digital mapping. Students will participate in full scale temporary lighting installations.	Credit Hours: 3.000 Schedule Types: Lecture
INDD 205	Rendering for Industrial Design	An introduction to the digital and traditional techniques and materials that industrial designers use to develop and represent three-dimensional concepts and ideas. Emphasis is placed on controlling color, surface and light, and the use of rendering techniques in a professional industrial design workflow. <b>Prerequisites: DRAW 301 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
INDD 206	CAD I for Industrial Design	The course introduces students to computer-aided design with a focus on the industrial design processes. In an intuitive fashion, students create and refine designs using a solids-modeling software package. In order to recognize the critical role CAD plays in the development of designs, students will use designs created in design studio courses as the subject matter of the CAD activities. Design-control drawings, three-dimensional rendered drawings and perspective drawings will be the course's output.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
INDD 207	Materials and Processes for Manufacturing	This course is concerned with the materials used in the mass production of products, the processes used to shape these materials, and designing parts to appropriately reflect the materials and processes used. Students should be prepared to visit a number of manufacturing facilities.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
INDD 210	Ergonomic Studies	This course analyzes human factors as used in design development. It explores the issues of operator/ user human factors, and their impacts on design. Students will learn to quantify and apply human dimensions and capabilities, both physical and cognitive, within a product design process. Subjects include systems reliability, sensory and motor processes, basic research techniques, and anthropometric studies. <b>Prerequisites: INDD 106 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
INDD 301	Design 5 for Industrial Design	The fifth in a series of eight studios, this course focuses on industrial design as a collaborative professional practice, based on understanding of user needs, technology, and client requirements. Students will demonstrate control of the process of design to develop meaningful concepts that employ appropriate technology for their eventual realization.	Credit Hours: 4.000 Schedule Types: Studio
INDD 302N	Design 6 for Industrial Design	In this sixth of eight sequential studio courses, students design and develop consumer products. Students learn about the complexities of the product-development process, maintaining the initial intent of their designs while reconciling assembly requirements, marketing issues, materials, and sustainability.	Credit Hours: 5.000 Schedule Types: Studio

INDD 303	Drawing: Design & Development	This is an introductory industrial design sketching course for designers who want to improve their ability to apply understanding to the development of designs.	Credit Hours: 3.000 Schedule Types: Lecture
INDD 304	Design History & Theory	This seminar explores the context and scope of the practice of industrial design through readings, research, critical discussions, written presentations and papers. This course is intensive and incorporates a workshop component in which students will use various theoretical frameworks to examine their own attitudes and design work through papers and spoken/ graphic presentations. <b>Prerequisites: INDD 324 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
INDD 305	CAD II Solidworks	This course will build upon principles introduced in introductory CAD courses. It is primarily a laboratory course in which students will learn to take their early design concepts through to the final presentation using advanced digital design techniques. Students will use multiple digital design software packages across computer platforms with an emphasis on CAID packages such as NURBS modelers and animation software, as well as vector-based, desktop-publishing programs and bitmap-based programs.	Credit Hours: 3.000 Schedule Types: Lecture/Lab Course Attributes: Honors Assignment
INDD 306A	Intercultural Innovation: Study Abroad	During a short experience in a foreign country, students will observe and document cultural and demographic differences between countries through formal lectures, and field observation and team exercises. The work in this class is informed by the use of user-based observational research techniques. Documentation from this phase is brought back to the US for use in the INDD 306B Intercultural Innovation: Interdisciplinary Project Component class. Students should plan on taking BOTH classes.	Credit Hours: 1.000 Schedule Types: Lecture, Study Abroad Course Attributes: Global Courses
INDD 306B	Intercultural Innovation: Study Abroad	This is the second in a two-course sequence. This class builds on work done in the INDD 306A Intercultural Innovation: Study Abroad Component course. Students should plan on taking BOTH classes. In INDD 306B, students evolve research by interdisciplinary teams outside the US into well-documented opportunities for new products, business platforms or systems. In a series of team meetings and design critiques, they then turn them into cohesive proposals.	Credit Hours: 2.000 Schedule Types: Lecture Course Attributes: Global Courses
INDD 307	Advanced Materials & Processes for Manufacturing	This course builds on concepts and information which is presented in Materials and Processes for Manufacturing with a much deeper investigation of development workflow, regulatory considerations, designing for particular performance parameters, and designing for assembly and validation. Students will be introduced to considerations in design such as structural robustness and environmental sealing against moisture and dust, along with development and modeling strategies which facilitate iterative solutions which can be easily modified as testing and validation takes place. The focus of the course will be on development of an actual product design which will be taken to the point where a fully functioning prototype can be fabricated and tested.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab

INDD 308	Biomimicry in Industrial Dsgn	<p>This January term travel course to Costa Rica is offered as an upper-level Industrial Design course that may be of interest to other majors. During this Study Abroad Short Course, students are introduced to principles of biomimicry, the practice of looking at the world in ways that inspire innovation based on processes that take place in nature- specifically those found in the tropical biodiversity of the diverse ecosystems of the Neotropics, including coral reefs, mangroves, tropical dry forest, rainforest, and cloud forest. Field research will inspire design solutions to meet the needs of neighboring communities.</p> <p>This course is not offered every year; please consult your academic advisor if interested.</p> <p><b>Prerequisite: Completion of the Study Abroad application and policy guideline process; GPA 2.5; Completion of INDD 201 and DECSYS or permission of instructor.</b></p>	<p>Credit Hours: 3.000 Schedule Types: Study Abroad</p>
INDD 324	History of Design & Communication	<p>This course begins with the impact of industrialization on communication and products, and explores the development of design and philosophies of design into the 21st century. Aspects of industrial design and graphic communication will be critically reviewed. Current design events will be studied interactively and discussed as a continuation of prior schools of design thought.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
INDD 371	Soft Goods Development	<p>This course will introduce students to the soft-goods and accessories industry through the following product categories: footwear, bags, and outdoor gear. Students will develop a keen understanding of the following: history, design skill-sets, materials, introductory construction techniques, research methodologies, product development, manufacturing practices, and exposure to the international community involved within this fast-paced and exciting industry.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
INDD 372	Soft Goods Fabrication	<p>This course will introduce students to the Soft-goods and Accessories industry through the following professions: footwear design, bag design, and outdoor gear. Through interdisciplinary and industry collaborations, students will develop an advanced understanding of the development/fabrication processes, construction methods, prototyping, materials, computer software, manufacturing practices, and professional collaborations in the development of soft good products.</p>	<p>Credit hours: 3.000 Schedule Types: By Appointment, Lecture</p>
INDD 381	Independent Study in Industrial Design	<p>This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. Permission required. See the statement on Independent Study under Academic Policies.</p> <p><b>Prerequisites: INDD 202 (Minimum Grade of C)</b></p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment - 2 students, Independent Study</p>
INDD 401N	Design 7 for Industrial Design	<p>The seventh in a sequence of eight studios, this course focuses on communicating a student's developed skills and abilities. This studio incorporates initial development work on the Capstone Project.</p> <p><b>Prerequisite: INDD 302N</b></p>	<p>Credit Hours: 5.000 Schedule Types: Studio</p>
INDD 402N	Design 8 for ID Capstone	<p>The last in a sequence of eight studio courses, this course is dedicated to the student's capstone project and accompanying documentation. Students present the outcome of their projects at the Kanbar Showcase.</p> <p><b>Prerequisite: INDD 401</b></p>	<p>Credit Hours: 5.000 Schedule Types: By Appointment, Lecture, Studio</p>
<b>INDUSTRIAL ENGINEERING</b>			
IENG 315	Operations Research II	<p>The course explores dynamic programming; decision theory involving one stage problem; probabilistic models of operations research; inventory theory; Markov chains; queuing theory and simulation.</p> <p><b>Prerequisite ENGR 304</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
IENG 413	Simulation Systems	<p>The course explores procedures and rationale for planning, designing and implementing computer simulation experiments used to analyze human-machine systems in engineering, business and social sciences.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>

IENG 414	Manufacturing Quality Control	This course covers the methods used for statistical quality control, capability analysis, monitoring and improvement. Students will learn the techniques, as well as the software available (Minitab, Excel, and SPSS) required to implement these techniques.	Credit Hours: 3.000 Schedule Types: Lecture
IENG 415	Production Planning & Control	This course covers several techniques that focus on efficient operations management within any organization. The topics include forecasting, inventory management, production systems - MRP, JIT, CONWIP - aggregated workforce planning, production scheduling and supply chain management. Even though the topics seem to be oriented to the manufacturing industry, the concepts taught in this course are applicable to any type of organization, including service, health care, manufacturing, financial and others.	Credit Hours: 3.000 Schedule Types: Lecture
IENG 418	Systems Engineering	This course focuses on implementation of continuous process improvement within an organization. The purpose of the course is to provide the students with a comprehensive treatment of different tools employed successfully by industries for creating value while eliminating waste (non-value added activities). The course includes lean thinking, value stream mapping, cellular manufacturing, cycle time reduction, Kaizen training, Kanban production systems and six-sigma. <b>Corequisite: ENGR 498</b>	Credit Hours: 3.000 Schedule Types: Lecture
IENG 420	Integrating Business & Engineering	Integrating Business and Engineering The course is designed to help students understand how business and engineering work together in an organization. This course will cover the fundamental concepts of financial reports, marketing, strategic planning, and product life-cycle management. The focus of the course is to prepare the engineering students to make decisions related to technology, product and process development, in a way that combines technical, financial, marketing and strategic dimensions. <b>Prerequisite: ENGR 303 and ENGR 418</b>	Credit Hours: 3.000 Schedule Types: Lecture
IENG 426	Supply Chain Model & Analysis	This course is a designated elective that can be selected as one of the two required designated electives for the BSISE. The course provides a broad introduction to many critical facets of supply chain. Students in this course will apply industrial engineering tools learned through the curriculum to design, analyze and optimize the supply chain such as, mathematical optimization, inventory management, transportation and network location, facilities planning and material handling. Then, more advanced topics are interrelated such as the value of information sharing in the supply chain, and customer value strategic alliances, international issues and decision support systems.	Credit Hours: 3.000 Schedule Types: Lecture
IENG 427	Facility Planning & Material Handling	Facility Planning and Material Handling Physical organization of work places and departments to optimize objectives such as material movement, safety and worker satisfaction. Review of ISE methods for work-place design and productivity measurement and economic decision-making. Computer solutions for layout problems and mathematical models for location problems. Analysis and design of material handling, warehousing and distribution systems.	Credit Hours: 3.000 Schedule Types: Lecture
<b>INTEGRATIVE SEMINAR</b>			
ISEM 300	Ethnographic Research Methods	This course explores a range of ethnographic research tools to analyze human belief, behavior and cultural practices. Students learn to formulate better research questions and conduct ethnographic research to address a contemporary social problem, and will become equipped to analyze and communicate the findings. Students reflect upon their impact in the community and on other ethical questions as part of conducting ethnographic research. <b>Prerequisites: WRIT 201/202 and GCIT 2XX or GDIV 2XX</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes Integrative Seminars, Junior Seminar Course, Writing Intensive



ISEM 301	Animals and Society	<p>Animals: we encounter them in our backyards and on our plates; in sacred texts and as sports mascots. Given the many ways they figure in our societies, how should humans relate to their fellow animals? This course surveys how the treatment of animals across the domains of art, science, literature, philosophy, and/or culture produces both intersecting and contradictory understandings of the relationship between animals and humans. Students will consider issues of contemporary concern involving animals, particularly as regards students' future professions.</p> <p><b>Prerequisites: WRIT 201/202 and GCIT 2XX or GDIV 2XX</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>
ISEM 302	Telling Stories, Selling Stories	<p>We are constantly surrounded by stories in our daily lives - at home, at play, and in the workplace - and every day we create just as many stories of our own as we move through all of these spaces. In this course, we analyze, evaluate, and create narratives. We learn and discuss the parts that make up a narrative, and consider how these components are used by storytellers across media and disciplines to create narratives that are (or are not) effective, compelling, ethical, and successful at achieving their purpose.</p> <p><b>Prerequisites: WRIT 201/202 and GCIT 2XX or GDIV 2XX</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Integrative Seminars, Writing Intensive</b></p>
ISEM 303	Perspectives on Psychoanalysis	<p>In this course, students will examine the theories and history of psychoanalysis as well as the many social, cultural, scientific, medical, and philosophical dimensions surrounding this most influential and controversial of disciplines. Over the course of the semester, the class will chart the various schools of psychoanalysis, the different personalities involved (Freud, Jung, Klein, Lacan, Fanon, and others), the often-fierce debates and rivalries between them, how the discipline has changed as it has spread geographically and over the generations, and the various types of critique it has encountered (feminist, leftist, positivist, anti-psychiatry, et cetera).</p> <p><b>Prerequisites: WRIT 201/202 and GCIT 2XX or GDIV 2XX</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Integrative Seminars, Writing Intensive</b></p>
ISEM 304	Cultures of Health & Illness	<p>How do cultures and societies shape experiences of illness and health? How do cultures affect and communicate conceptions of illness, health, and medicine? In this writing-intensive course, students will study social and cultural dimensions of health, illness and medicine to research the wider contexts in which individuals and societies view and respond to illness and health. Students will draw from multiple disciplines such as literature, rhetoric, anthropology, sociology, history, and philosophy to investigate and propose solutions to current medical and cultural issues that impact citizens and healthcare practitioners in the U.S. and around the globe.</p> <p><b>Prerequisites: WRIT 201/202 and GCIT 2XX or GDIV 2XX</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Integrative Seminars, Writing Intensive</b></p>
ISEM 305	Healthcare Economics & Policy	<p>This course will apply the basic principles of economics to understand the market for healthcare in the US and the role of policy in addressing issues relating to healthcare delivery, financing and access. Students will learn about the role of public health, technology and pharmaceuticals in rising healthcare costs, and whether higher spending levels lead to better outcomes. We will explore the social and economic implications of private versus public insurance and the role of government in addressing "market failures." The course will discuss the politics of healthcare reform and evaluate the effects of recent reforms like the Affordable Care Act.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Integrative Seminars, Level Two Interdisciplinary</b></p>

ISEM 313	Conspiracy Theories: Analysis	<p>The political use of conspiracy theories is not unique in American Politics. Baseless claims supported by conjecture and rumor instead of reliable evidence have colored public perception of events as disparate as the assassination of JFK, the Moon Landing, 9/11, the death of Vince Foster, the Boston Marathon Bombing, and the mass shooting at Sandy Hook. Once dismissed as a hobby for those wearing tinfoil hats, conspiracy belief now factors into electoral politics, policymaking, and even foreign policy. On the other hand, real conspiracies such as Watergate and Columbine have contributed to the problem by creating a climate of distrust in government and in the very notion of expertise. In this class the students will first learn the psychology of conspiracy theory formation and belief and then we will deconstruct each theory focusing on the reason its creation, those behind its dissemination and creation, and evaluate of credibility of supporting evidence. The student will learn how to vet sources, and apply logical analysis using verifiable, not alternative, facts.</p> <p><b>Prerequisites:</b> WRIT 201/202 and GCIT 2XX or GDIV 2XX</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes  Integrative Seminars,  Writing Intensive</p>
ISEM 340	Sustainable Development in the Global South	<p>This course examines sustainability issues in non-Western countries around the world. Students will consider how local economic, political and cultural factors help shape sustainability strategies and examine the relationship between economic development and sustainability in a comparative framework.</p> <p><b>Prerequisites:</b> WRIT 201/202 and GDIV 2xx or GCIT 2xx</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes  Integrative Seminars,  Writing Intensive</p>
ISEM 360	Environments for Well-Being	<p>This course provides an introduction to a range of viewpoints, concepts, and characteristics of human behavior in existing designed spaces. Cultural, social, and psychological factors are examined, e.g., relationships to water, responses to open and enclosed spaces (both interior and exterior), roles of textures and aromas, relationships to the natural environment, etc. Various theories and methods of environmental assessment and design are studied that are based on an understanding of mutually supportive relationships between people and their physical environment. This course looks at how people use and are impacted by various environments and stimuli from a range of cultural, psychological and physical perspectives.</p> <p><b>Prerequisites:</b> WRIT 201/202 and GDIV 2xx or GCIT 2xx</p>	<p>Credit Hours: 3.000  Schedule Types: Lecture  Course Attributes  Integrative Seminars,  Writing Intensive</p>
<b>INTERDISCIPLINARY</b>			
IDSC 302	Research & Scientific Method	<p>introduces research methodologies applicable to health care and the health professions. Emphasizes research methodologies (from qualitative and descriptive to quasi experimental and experimental), the application of research approaches to health professions-based research questions, and the analysis of reported research. Prepares and requires students to conduct literature searches relevant to the department or researchable questions and appropriate research designs and to become critical consumers.</p> <p><b>Prerequisites:</b> MATH 301</p>	<p>Credit Hours: 3.000  Schedule Types:  Independent Study,  Lecture, Lecture/On-Line,  On-Line</p>
IDSC 303	Applied Research Project	<p>Provides an opportunity for real time research on a topic either selected during IDSC 302 or on a new one in consultation with the instructor. Participants will refine a comprehensive proposal, conduct a pilot study to test a research hypothesis and present findings in a final seminar session</p> <p><b>Prerequisites:</b> IDSC 302</p>	<p>Credit Hours: 3.000  Schedule Types:  Independent Study,  Lecture, Lecture/On-Line,  On-Line</p>
<b>INTERIOR DESIGN</b>			
INTD 102	Design 2 for Interior Design	<p>This interior design foundation studio is a synthesis of fundamental design principles and an introduction to research as a tool for understanding programming and design. Lectures and demonstrations will utilize the case-study methodology to investigate various design strategies and to chart the historical course of modernism within the context of residential design. This first interior design studio introduces students to methodologies, processes, color theory, and design elements relevant to interior design.</p> <p><b>Prerequisites:</b> ARFD 101 (Minimum Grade C)</p>	<p>Credit Hours:4.000  Schedule Types: Studio</p>

INTD 201	Design 3 for Interior Design	<p>This studio examines the elements, principles and theories of interior design within the framework of residential and hospitality design. Students will explore and synthesize conceptual, theoretical, functional, and aesthetic issues. Additional foci include the organization and interrelationship of multi-level interior spaces, elements of enclosure, human behavior issues, symbolism and socio-cultural factors. The craft of making and the role of color, materials, furniture, fixtures and equipment in defining spaces and environmental experience will be emphasized.</p> <p><b>Prerequisites: INTD 102 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 4.000</b> <b>Schedule Types: Studio</b></p>
INTD 202	Design 4 for Interior Design	<p>This studio introduces students to the conceptual, theoretical, functional and aesthetic issues related to the design of environments with a focus on health and well-being for various populations. The design issues explored are within the context of community and healthcare spaces. The integration of intuitive and structured design processes will be emphasized. The development of spaces, selection of furniture, fixtures, equipment and materials will be made in relation to performance and experiential requirements. This course incorporates collaboration, research, and analysis to explore human behavior and needs in the built environment.</p> <p><b>Prerequisite INTD 201 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 4.000</b> <b>Schedule Types: Studio</b></p>
INTD 206	Interior Building Technology	<p>This course focuses on materials, construction, installation as it specifically relates to interior design . Students will be introduced to the nature and characteristics of interior detailing in relation to interior construction such as architectural woodwork, millwork, partitions, floors, ceilings, stairs, custom cabinetry, furniture, and specialty elements. The influence of interior finish materials on interior form and detailing will be explored. Additional foci include environmental factors, human factors, codes, regulations, standards and construction documentation.</p> <p><b>Cross-Level Course: IARC 607</b> <b>Prerequisites: ARDS 210 and INTD-201 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Lab, Lecture</b></p>
INTD 208	Presentation Techniques	<p>This course explores the broad array of presentation techniques available to advantageously convey a designed interior. Emphasizing the presentation of a complete interior, students will refine and expand their drawing and model building skills using a wide range of media and integrating manual and digital techniques. This course also addresses the interrelationship of the visual and verbal components of making an effective presentation.</p> <p><b>Cross-level course: IARP 508</b> <b>Prerequisites: INTD 109 and INTD 102 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 3.000</b> <b>Schedule Types: Studio</b></p>
INTD 301	Design 5 for Interior Design	<p>This interior design studio challenges students with increased complexity of three-dimensional interior space, program, concept, and design process in the context of commercial and retail design. Students will translate their design thinking into comprehensive solutions that address place making, branding, construction technology, materiality, lighting design, color, human factors, furniture selection/planning, building codes and standards.</p> <p><b>Prerequisites: INTD 202 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 6.000</b> <b>Schedule Types: Studio</b> <b>Course Attributes: Nexus Design Experience</b></p>
INTD 302	Design 6 for Interior Design	<p>This studio concentrates on contemporary issues relating to workplace design, building technology, and sustainable design. Design and technology issues are addressed through: an understanding of context, office culture and behavior, form making, construction systems, space planning, materials, furniture systems and equipment, lighting (daylighting and artificial), indoor air quality, water systems, thermal comfort and HVAC systems. Solutions emphasize holistic, comprehensive and sustainable design thinking, organization of complex spatial responses, and the understanding that design is inherently constructive in nature.</p> <p><b>Prerequisites: INTD 301 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 6.000</b> <b>Schedule Types: Studio</b> <b>Course Attributes: Nexus Design Experience</b></p>

INTD 304	Integrated Community Service	This integrated community service course is specific to Interior Design. It is an opportunity for students to use and apply their acquired knowledge in a real world setting and to work in integrated and collaborative teams. Students will experience the reciprocal nature and responsibility of community service work as fully participating citizens within the greater Philadelphia region. <b>Prerequisite: INTD 202 (Minimum grade C) or by permission</b>	Credit Hours: 0.500 Schedule Types: Studio
INTD 305	Interior Building Systems	This course focuses on the understanding and application of a broad range of mechanical, electrical, lighting, acoustical, plumbing, HVAC, security, and other building systems in the context of interior design. Students will also be introduced to the nature and characteristics of fire detection, protection, and suppression in building interiors. The critical role of interior building systems in establishing and maintaining the health, safety and welfare of users will be emphasized. <b>Prerequisites: INTD 206 (Minimum grade C) and INTD 202 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
INTD 306	Advanced Visualization: Interiors	This course teaches advanced digital three-dimensional modeling, rendering, and evolving digital technologies with a focus on interior environments. Emphasis is placed on compelling representation of interior spaces, forms, materials, furniture, color, and lighting effects. These professional level skills enhance design representations and presentations. Students complete a series of exercises and projects covering a series of advanced digital techniques. <b>Cross-level course: IARC 612</b> <b>Prerequisites: ARDS 208 (Minimum Grade C) or ARDS 209 (Minimum Grade C) and INTD 202 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
INTD 307	History 4: Modern to Contemporary	Modern/Contemporary Architecture and Interiors (1930-Present) This course analyzes major movements and theoretical constructs that have dominated architecture and interior design from the post-World War II period until the present. Discussion focuses upon societal and environmental aspects, politics, economics, science and technology, psychology, that shape the greater context for architecture, interiors, and the allied arts. Students examine key theoretical texts to evaluate current thinking relative to issues such as, but not limited to, sustainability, critical regionalism, phenomenology, and the role of the digital in contemporary design practice. <b>Prerequisite: AHST 305</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio Course Attributes Writing Intensive
INTD 309	Vis 4: Constuction Documentation	This computer-aided design course, further develops students' design communication and documentation skills utilizing ACAD and Building Information Modeling (BIM) software. Students will have the opportunity to produce interior design working drawings and advance their knowledge of professional interior design construction and specification documents. <b>Prerequisite:INTD 209 or ARDS 208</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
INTD 310	Textiles & Materials for Interiors	This course introduces the role of textiles and non-textile materials in the creation of commercial and residential interiors. Key topics include the selection, specification and application of textiles and materials based on their properties and performance criteria; sources of textiles and materials, the concept of sustainable resources; appropriate installation methods and maintenance requirements of textiles and materials in interior applications; and codes, regulations and standards related to use of textiles and materials in interiors. <b>Cross-Level Course: IARC 610</b> <b>Prerequisite: INTD 201 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture

INTD 311	Introduction to Set Design	<p>This elective focuses on developing the setting for the action of a play. The set designer develops many of the same skills exercised by architects/interior designers: mastery of design fundamentals, understanding of time and place, knowledge of construction techniques and awareness of how people use space. Steps to creating the stage set will include: careful reading and discussion of selected plays, surveying an existing stage, assisting in the construction of a stage set and attending assigned performances.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture, Studio</b></p>
INTD 325	Furniture Design	<p>This elective course is intended to provide students with a basic knowledge of the aspects involved in furniture design. The goal is to expose students to the various means through which one engages in product design. Emphasis is on the fabrication process in addition to proto- typing, testing and revision. The course consists of readings, brief lectures, class discussions and design projects that cover the range of information that designers need to know to be able to specify, design and evaluate furniture-related products for the built environment. A significant amount of class time will be devoted to the development, design revision and fabrication of a major projects.</p> <p><b>Cross-Level Course: IARC 614</b>  <b>Prerequisite: INTD 201 (Minimum Grade C) or ARCH 201 (Minimum Grade C) or INDD 201 (Minimum Grade C) or LARCH 201 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture, Studio</b></p>
INTD 401	Design 7 for Interior Design	<p>This advanced studio emphasizes exploration of a design issue in contemporary culture and society. Research is used as a basis and structure for design investigations, merging interpretative learning with formal explorations in experiential design. Core components of design incorporate investigations at the detail and experience levels. It develops design narrative sequencing, design conceptualization, and practical implementation skills. Students will develop an analytic understanding of the target groups and facility with materials and fabrication technologies. The semester-long project in this studio provides opportunities for in-depth exploration of three-dimensional spaces and form and its qualitative impact on the human experience in the interior environment.</p> <p><b>Prerequisites INTD 302 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 6.000</b>  <b>Schedule Types: Studio</b></p>
INTD 412	Professional Practice for Interior Design	<p>In this course, students are introduced to the administrative, financial, legal and ethical aspects of professional practice, including types of business formations, marketing, contracts, industry relationships and project management. Lectures and assignments cover a range of specialized services performed by design firms, and the role and responsibilities of the designer in different positions and at various stages of their career. Life-long learning, professional development and the value of professional organizations will be discussed. Guest speakers will add a unique insight into the profession.</p> <p><b>Cross-level course: IARC 708</b>  <b>Prerequisites: INTD 206 and INTD 301</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Lab, Lecture, Lecture/Lab</b></p>
INTD 487	Capstone Research & Programming for Interior Design	<p>This course gives students the opportunity to assess their inclinations in the field of interior design and to propose a design thesis that addresses their specific interest. Students are expected to generate individualized research and programming to be used for design and development in their Capstone Project the following semester. They will produce a Capstone Research &amp; Programming Document, which will be the result of research, analysis, and the synthesis of information. It will justify their project goals and articulate a clear definition of parameters and programming for their Capstone design project. The process of generating this document will recapitulate and augment the research and programming process, which students have been exposed to in previous interior design studios.</p> <p><b>Prerequisites: INTD 302 (Minimum Grade C)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture, Studio</b></p>

INTD 488	Capstone Project Interior Design	<p>The Capstone Project for Interior Design studio is the second part of a two-semester course sequence and year-long research and design investigation. This semester provides students with an opportunity to expand on their research and prove their thesis through application to a design project. The student must demonstrate aptitude and understanding of architectural and interior design theory, principles, technology, as well as overall design competence. Students will further their investigation through design exploration and project development. They will develop a comprehensive presentation that integrates their design research, pre-design exploration, schematic design, design development and design detailing with their final design solution.</p> <p><b>Prerequisites: INTD 401 (Minimum Grade C) and INTD 487 (Minimum Grade C) or permission</b></p>	<p><b>Credit Hours: 6.000</b> <b>Schedule Types: Studio</b></p>
<b>INTERNSHIP</b>			
INTN 493T	Internship	<p>Academic internships at Thomas Jefferson University aid students in professional preparation through a work experience directly related to their major and career goals. Three credit registration options exist in 0.5 credit, 3 credit and 6 credit increments. All are completed as elective academic courses, including a course syllabus focused on professional skill-building and written assignments. While the primary emphasis on the course is on the internship work experience, course assignments are incorporated to prompt reflection on the internship. This reflection is an integral component of experiential learning and students' overall career and professional development. The Career Services Center and designated Faculty Internship Advisor (FIA) from the student's major provide support and guidance during the semester of participation. Career Services staff is also available to assist students with internship search strategy prior to the internship. At the conclusion of the internship semester, all students are evaluated both by their employer and FIA, receiving a grade derived from successful performance as determined by the employer, the quality of academic assignments submitted to faculty, and completion of minimum required hours. All internships, regardless of credit registration, are a minimum of twelve weeks in length. Academic internships are offered during the fall, spring and twelve week summer semesters.</p>	<p><b>Credit Hours: 6.000</b></p>
INTN 493Z	Internship	<p>Primarily for international students OR students completing unpaid internships where credit is required</p>	<p><b>Credit Hours: .500</b></p>
INTN 493F	Internship I	<p>Academic internships at Thomas Jefferson University aid students in professional preparation through a work experience directly related to their major and career goals. Three credit registration options exist in 0.5 credit, 3 credit and 6 credit increments. All are completed as elective academic courses, including a course syllabus focused on professional skill-building and written assignments. While the primary emphasis on the course is on the internship work experience, course assignments are incorporated to prompt reflection on the internship. This reflection is an integral component of experiential learning and students' overall career and professional development. The Career Services Center and designated Faculty Internship Advisor (FIA) from the student's major provide support and guidance during the semester of participation. Career Services staff is also available to assist students with internship search strategy prior to the internship. At the conclusion of the internship semester, all students are evaluated both by their employer and FIA, receiving a grade derived from successful performance as determined by the employer, the quality of academic assignments submitted to faculty, and completion of minimum required hours. All internships, regardless of credit registration, are a minimum of twelve weeks in length. Academic internships are offered during the fall, spring and twelve week summer semesters.</p>	<p><b>Credit Hours: 3.000</b></p>
<b>TEXTUAL ANALYSIS</b>			

TXIS 100	Textual Analysis for International Student	This course is designed for international students who need additional English language comprehension skills to succeed in college. Students are introduced to the academic practices and expectations of U.S. universities and the skills required to understand course materials and to complete common course assignments. Student learn strategies for reading and thinking critically, expanding vocabulary, and retaining content, and complete assignments in academic reading, note taking, review techniques, and critical thinking skills. Students required to take TXIS 100 must not register for AMST 114 in the same semester.	Credit hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Lecture
<b>INVASIVE CARDIOVASCULAR TECHNOLOGY</b>			
RSI 302	Noninvasive Testing Principles and Procedures	Provides a foundation in the basic principles of electrocardiography. Presents an overview of the theory and diagnostic techniques utilized by technologists in noninvasive laboratory. Emphasizes the development of a systematic approach to electrocardiographic interpretation, dysrhythmia analysis, exercise stress testing, Holter monitoring, nuclear medicine procedures, and pacemaker evaluation.	Credit Hours: 1.000 Schedule Types: Lecture
RSI 311	Cardiovascular Physiology	Presents the construction and dynamics of the cardiovascular system in detail. Includes the development of the cardiovascular system, anatomical and physiological characteristics, heart sounds, biophysics of the cardiac cell, cardiac pumping action and its regulation, cardiovascular hemodynamics, coronary blood flow, systemic and pulmonary circulations and the control of regional circulation.	Credit Hours: 2.000 Schedule Types: Lecture
RSI 312	Cardiovascular Patho-physiology	Continuation of Radiologic Sciences CS 311, Cardiovascular Physiology. Provides an examination of the of the structure and function of the cardiovascular system in health and disease. Emphasizes the pathophysiological mechanisms of acquired and congenital cardiovascular diseases as well as their clinical presentation, detection and treatment. <b>Prerequisite: RSI 311</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSI 313	Radiobiology Health Physics	Presents the principles of cell biology and effects of ionizing radiation at the molecular, cellular and systemic levels. Emphasis is on changes at the cellular level, and stochastic vs. deterministic effects and the concept of risk estimates. Covers principles and practice of radiation safety in radiology, including pertinent rules and regulations.	Credit Hours: 2.000 Schedule Types: Lecture
RSI 338	Invasive Procedures I	Provides guided practice in the performance of procedures utilized in diagnostic invasive cardiovascular procedures. Includes sterile technique, circulating and monitoring procedures, pharmacologic identification, room set-up and film processing.	Credit Hours: 3.000 Schedule Types: Lecture
RSI 339	Invasive Procedures II	Continuation of Radiologic Sciences I 338, Invasive Procedures I. Provides guided practice in the performance of advanced invasive cardiovascular procedures in a laboratory setting. Emphasizes the clinical application and operation of equipment utilized in interventional and electrophysiologic studies. <b>Prerequisite: RSI 338</b>	Credit Hours: 3.000 Schedule Types: Lecture
RSI 341	Radiation Physics & Instrum I	This course will provide the student with content that establishes a knowledge base in radiographic, fluoroscopic and mobile equipment requirements and design. The content also provides a basic knowledge of quality control. Content establishes a basic knowledge of atomic structure and terminology. Also presented are the nature and characteristics of radiation, x-ray production and the fundamentals of photon interactions with matter.	Credit Hours:3.000 Schedule Types: Lecture

RSI 342	Radiography Physics & Instrumentation II	This course will provide the student with content that establishes a knowledge base in radiographic, fluoroscopic and mobile equipment requirements and design. The content also provides a basic knowledge of quality control. Content establishes a basic knowledge of atomic structure and terminology. Also presented are the nature and characteristics of radiation, x-ray production and the fundamentals of photon interactions with matter. Content imparts an understanding of the components, principles and operation of digital imaging systems found in diagnostic radiology. Factors that impact image acquisition, display, archiving and retrieval are discussed. Principles of digital system quality assurance and maintenance are presented. <b>Prerequisite: RSI 341</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSI 357	Invasive Principles I	Provides a comprehensive introduction to the fundamental skills and principles needed to perform diagnostic cardiac procedures. Emphasizes indications and contraindications and the collection of diagnostic information obtained during the procedure. Students utilize these fundamentals to evaluate acquired cardiovascular disease states.	Credit Hours: 3.000 Schedule Types: Lecture
RSI 358	Invasive Principles II	Continuation of Radiologic Sciences I 357, Invasive Principles I. Emphasizes emergency and interventional techniques, electrophysiology studies and specialty applications in congenital and acquired disease states. <b>Prerequisite: RSI 357</b>	Credit Hours: 3.000 Schedule Types: Lecture
RSI 431	Clinical Invasive I	Requires observation and application of clinical principles in an invasive cardiovascular laboratory. Emphasizes the professional attributes and fundamental technical skills necessary to perform as a team member during invasive procedures. Students synthesize learning from the didactic, laboratory and instrumentation courses. Students must demonstrate competency in the performance of ICVT procedures.	Credit Hours: 6.000 Schedule Types: Clinical
RSI 432	Clinical Invasive II	Continuation of Radiologic Sciences I 431, Clinical Invasive I. Students continue application of ICVT skills. Students must demonstrate competency in the performance of ICVT procedures. <b>Prerequisite: RSI 431</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSI 433	Clinical Invasive III	Continuation of Radiologic Sciences I 432, Clinical Invasive II with active participation in an invasive cardiovascular laboratory. Emphasizes the professional attributes and technical skills necessary to perform as a team member during interventional techniques, electrophysiology studies and specialty applications in congenital and acquired disease states. Presents the opportunity to work more independently in the performance of invasive cardiovascular procedures. Students accept more responsibility for simple procedures and begin to perform more complex procedures under supervision. <b>Prerequisite: RSI 432</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSI 483	Invasive Review Seminar	Presents a comprehensive review of the physical principles, instrumentation and clinical applications of invasive cardiac procedures in preparation for the certification examinations.	Credit Hours: 2.000 Schedule Types: Lecture
<b>ITALIAN</b>			
ITAL 101	Italian I	A beginner's course designed for students with very little or no knowledge of the language. The focus is on basic oral expression, listening comprehension and acquiring simple reading and writing skills, so that students can gain confidence in the language and to begin to have conversations. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses
ITAL 201	Italian II	A beginner's course designed for students who have completed one semester of college-level language or the equivalent. The focus is on oral expression, listening comprehension and the acquisition of simple reading and writing skills, so that students can gain confidence in the language and conduct conversations and other social interactions in the language with some level of ease. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses



ITAL 301	Italian III	An intermediate course designed for students who have completed two semesters of college-level language or the equivalent. The focus is on advancing oral expression, listening comprehension and the development of reading and writing skills, so that students can gain confidence and express themselves fluidly entirely in the target language. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses
ITAL 401	Italian IV	An intermediate course that provides students with the opportunity to communicate in a fluent and sophisticated manner. The focus is on expanding the knowledge of structures and vocabulary that students have acquired in levels I-III. In addition to constant attention to speaking, writing, listening and reading, more complex ways of expression are also emphasized. Contemporary culture is explored through authentic visual media and written materials.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses
<b>JAPANESE</b>			
JAPN 101	Japanese I	A beginner's course designed for students with very little or no knowledge of the language. The focus is on basic oral expression, listening comprehension and acquiring simple reading and writing skills, so that students can gain confidence in the language and to begin to have conversations. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Japanese Language
JAPN 201	Japanese II	A beginner's course designed for students who have completed one semester of college-level language or the equivalent. The focus is on oral expression, listening comprehension and the acquisition of simple reading and writing skills, so that students can gain confidence in the language and conduct conversations and other social interactions in the language with some level of ease. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Japanese Language
JAPN 301	Japanese III	An intermediate course designed for students who have completed two semesters of college-level language or the equivalent. The focus is on advancing oral expression, listening comprehension and the development of reading and writing skills, so that students can gain confidence and express themselves fluidly entirely in the target language. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Japanese Language
JAPN 401	Japanese IV	An intermediate course that provides students with the opportunity to communicate in a fluent and sophisticated manner. The focus is on expanding the knowledge of structures and vocabulary that students have acquired in levels I-III. In addition to constant attention to speaking, writing, listening and reading, more complex ways of expression are also emphasized. Contemporary culture is explored through authentic visual media and written materials.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Japanese Language
<b>KNITTING</b>			
KNIT 201	Knit Technology I	The understanding of both weft- and warp-knit fabrics through an investigation of knit construction, machinery, principles and knit fabric analysis. Lectures are complemented with a series of lab exercises on hand-flat equipment and fabric-analysis projects designed to fully acquaint the student with the principles of knit-fabric design and production. <b>Prerequisites: TEXT 101 (Minimum Grade D) or TEXT 104 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab

KNIT 203	Knit Design Studio I	Students will learn through individual development how to create a range of texture and color effects within knit design. Independent needle selection and the use of the presser foot will be explored within design areas involving Jacquard, held-stitch and tuck-stitch structures. Design ideas will be developed through to swatch/sketch proposals suitable for sweater production. <b>Prerequisites: KNIT 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio Course Attributes: Honors Assignme
KNIT 205	Knit Technology II	A further investigation into the construction, design and production of both weft- and warp-knit fabrics. Lectures will be complemented with lab work involving the design, production and analysis of knit fabrics upon power-knitting equipment. <b>Prerequisites: KNIT 201 Minimum Grade of D</b>	Schedule Types: By Appointment - 1 student, By Appointment, Lab, Lecture, Lecture/Lab Course Attributes: Honors Assignment
KNIT 213	Knit Design Studio II	A knit design studio elective for Textile or Fashion majors specializing in the knit-design area. Original design ideas will be developed through swatch/sketch presentations. Garment ideas will be developed through technical sketches and specifications into completed sweaters. <b>Prerequisites: KNIT 326 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
KNIT 307	Advanced Warp Knitting	Covers all facets of warp-knitting technology with particular emphasis on the variety of machines and fabric construction in relation to end-use applications and markets. Tricot and raschel warp-knit fabric constructions are made in the knitting laboratory to illustrate the basic warp-knit stitches and lapping motions. A variety of warp-knit fabric samples are analyzed to illustrate basic fabric geometric parameters used in the design and production of warp-knit constructions. Also, students are required to research a unique warpknit process/product.	Credit Hours: 4.000 Schedule Types: Lab, Lecture
KNIT 326	Advanced Weft Knitting	An exploration of the principles involved in knit design using CAD systems and electronic-knitting equipment. Students will design, write computer programs and knit their own fabrics on sweater- and jersey-knitting equipment. Fabric constructions such as Jacquard, links-links, cables, pointelle and presser-foot designs will be developed.	Credit Hours: 3.000 Schedule Types: Lecture/Studio
KNIT 401	Fashion Knit Design	An elective course in which students may explore the development of knit design. Design ideas will be developed on hand equipment through to swatch/sketch proposals suitable for product design. Students can take this course as a single elective and develop design work suitable for inclusion in their portfolio or take further knit-design electives in order to further their skills. <b>Cannot be taken as a replacement for KNIT 201.</b>	Credit Hours: 3.000 Schedule Types: Lecture/Studio
<b>LABORATORY SCIENCE</b>			
LS 301	Molecular Biology	Principles and mechanisms of cellular function at the molecular level, including an overview of experimental techniques; gene expression, structure and replication; mutations and repair of DNA; synthesis of RNA upon DNA template; synthesis of DNA upon RNA template; recombinant DNA; amplification and analysis; molecular basis of genetic disease and cancer, and diagnostic applications.	Credit Hours: 3.000 Schedule Types: Lecture
LS 304	Biochemistry	Examines structure and function of biological macromolecules, polysaccharides, proteins and nucleic acids; lipids; enzymes and metabolism; bioenergetics; control mechanisms; hormones; body fluids; nutrition; and biochemical pathology.	Credit Hours: 3.000 Schedule Types: Clinical, Exam, Lecture, Seminar

LS 310	<b>Introduction to Molecular Diagnostics</b>	Course focusing on the techniques, procedures and protocols used in the molecular preparation and interpretation of biologic fluids and other human specimens using genetic technologies, nucleic acid hybridization and amplification techniques, immunochemistry and biosensor technology. Laboratory sessions cover contemporary procedures for diagnostic testing such as prognostic markers, DNA analysis, FISH, PCR, blotting techniques and DNA sequencing. Lecture and Laboratory.	<b>Credit Hours: 2.000</b> <b>Schedule Types: Lecture</b>
LS 311	<b>Functional Histology</b>	Microscopic study of the human body including normal histology and physiology and relationships to life processes through interactive lecture and microscopy laboratory sessions.	<b>Credit Hours: 2.500</b> <b>Schedule Types: Lecture</b>
LS 331	<b>Immunology</b>	Examines basic principles and mechanisms of the immune system in the physiologic condition and in the disease. Contains didactic and laboratory practical modules. Immune mechanisms in infections, hypersensitivity reactions, autoimmunity, immunodeficiencies, as well as tumor and transplantation immunology are discussed. The lectures are provided on the BBL as PowerPoint presentations with written notes under each slide.	<b>Credit Hours: 3.000</b> <b>Schedule Types: Clinical, Exam, Lecture, Seminar</b>
LS 399	<b>Independent Study</b>	Study under faculty supervision of an area or topic not included in the formal curriculum, with emphasis on individual study and research. Eligible students must obtain faculty sponsorship. Objectives, settings, implementation strategies, preceptorship and evaluation criteria are the responsibility of the student and program faculty. A maximum of six semester credits during the entire program may be earned by independent study. Prerequisites: Completion of one semester of study, good standing in the college and department, a minimum grade point average of 2.5 for undergraduate students or 3.0 for graduate students, and approval of faculty advisor and program director.	<b>Credit Hours: 1.000- 6.000</b> <b>Schedule Types: Independent Study, Lab</b>
LS 403	<b>Research Design</b>	Methods and techniques for extending the scientific base of knowledge for bioscience laboratory practice. Students analyze contemporary research studies, designs and related statistical processes to assess their appropriateness for answering experimental hypotheses and laboratory practice issues. Education methods and communication skills relevant to disseminating scientific findings are emphasized.	<b>Credit Hours: 2.000</b> <b>Schedule Types: Lecture</b>
LS 404	<b>Experimental Research I</b>	Experimental Research II is the conclusion of a two-semester course series in which students engage in experimental research under the tutelage of a Ph.D. level primary investigator either assigned by, or approved by the student's program-specific advisor. The research topic and scope of work as set forth during LS 404/804 will conclude with a summary of findings in the form of a research paper of publishable quality and participation in Sigma Xi Student Research Day.	<b>Credit Hours: 1.000</b> <b>Schedule Types: Clinical, Reseach</b>
LS 405	<b>Experimental Research II</b>	Experimental Research II is the conclusion of a two-semester course series in which students engage in experimental research under the tutelage of a Ph.D. level primary investigator either assigned by, or approved by the student's program-specific advisor. The research topic and scope of work as set forth during LS 404/804 will conclude with a summary of findings in the form of a research paper of publishable quality and participation in Sigma Xi Student Research Day.	<b>Credit Hours: 1.000</b> <b>Schedule Types: Clinical, Reseach</b>
LS 413	<b>Pathology</b>	Study of basic disease processes of the body including inflammation, repair, hemodynamic disorders, and neoplasia; and specific disease processes affecting the major body systems.	<b>Credit Hours: 2.000</b> <b>Schedule Types: Lecture</b>

LS 430	Laboratory Standards and Practices	Overview of the various techniques and resources used to influence and measure performance improvement, proper test utilization and best practices as strategies to improve the effectiveness of patient care. Students examine the relevant literature and develop instruments to assess the laboratory's role in cost-effectiveness, access to laboratory testing and quality of laboratory testing.	Credit Hours: 3.000 Schedule Types: Lecture
LS 440	Current Research in the Biosciences	Examination and critical review of the literature pertaining to the bioscience disciplines of biotechnology, cytotechnology and medical technology. Students and faculty present important papers from contemporary literature for critical discussion. Education methods and communication skills relevant to conveying scientific findings are emphasized. Undergraduate students submit a written synopsis of weekly topics. Entry-level masters students select a topic of interest, research the literature and produce a comprehensive review suitable for publication in a peer-reviewed journal.	Credit Hours: 2.000 Schedule Types: Lecture
LS 498	Special Topics in Laboratory Science	Student-designed, arranged and implemented experience in a setting directly or indirectly related to laboratory sciences. Practical and/or theoretical studies may be selected from laboratory practice areas (histotechniques and histopathology, electron microscopy, forensics, veterinary; flow cytometry, cytopreparation); laboratory practice settings (physician office, home health service, community clinic, OR/Stat lab); administration (managed care, laboratory or research); education (public, professional); diagnostic and/or treatment services (radiography, respiratory care, nuclear medicine, dialysis, IV therapy, family medicine); and community service. These or other experiences are subject to availability and/or scheduling restrictions. Depending on the area selected, competence assessment and/or a summary report is required. Prerequisite: Approval of course coordinator and program director.	Credit Hours: 1.000- 6.000 Schedule Types: Clinical, Exam, Lecture, Seminar
LS 499	Independent Study	Study under faculty supervision of an area or topic not included in the formal curriculum, with emphasis on individual study and research. Eligible students must obtain faculty sponsorship. Objectives, settings, implementation strategies, preceptorship and evaluation criteria are the responsibility of the student and program faculty. A maximum of six semester credits during the entire program may be earned by independent study. Prerequisites: Completion of one semester of study, good standing in the college and department, a minimum grade point average of 2.5 for undergraduate students or 3.0 for graduate students, and approval of faculty advisor and program director.	Credit Hours: 1.000- 6.000 Schedule Types: Independent Study, Lab
<b>LANDSCAPE ARCHITECTURE</b>			
LARC 102	LA Desgn 2: Landscape Arch Fnd	This foundation design studio is a synthesis of fundamentals of landscape architecture design principles, introduction to programmatic research and an in-depth study of design process, methodologies and craft. All explorations use the landscape as the subject of the studio. Form, texture and spatial organization are emphasized along with social, psychological and spiritual experiences of place.	Credit Hours: 4.000 Schedule Types: Studio Course Attributes: Honors Assignment
LARC 103	Landscape Ecology	Landscape Ecology combines the spatial approach of the planner and designer with the functional approach of the ecologist. As a field it is an integrative and multidisciplinary science that combines geology, botany, zoology and human settlements at the "landscape" scale. For this course the focus will be various land use scales, i.e., the block, neighborhood, city, and region and how ecological processes function at each scale. Students learn the key principles of landscape ecology and then how to apply them to preservation, conservation, planning and the design process.	Credit Hours: 3.000 Schedule Types: Lecture/Lab

LARC 201	Landscape Design 3: Site Design	The focus of this design studio is sustainable site-scale planning and design. Students explore site planning theories, methods and resources used in analyses for sustainable settlement, preservation or management of the land. Natural, cultural and experiential data are integrated into the decision-making and design processes.	Credit Hours: 4.000 Schedule Types: Studio
LARC 203	Graphics for Landscape Architecture	In this course, the student gains proficiency in various landscape architecture graphic conventions used in generating, evaluating and presenting design ideas. Included are principles and application of graphic language, color theory, diagramming, plan and section graphics, and oblique and perspective drawings.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
LARC 206	Landscape Architecture History I	This survey course covers significant examples of landscapes and landscape design from the eastern, central Asian, and western regions of the world, produced from ancient times through the 19th centuries. Students will be introduced to the cultural and social history of each epoch as a means of critically analyzing key historical works of landscape design and addressing the ideas and concepts imbedded in the term landscape. <b>Prerequisite:WRTG 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
LARC 207	Landscape Technology: Grading	This course focuses on the principles and techniques of landform manipulation for design and drainage. Students develop an understanding of contours, contour manipulation, and siteconstruction methodologies. Topics include topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut-and-fill calculations.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
LARC 212	Local Flora	An introduction to regional native plants used in landscape architecture and ecological restoration. Characteristics, terminology, and keys used in identifying plants and plant families will be taught as well as sight recognition of common species. Other topics include plant growth, development, and propagation, species interactions, habitat ranges, and recognition of best management practices. Field work constitutes a significant part of the course.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
LARC 300	Landscape Design 4: Urban Dsgn I	This design studio focuses on urban design at the site scale. It reinforces design principles learned in earlier semesters, while introducing students to increasing complexity in both program and the design process. The primary philosophical underpinning of the studio is design within a sustainable urban context. <b>Prerequisite: LARCH 201 (Minimum grade C)</b>	Credit Hours: 6.000 Schedule Types: Studio Course Attributes: Nexus Design Experience
LARC 303	Landscape Tech: Advanced Grading	This Advanced Grading course augments what the students have learned in their first Grading course, plus covers in more depth other sustainable aspects of landform manipulation for design and stormwater management. Computer applications will be used as a learning tool. Field trips to sites that are particularly appropriate for observing, measuring, and experiencing the sculptural qualities and capabilities of landform are also an integral component of this course. <b>Prerequisite:take LARCH-207( minimum grade C)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab Course Attributes: Honors Assignment
LARC 304	Landscape Design 5: Community Design	This studio focuses on sustainable community design with the physical environment viewed as a catalyst for community enhancement and revitalization. Issues include community identification, social cohesiveness, social, economic and political factors, the role of open space in urban neighborhoods, and community safety and livability. Emphasis is placed on learning methods and techniques for developing physical-design solutions and implementation strategies when working with school, neighborhood and communities groups. An important component of the experience is community participation.	Credit Hours: 6.000 Schedule Types: Studio

LARC 305	Plant Community Ecology	This course investigates how interactions within plant species, between species, and between species and their environment influences plant community structure. Questions explored include: How many species are in a given habitat type? Why these species and not others? How do they interact with each other plants? What controls their abundances in natural and urban landscapes? Students will learn how plant distributions are influenced by environmental conditions with a particular emphasis on the urban environments. In-the-field exercises constitute a significant portion of this course.	Credit Hours: 3.000 Schedule Types: Lecture/Lab
LARC 307	History of Landscape Architecture II	This course is the third of a four-term sequence of history/ theory courses. It surveys key examples of landscape architecture from the mid-19th century to the present time. Students strengthen their vocabulary for analyzing and evaluating the designed landscape. Students are also introduced to the influential personalities, projects, events, concepts and thoughts that were pivotal in the philosophical and ethical development of the profession of landscape architecture.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment, Writing Intensive
LARC 310	GIS for Landscape Analysis	Students are introduced to Geographic Information Systems (GIS) applications appropriate to landscape analysis. GIS is an increasingly important software tool for organizing digital spatial data in an accessible and logical manner for site design, recreation master planning, visual analysis, comprehensive planning, resource management and public advocacy.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab, Studio
LARC 312	Sustainable Planting Design	In this course students apply the ecological needs of plants to real situations such as greenroofs, xeriscaping, habitat management, brownfield restorations, meadows and highway plantings. The course stresses ecological relationships among plants and how those relationships are used in the design of these environments. In order to design and maintain these environments students need to understand planting design as well as ecology.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
ISEM 360	Environments for Well-Being	This course provides an introduction to a range of viewpoints, concepts, and characteristics of human behavior in existing designed spaces. Cultural, social, and psychological factors are examined, e.g., relationships to water, responses to open and enclosed spaces (both interior and exterior), roles of textures and aromas, relationships to the natural environment, etc. Various theories and methods of environmental assessment and design are studied that are based on an understanding of mutually supportive relationships between people and their physical environment. This course looks at how people use and are impacted by various environments and stimuli from a range of cultural, psychological and physical perspectives. [Writing Intensive] <b>Prerequisite: WRIT 2XX and 1 course from GCIT or GDIV or Language</b>	Credit Hours: 3.000 Schedule Types: Lecture
LARC 400	Landscape Design 6: Restoration Management	This studio course focuses on restoration management methodologies and ecological landscape design principles as they apply to a damaged urban landscape. Students explore sustainable restoration methodologies, how to determine values and make choices, while being cognizant of the costs and public perception. Techniques, practices and materials both sustainable and conventional are evaluated as part of the planning and design processes. <b>Prerequisite: LARCH300 (Minimum grade C)</b>	Credit Hours: 6.000 Schedule Types: Studio
LARC 401	Landscape Design 7: Urban Design II	LA Design 7 is an interdisciplinary studio for landscape architecture and other design students who will work in interdisciplinary teams. Specific studio topics may include brownfield redevelopment, co-housing development, waterfront redevelopment, community revitalization.	Credit Hours: 6.000 Schedule Types: Studio

LARC 409	Landscape Tech: Materials and Methods	This course develops concepts, methods and techniques for understanding construction materials and assembly techniques related to landscape architecture construction. Students are introduced to materials commonly used in landscape construction (wood, stone and brick, concrete, and asphalt), with an emphasis on sustainable landscape construction materials and practices. Methods, concepts, and principles for developing construction details are also covered, including conventional and digital communication techniques. Specialized aspects such as structural mechanics for various materials and uses are emphasized. <b>Prerequisite:</b> LARCH 207; LARCH 201 or LARCH 202	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
LARC 412	Landscape Tech: Urban Hydrology	Urban hydrology examines sustainable water resource issues as they relate to landscape planning and site planning and design within the urban or urbanizing context. This includes the theory and techniques associated with soil and water conservation comprehension of the why, when and where that leads to sustainable planning or design strategies. Topics include surface water hydrology, stormwater runoff estimation, sustainable stormwater management techniques, watershed planning, flood routing and impact mitigation, and erosion and sedimentation control tools and regulations.	Credit Hours: 3.000 Schedule Types: Lecture
LARC 414	Intro to Horticulture Therapy	This course introduces students to the profound interaction between people to plants and the therapeutic benefits of horticulture on mind, body and soul. Students learn the history, principles, practices, basic skills, applied research and recent development of horticultural therapy. They will become familiar with physically, mentally and emotionally challenged populations in different settings including special schools and correctional facilities through site visits. <b>Prerequisite:</b> WRITING 2XX	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
LARC 506	Professional Practice for LA	Professional Management for Landscape Architecture introduces the ethical, legal, and administrative issues and procedures encountered in numerous forms within landscape architecture practice. Topics include: types of practice, project management, the ethical and legal frameworks in which professional landscape architecture practice occurs, contractual documents, proposal preparation and fee structuring. The preparation of an effective resume and portfolio concludes the course.	Credit Hours: 3.000 Schedule Types: Lecture
LARC 507	Cultural and Landscape Preserv	This course covers theories and practices of historic and cultural preservation as a component of a more comprehensive framework for environmental and resource management. Students study the importance of designating historic districts, buildings and landscapes, as well as accomplishing preservation goals, within the existing regulatory environment. Also covered are interpretive methodologies for understanding current cultural and social patterns and practices in the landscape, with an emphasis on sustainability. <b>Prerequisite:</b> LARCH 206 or ARCH 421	Credit Hours: 3.000 Schedule Types: Lecture
LARC 515	Advanced GIS: for Landscape Architecture	This is an advanced course in Geographic Information Systems (GIS). Students continue their studies in GIS applications appropriate to landscape analyses. GIS is an increasingly important tool for organizing digital spatial data in an accessible and logical manner for site design, recreation master planning, visual analysis, comprehensive planning, resource management and public advocacy. <b>Prerequisites:</b> LARC 310 (Minimum Grade D)	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
LARC 516	Landscape Tech: Construction Documents	This is the final course of the construction technology series. The major emphasis is the preparation of a complete set of technical construction documents with specifications, sustainable practices, and cost estimates. Specific topics include: site demolition, layout and dimensioning, and specification writing.	Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab

LARC 521	Environmental Policy	Environmental problems are essentially social, economic and political problems. This course traces the evolution environmental policy, legislation and regulations, both in the U.S. and worldwide, including the background and context of environmental policymaking. Students will also examine the substantive problems and political process of environmental movements, and contemporary environmental thought with regard to issues of sustainability and environmental justice.	Credit Hours: 3.000 Schedule Types: Lecture
LARC 599	Landscape Design 10: Capstone Project	This course is the last in a series of studios specific to the landscape architecture program curriculum. Students work independently and/or in groups. The Design Project requires individual/team research, inventory and analysis, programming, and design concept development through final design.	Credit Hours: 6.000 Schedule Types: Studio
		<b>LAW</b>	
LAW 101	Introduction to Law & Society	An interdisciplinary introduction to legal systems and the law. Laws are created by social and cultural systems and affected by social, economic and political environments. This course will help students understand the development and impact of legal systems through case studies of many current legal issues and debates. There will also be an introduction to international comparisons.	Credit Hours: 3.000 Schedule Types: Lecture
LAW 103	Crime and Justice	This course provides an introduction to criminal justice in America. Students will examine the criminal justice system and process in the social context of justice and democratic society. They will study the police and criminal courts as political institutions that make decisions with an eye to the press and popular opinion as well as to race, class and justice.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
LAW 105	American Government and the Legal System	This course provides an introduction to Law and American Government in action. In the course students will investigate the structures and processes of American Government and the relationships between the three branches of government within the context of how public policy is made and implemented.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: American Diversity, Pseudo
LAW 201	Constitutional Law and the Supreme Court	This course provides an examination of the sources, growth, development, and interpretation of the United States Constitution. It also examines the role of the Supreme Court in addressing issues of constitutionality, and considers key cases, historically and currently.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
LAW 203	Comparative Legal Systems	This course provides an introduction to comparative law, and how different legal systems approach the law, legal analysis and legal culture. This course provides an examination of comparative legal systems, which consist of legal processes, institutions and culture, through a series of thematic comparative case studies. It also examines the role of dispute resolution processes in different legal cultures; addresses issues of civil, criminal and administrative law; and considers key cases, historically and currently. <b>Prerequisites: WRIT 101 (Minimum Grade D) or WRIT 101G (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses
LAW 205	Philadelphia Law & Politics	This course provides a critical introduction to local law and politics. This course will focus on social change in cities, focusing on Philadelphia, in the context of structural urban problems. It provides an examination of the Philadelphia legal and political system by having students learn about processes, institutions and culture, through readings and real world experiences in and around the city of Philadelphia. Students will experience local law and politics through readings and discussions as well as by interacting with members of the legal and political community. <b>Prerequisite: WRTG 101 and HIST 114 or WRIT-101 and DBTU 114</b>	Credit Hours: 3.000 Schedule Types: Lecture



LAW 207	Forensic Law	Forensic Science is the collection, study and presentation of scientific evidence in a court of law used in both criminal and civil trials. The goal of forensics is the dispassionate use of science to reliably establish facts free of claims of bias or mistake. The mission of this course is to introduce many of the techniques used daily in courts of law to establish the admissibility of evidence and to examine the benefits of forensics in the creation of this admissible evidence as well as its limitations and potential for misuse. <b>Prerequisite: LAW 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
LAW 210	Law In/For the Workplace	Employment Law is the study of the major human resource legal issue that every entrepreneurial student (from fashion, design, graphic arts, architecture business to law) must know before opening up their own business and should keep squarely in mind as their business grows. Further, knowledge of employee rights gained in this course will empower students who work in another's business. Topics include analysis of the following issues; wages, hiring and firing, anti discrimination laws, worker benefits, union issues, arbitration, anti-complete clauses and trade secrets.	Credit Hours: 3.000 Schedule Types: Lecture
LAW 212	Intro to Law Enforcement	Introduction to Law Enforcement addresses the role that police officers play in society and the Criminal Justice System. The course is designed to highlight the structure and history of police; the nature of police work; police discretion and misconduct; the major trends and issues facing law enforcement; different types of policing strategies, and the future of the Law Enforcement field. The goal is to present students with potential situations that 21 century law enforcement is faced with and provide hands on real world techniques to understand and deal with challenges of the profession.	Credit Hours: 3.000 Schedule Types: Lecture
LAW 213	Conspiracy Theories	Students will examine popular and iconic conspiracy theories, real and imagined including 9/11, the JFK assassination and Watergate with the purpose of deconstructing the evidence, investigating the reason for their creation and analyzing their effect on American Society, culture and politics. <b>Prerequisites: WRIT 101 (Minimum Grade D) or WRIT 101G (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
LAW 300	International Law	This course provides an introduction to the international law system that examines the rules binding the international conduct of states and non-state actors. The course covers topics related to the sources and functions of international law, and related issues of jurisdiction and standing. It also focuses on international institutions, and specific issues in international law such as the rules of warfare and peacekeeping; human rights; international trade and communication. <b>Prerequisites: LAW 101 (Minimum Grade D) and WRIT 211 (Minimum Grade D) or WRIT 215 (Minimum Grade D) or WRIT 217 (Minimum Grade D) WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
LAW 301	Health, Law & Ethics	This course provides students with the foundation to recognize, understand, and resolve legal and ethical issues associated with contemporary healthcare. It represents an introduction to the US legal system and the basics of ethical and bioethical issues. Students explore liability, conflict management, the consent process, and the business of medicine, privacy and the role of an ethics. Additionally students debate the ethical and legal consequences of contemporary health-related issues (such as end-of-life dilemmas, surrogacy and, organ donation). <b>Prerequisites: WRIT 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
LAW 302	Law and Ethics	This course examines the intersection between ethical issues and law in the context of the United States. The course will consider contemporary cases that illustrate the intersection of contemporary legal and ethical issues. There will be a service-learning component to this class. <b>Prerequisites: LAW 101 (Minimum Grade D) and WRIT 211 (Minimum Grade D) or WRIT 215 (Minimum Grade D) or WRIT 217 (Minimum Grade D) or WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive

LAW 304	Law, Media & Society	This course examines the dynamic interactions between law, technology and media and how they affect a variety of global social and legal issues, including the democratic process, civil rights, and how individuals relate to each other legally, socially, economically, and sexually.	Credit Hours: 3.000 Schedule Types: Lecture
LAW 306	Legal Research, Writing and Moot Court	This course will introduce students to the basics tenets of legal research, writing and persuasive arguing by way of a moot court appellate competition focusing on current controversial topics that affect both American law and society	Credit hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
LAW 308	Law, Women and Gender	This course will examine how the courts and the democratic process have confronted issues of civil rights in the area of law and gender. Using court cases and legislative acts, students will study: (1) The historical denial of basic civil rights to women; (2) Gender discrimination and the law's efforts combat this discrimination; (3) Abortion rights; (4) Same-sex marriage, and (5) Violence against women and sexual assault. Students will learn how the law affects gender discrimination and analyze how well the law allows us to challenge discrimination. <b>Prerequisites: WRIT 217 (Minimum Grade D) or WRIT 215 (Minimum Grade D) or WRIT 211 (Minimum Grade D) or WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade D) or HIST 114 (Minimum Grade D) or DBTU 114 (Minimum Grade D) or AMST 114 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
LAW 411	First Amendment Seminar	This course examines the first amendment rights of speech, press and association, and focuses on landmark Supreme Court rulings and scholarly commentary. The course will provide students with skills to critically interpret the First Amendment and apply lessons learned to their own lives. It will cover such issues as libel law, obscenity, symbolic speech, and freedom of the press and freedom of association. <b>Prerequisites: LAW 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
LAW 499	Sr Cap:Public Policy Advocacy	This capstone course for the Law and Society major combines a classroom seminar (50 minutes per week) on advocacy skills with a real-world public policy advocacy project within either a self-selected pre-existing organization or an initiative of the student's own creation and design. Students will also receive 100 minutes of designated instruction time, via the web, during which their E-Reports will be reviewed and the status of their projects will be discussed. Students will review and integrate the skills and knowledge they developed during previous courses in the Law and Society curriculum while also applying the principles of public policy theory and oral and written advocacy to the student's selected project.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>MAGNETIC RESONANCE IMAGING</b>			
RSM 321	Patient Care & Services in Diagnostic Imaging	This course presents an introduction to basic medical techniques in patient care, safety, infection control, pharmacology, medico-legal issues, bioethics, health care delivery environments, diversity and an overview of the various imaging specialties in the Radiologic Sciences. Current issues in the Radiologic Sciences will also be addressed.	Credit Hours: 2.000 Schedule Types: Lecture
RSM 400	MRI Physics & Instrumentation I	In-depth study of the physical principles and instrumentation in MRI. Includes fundamentals of atomic physics, pulse sequencing, data processing, imaging parameters, image contrast, image formation, and image optimization. Provides an overview of the MRI hardware.	Credit Hours: 3.000 Schedule Types: Lecture
RSM 401	Cross Sectional Anatomy I	The study of human anatomy as seen in axial, sagittal and coronal planes. Presents correlations to cadaver slides as well as CT and MR images. Anatomical regions studied include the central nervous system, neck and musculoskeletal system.	Credit Hours: 2.000 Schedule Types: Lecture

RSM 402	Cross Sec Anatomy II	The study of human anatomy as seen in axial, sagittal and coronal planes. Presents correlations to cadaver slides as well as CT and MR images. Anatomical regions studied include the thorax, abdomen and pelvis. <b>Prerequisite: RSM 401</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSM 403	MRI Phys and instrument II	Continuation of Radiologic Sciences M 400, MRI Physics and Instrumentation I. The course includes the following MRI topics : common MRI artifacts, motion, flow & magnetic resonance angiography (MRA). <b>Prerequisite : RSM 400</b>	Credit Hours: 1.000 Schedule Types: Lecture, On-Line
RSM 411	MRI Safety	A comprehensive overview of issues related to MRI patient care and safety. Practical guidelines and recommendations are included that assist in the safe management of patients in the MR environment. The course includes the following MRI topics: proper screening & preparation of MRI patients, implants and devices contraindicated for MRI - including cardiac devices, neurostimulators, passive & active devices, maintenance of a safe work environment & ACR zoning, bio-effects of the static, gradient & radiofrequency electromagnetic fields, the missile effect, claustrophobia & other panic disorders associated with MRI procedures, issues related to MRI & pregnancy, MRI contrast agents & nephrogenic systemic fibrosis, auditory effects & MRI, issues related to cryogen & quench of MRI magnets, practice standards for the MRI technologist, and implementation of standard MRI safety policies & procedures.	Credit Hours: 2.000 Schedule Types: Lecture
RSM 412	Clinical MRI I	Students participate in the diagnostic process of performing MRI imaging examinations at clinical sites. Requires imaging anatomic structures and pathology and recording the information needed to provide optimal examinations. Provides intensive, hands-on clinical practice under the direct and indirect supervision of the MRI clinical staff. Evaluation is based on clinical competency in all aspects of MRI imaging procedures, including: patient preparation, patient care, room preparation, patient positioning, MRI exam protocols, technical skills, equipment skills, safety procedures, scanning efficiency, and MRI image evaluation.	Credit Hours: 6.000 Schedule Types: Clinical
RSM 413	Clinical MRI II	Continuation of Radiologic Sciences M 412, Clinical MRI I. Students participate in the diagnostic process of performing MRI imaging examinations at clinical sites. Requires imaging anatomic structures and pathology and recording the information needed to provide optimal examinations. Provides intensive, hands-on clinical practice under the direct and indirect supervision of the MRI clinical staff. Evaluation is based on clinical competency in all aspects of MRI imaging procedures, including: patient preparation, patient care, room preparation, patient positioning, MRI exam protocols, technical skills, equipment skills, <b>safety procedures, scanning efficiency, and MRI image evaluation.</b> <b>Prerequisite: RSM 412</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSM 414	Clinical MRI III	Continuation of Radiologic Sciences M 413, Clinical MRI II. Students participate in the diagnostic process of performing MRI imaging examinations at clinical sites. Requires imaging anatomic structures and pathology and recording the information needed to provide optimal examinations. Provides intensive, hands-on clinical practice under the direct and indirect supervision of the MRI clinical staff. Evaluation is based on clinical competency in all aspects of MRI imaging procedures, including: patient preparation, patient care, room preparation, patient positioning, MRI exam protocols, technical skills, equipment skills, safety procedures, scanning efficiency, and MRI image evaluation. <b>Prerequisite: RSM 413</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSM 415	MRI Pathology	The study of human pathology as seen in axial, sagittal and coronal planes. Presents correlations with CT and MR images. Anatomic regions studied include the central nervous system, neck, musculoskeletal system, thorax, abdomen and pelvis.	Credit Hours: 1.000 Schedule Types: Lecture, On-Line

RSM 431	MRI Procedures I	Introduces MRI neurological and musculoskeletal imaging protocols and principles. Scan techniques discussed include information on pulse sequences, scan planes, and slice prescriptions. Correlation between normal and pathological conditions will be included.	Credit Hours: 3.000 Schedule Types: Lecture
RSM 432	MRI Procedures II	Introduces MRI thoracic, abdominal, and pelvic imaging protocols and principles. Scan techniques discussed include information on pulse sequences, scan planes, and slice prescriptions. Correlation between normal and pathological conditions will be included. In addition, there is a unit on pediatric imaging. <b>Prerequisite: RSM 431</b>	Credit Hours:3.000 Schedule Types: Lecture
RSM 451	Imaging Informatics	Digital electronics, computers, and information technology are fundamental to medical imaging practice in the 21st century. This course presents an introductory overview of the science and technology underlying the information systems that are pervasive in modern diagnostic imaging. Topics include digital image acquisition, reconstruction, and post-processing, advanced visualization, decision support, computer networking and PACS, information systems, and industry standards such as DICOM, HL7, and IHE.	Credit Hours: 1.000 Schedule Types: Lecture
RSM 473	MRI Review Seminar	Taught in a seminar fashion, this course provides a review of the principles of MRI image formation, data acquisition, image processing, imaging procedures, patient care and safety - i.e., a final comprehensive review of MRI principles before students take the ARRT Board Examination for Magnetic Resonance Imaging.	Credit Hours: 2.000 Schedule Types: Lecture
RSM 474	MRI Advanced Scanning Seminar	Taught in a seminar fashion, this course allows students to obtain an introduction and overview of advanced scanning techniques in magnetic resonance imaging. The course includes the following advanced MRI scanning topics: MRI spectroscopy in the brain, high performance gradients, combinations of MRI, susceptibility weighting imaging, MR elastography, MR relaxometry, motion correction, and restriction spectrum imaging.	Credit Hours: 1.000 Schedule Types: Lecture, Seminar
RSM 498	MRI Special Topics	A research project/special topics course taught in an independent study/seminar manner. Students will produce a written literature review paper and present research projects on MRI topics agreed to by the instructor.	Credit Hours: 1.000 Schedule Types: Lecture
RSM 499	MRI Independent Study	A research project taught in an independent study manner. Students will produce a written literature review paper and present research projects on MRI topics agreed to by the instructor.	4.000 Schedule Types: Independent Study,
<b>MANAGEMENT</b>			
MGMT 111	Essentials of Entrepreneurship	This course will give students a realistic look at the demands of starting a viable business and help students evaluate their own skills, talents, and potential role in the entrepreneurial eco system. Concepts highlighted in this course include: networking, building the right team, legal business structures, venture funding options, and planning for growth. <b>Prerequisites: MKTG 102 or MKTG 104 and MGMT 301 or MGMT 104</b>	Credit Hours: 3.000 Schedule Types: Lecture
MGMT 301	Principles of Management	Effective management is fundamental for the successful operation of all types of enterprises. The course will present the principles, techniques and concepts needed for managerial analysis and decision making. Functions highlighted include planning, organizing, staffing and controlling.	Credit Hours: 3.000 Schedule Types: Lecture
MGMT 307	International Management	Introduces students to the special aspects of managing a company in the global environment. Issues involved in understanding and applying the international and cross-cultural dimensions of the traditional management functions, such as organization, control, motivation, human resources and labor relations; and organization theory are studied. Lectures, readings, exercises and cases will be used. <b>Prerequisites: MGMT 301 or MGMT 104</b>	Credit Hours: 3.000

MGMT 309	Systems Analysis	<p>This course introduces the structured approach to design of new applications software, software systems, networks, and/or World Wide Web installations. It deals with the usual life cycle for such operations. Analysis includes approaches to specifying input and output, file structures, trade-off techniques, implementation, documentation and testing. Other approaches such as rapid application development and object-oriented analysis are discussed.</p> <p><b>Prerequisite:</b> MIS 202</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MGMT 310	People & Teams in Organizatns	<p>The course includes an in-depth exploration of topics such as communication, group dynamics, group roles, team building, power and politics, leadership, and negotiation and conflict resolution. In addition, issues of organizational culture and diversity are examined. Through readings, discussions, class activities and projects, students learn how to be effective organizational communicators, team members and leaders. Students also gain an understanding of culture and diversity issues, and how to effectively manage them.</p> <p><b>Prerequisite:</b> MGMT 301 or MGMT 104 (Minimum Grade of D)</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MGMT 311	Colloquium in Management	<p>Consideration of selected relevant issues in management and society that are of serious interest to students and faculty, such as technology of the future, impact of data banks, management and public policy, planning systems, education and human resources</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MGMT 315	Communication, Negotiations and Creative Economics	<p>This is a course in organizational politics ? power, influence, conflict and conflict management. It has two goals: first, to develop students? skills in recognizing politics and conflict situations; and second, to teach students to use negotiating to achieve personal organizational goals. Through readings, discussion and role-plays, a wide range of conflict and negotiating contexts will be considered. These include situations in interpersonal, interorganizational and union-management relationships.</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MGMT 320	Human Resource Practice & Tools	<p>This course surveys the roles, policies and procedures of human resource management (HRM) in organizations today. Students learn the steps to staff and motivate a workforce, and appreciate the role of quantitative and qualitative decision making in HRM. Course materials deal with environmental impacts on HRM, equal employment opportunity, human resource planning, selection, performance evaluation, wage and salary administration, training and other relevant topics.</p> <p><b>Prerequisites</b> MGMT 301 or MGMT 104</p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MGMT 401	Operations Management	<p>This course is a comprehensive survey of production and service operations management, topics and functions. Topics include methods and work measurement, materials management, plant location and layout, production planning and control, maintenance, quality control, "Total Quality," Japanese management styles, "Systems Approach;" and decision tools such as PERT, linear programming, queuing theory, sampling and simulation. Service-delivery applications and activities are also highlighted.</p> <p><b>Prerequisites:</b> STAT 201 Minimum Grade of D and MGMT 104 Minimum Grade of D or MGMT 301</p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment - 4 students, Lecture, On-Line Course Attributes: Honors Assignment</p>
MGMT 405	Aprl/Textile Supply Chain Mgm	<p>This course will bring into sharp focus the global relationship that exists between all of the elements of the textile-apparel-retail supply chain. Areas covered: traditional management functions of control over timeliness of production, and quality and labor relations in the global marketplace.</p> <p><b>Prerequisites:</b> FASM 401</p>	<p>Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab, On-Line Course Attributes: Global Courses</p>

MGMT 411	Venture Creation	From opportunity finding to launch, this course provides students the opportunity to apply concepts that cover all major elements of entrepreneurship in the role of the venture creator. Concepts used in the exploration of a venture opportunity include: customer identification and development, business model development and testing, proof of concept evaluation, and pursuing appropriate funding opportunities. <b>Prerequisites: MGMT 111</b>	
MGMT 412	Current Management Topics	This course is designed for senior management majors, and integrates and extends concepts learned in other upper-level management courses. The dynamic nature of management is emphasized through reading, analyzing and discussing recent literature in terms of the current business environment. Students examine topics including 21st-century career management; the role of education and technology in organizations; and future trends in management and organizations. The course includes individual and group readings, cases, and research projects that are presented as written and oral assignments.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture
MGMT 490	Business Policy and Strategy	The process and techniques of strategy formulation, implementation and evaluation are studied and applied. Case studies of domestic and international companies and not-forprofit organizations are used to integrate strategic management concepts with knowledge acquired in other functional area courses. Includes extensive written individual and team assignments and oral presentations. <b>Students taking this course cannot take MGMT 491 for credit</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture Course Attributes: Writing Intensive
MGMT 490N	Business Policy and Strategy	The process and techniques of strategy formulation, implementation and evaluation are studied and applied. Case studies of domestic and international companies and not-forprofit organizations are used to integrate strategic management concepts with knowledge acquired in other functional area courses. Includes extensive written individual and team assignments and oral presentations. <b>Students taking this course cannot take MGMT 491 for credit.</b> <b>Classifications:Senior</b>	Credit Hours: 6.000 Schedule Types: Lecture Course Attributes: Writing Intensive
MGMT 491	Textile, Retail & App Business Policy & Strategy	The process and techniques of strategy formulation, implementation and evaluation are studied and applied as they pertain to the textile, apparel and retail industries. Case studies of domestic and international companies are used to integrate strategic management concepts with knowledge acquired in other functional area courses. Includes extensive written individual and team assignments and oral presentations. Students taking this course cannot take MGMT-490 for credit. <b>Classifications: Senior</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
MGMT 498	Business Capstone I	In this course, students evaluate relevant professional, ethical, and social responsibilities of individuals and organizations. The definitions and roles of sustainable practices, social enterprise, and social entrepreneurship in organizations are explored, and students apply these concepts to real-world business opportunities. An individual writing-intensive assignment ties the course to students' areas of specialization. The course also includes a critical review of the functional areas of business. <b>Classifications: Senior</b>	Credit Hours: 3.000 Schedule Types: Lecture Attributes: Writing Intensive
MGMT 498N	Business Capstone: Strategy Sim	In this course, students will be introduced to the fundamentals of business strategy and strategic decision-making. Students will demonstrate their functional knowledge of core business areas including: accounting and finance, management, and marketing, as well as product development and operations. The process and techniques of strategy formulation, implementation and evaluation are studied and applied as student teams operate competing companies in a computer-simulated business environment. This course builds on themes from the DEC Core. <b>Classifications: Junior or Senior</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive

MGMT 499	Business Capstone II	The process and techniques of strategy formulation, implementation and evaluation are studied and applied using real-world domestic, international, and not-for-profit company examples. This course builds on themes from the DEC core as they apply to the capstone experience. <b>Classifications: Senior</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b> <b>Course Attributes: Writing Intensive</b>
MGMT 499N	Business Capstone: CSR	In this course, students explore and evaluate the role of business in society. They demonstrate their understanding of ethics, social responsibility, and responsible management in a capstone business project that illustrates their comprehension of business strategy within the context of their major. This course builds on themes from the DEC Core. <b>Classifications: Senior</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: By Appointment, Lecture</b> <b>Course Attributes: Writing Intensive</b>
<b>MANAGEMENT INFORMATION SYSTEMS</b>			
MIS 202	Management Information Systems	This course is designed for future managerial end users of e-business information systems who will both use and manage information technology (IT). The course addresses the strategic, tactical and operational uses of IT in business for problem solving and identifies and explains MIS applications including customer relationship management systems, enterprise systems, e-commerce applications, transaction processing systems, business analytics, and emerging technologies. Computer assignments complement the topics discussed in class.	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
MIS 305	Database Analysis, Design & Mgmt		<b>Credit Hours: 3.000</b> <b>Schedule Types: By Appointment, Lecture</b>
<b>MARKETING</b>			
MKTG 102	Principles of Marketing	Principles of Marketing A basic course in which the main functions, institutions and concepts of marketing are studied. Attention is focused on providing an analytical and corporate framework for studying and understanding the marketing system within changing environmental forces.	<b>Credit hours: 3.000</b> <b>Schedule Types: Lecture, On-Line</b> <b>Course Attributes: Honors Assignment</b>
MKTG 104	Marketing Foundations	A basic course in which the main functions, institutions and concepts of marketing are studied. Attention is focused on providing an analytical and corporate framework for studying and understanding the marketing system within changing environmental forces.	<b>Credit Hours: 1.500</b> <b>Schedule Types: Lecture</b>
MKTG 115	Fashion Merchandising	Fashion Merchandising A survey course that provides knowledge of the industries and services that comprise the fashion business. Interrelationships of the men's, women's and children's industries are developed. An interdisciplinary approach to the fashion business as it relates to cultural, historical and economic features is a central theme.	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
MKTG 207	Consumer in the Market Place	Consumer Behavior This course provides comprehensive understanding of the many dimensions of consumer behavior and the contributions of behavioral science to this discipline. The focus will be on understanding consumer needs. <b>Prerequisites: MKTG 102 or MKTG 104</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
MKTG 217	Retailing Strategy & Structure	Retailing Strategy and Structure A comprehensive understanding of retail strategy in the dynamic retailing environment. Special attention is given to retailing structure since it underlies the strategic decision making of retailing management. <b>Prerequisites: MKTG 102 or MKTG 104</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: By Appointment - 1 student, Lecture</b> <b>Course Attributes: Honors Assignment</b>
MKTG 300	Introduction to Sports Management	This course will examine the complex and diverse nature of sports marketing from a strategic marketing perspective. Specific emphasis will be placed on the contingency framework for strategic sports marketing, with attention to market selection, marketing mix decisions, and the implementation and control of the strategic sports marketing process. Additionally the course will examine the marketing through sports, using sports as a platform for developing strategies and tactics to sell non-sports products. <b>Prerequisite: MKTG 102</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>

MKTG 302	Prod Devp & Innovation	<p>Product Development and Innovation This course is designed to expose students to the concept of innovation and an understanding of the process of product/ service development and innovative marketing. Students learn how a product is conceptualized and ultimately commercialized. They will understand the factors that play a central role in the process.</p> <p><b>Prerequisites: MKTG 102 (Minimum Grade D) or MKTG 104 (Minimum Grade D)</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MKTG 305	Contemporary Brand Management	<p>In this course students will learn the terminology, concepts and activities of brand management, including gaining an understanding of the brand equity concept, including steps that can be taken to create and grow the brand's value, identifying &amp; establishing the brand values &amp; positioning, planning &amp; implementing brand marketing programs, measuring &amp; interpreting brand performance, and continuing to grow &amp; sustain brand equity over the long-term.</p> <p><b>Prerequisites: MKTG 102 or MKTG 104</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MKTG 310	Integrated Marketing Communication	<p>Integrated Marketing Communication This course examines the vital role of marketing communications in the development of marketing strategy. Integrated marketing communications (IMC) is emphasized as students explore the use of advertising, personal selling, sales promotions, Internet marketing, database marketing, public relations, etc., to enhance brand equity. The strategy and planning involved in the development of integrated campaigns is emphasized.</p> <p><b>Prerequisites: MKTG 102 or MKTG 104</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture</p>
MKTG 315	Marketing in a Digital Environment	<p>Marketing in a Digital Environment This course investigates the ways in which new technologies are changing the field of marketing. Major topics include Internet advertising, database marketing, sales-force automation and customer relationship-management software tools. Other topics include the impact of new technologies on distribution strategies, online pricing models, mass-customization strategies, data mining and media implications.</p> <p><b>Prerequisites: MKTG 102 or MKTG 104</b></p>	<p>Credit hours: 3.000 Schedule Types: Lecture</p>
MKTG 318	Sales Management	<p>Sales management is the planning, direction and control of the selling activities of a business. Topics include recruiting, selecting, training, equipping, assigning, routing, supervising, compensating and motivating the sales force. This course focuses on business-to-business marketing.</p> <p><b>Prerequisite: MKTG 102 or MKTG 104</b></p>	<p>Credit hours: 3.000 Schedule Types: Lecture</p>
MKTG 320	Visual Literacy	<p>A survey course in which students will examine, appreciate and communicate with visual media. Students will enhance their capacity to look at a design and evaluate what is effective, with an understanding of design language and the process by which good communication is created.</p>	<p>Credit Hours: 3.000 Schedule Types: By Appointment - 4 students, Lecture</p>
MKTG 324	International Marketing	<p>This course applies fundamental marketing concepts in a global context. We will study marketing practices used by businesses to adapt to the international environment and how to scan the globe for opportunities in other countries. The impact of technological advances, monitoring the changing business environment, and developing effective global marketing strategies is also presented.</p> <p><b>Prerequisites: MKTG 102 or MKTG 104</b></p>	<p>Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses</p>



MKTG 328	Merchandise Buying/ Operations	The course provides the student with the understanding of the interdependence of the merchandising and operations functions. Students have a comprehensive understanding of the retail business from gross sales to net profit. To achieve this understanding, students are required to prepare a merchandising/operations plan that integrates all of the elements of doing business in the retail environment. <b>Prerequisites: MKTG 217</b>	Credit hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment
MKTG 381	Independent Study in Marketing	Independent Study in Marketing Intensive independent study of a chosen subject. The student is expected to read a substantial number of major works in the field and to prepare a critical, documented paper. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b> <b>Prerequisite: MKTG 102 or MKTG 104</b>	Credit Hours: 3.000 Schedule Types: Independent Study
MKTG 391	Marketing Research	Exposure to marketing-research techniques and procedures used in gathering, recording, analyzing and reporting of data related to marketing problems. <b>Prerequisites: MKTG 207 and (ABA 202 or STAT 202)</b>	Credit Hours: 3.000 Schedule Types: Lecture
MKTG 408	E-Business Strategy	This is an introductory course in which the size, scope and impact of e-commerce is explored. This course includes discussions about how technology impacts business processes and transactions. A significant part of the course will discuss the e-business technology platform. Additional topics include business-to-business market exchanges, online auctions, electronic-payment systems, market valuation of e-commerce firms, and government policies and issues concerning e-commerce such as privacy, regulations and ethics.	Credit Hours: 3.000 Schedule Types: Lecture
MKTG 412	Marketing Strategy Seminar	Marketing Strategy Seminar Skills will be developed for making better decisions by learning to integrate various topics of marketing. The importance and know-how of anticipating, recognizing and adapting to external forces on the decision-making process and organization will be discussed. Emphasis will be placed on incorporating the most recent literature, which is of theoretical and practical importance, in the decision-making process. The course is built around readings, marketing cases, research papers and problem sets. A comprehensive marketing plan will be developed. <b>Prerequisite: MKTG 391</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>MATHEMATICS</b>			
MATH 099	Fundamentals of College Math	This course covers those topics in arithmetic and algebra that are essential to further work involving mathematics. Students will study fractions, decimals and percentages, signed numbers, linear and quadratic equations, exponents and scientific notation, factoring, techniques of graphing, equations of straight lines and linear systems of equations. There will be an emphasis on applications. Use of the scientific calculator will be discussed. Credits earned may not be applied toward graduation requirements. <b>(Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 100	College Algebra	While the content of MATH 100 is identical to that of MATH 101, more time is devoted during the semester to the review and use of elementary mathematical operations. See MATH-101 for content. <b>Prerequisites: Math 099 or placemet test</b>	Credit Hours: 3.000 Schedule Types: Lecture

MATH 101	College Algebra	A concentrated study of the topics traditionally found in College Algebra. Topics of study include algebraic equations and inequalities, absolute value, polynomial, rational, exponential, and logarithmic functions, systems of equations and inequalities, matrices, and determinants. Emphasis is placed on applications in business and economics. Additional topics may include conic sections, sequences and series, combinatorics, probability, modeling with functions, and mathematical induction. While the content of MATH-100 is identical to that of MATH-101, more time is devoted during the semester to the review and use of elementary mathematical operations.	Credit Hours: 3.000 Schedule Types: Lecture
MATH 102	Pre-Calculus	The fundamentals of college algebra, analytic geometry and trigonometry will be covered, with particular emphasis on those topics necessary for the calculus sequence. <b>Prerequisite: MATH 100 or MATH 111 or placement test</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 103	Applied Calculus	An introduction to the differential and integral calculus of polynomials, rational functions, exponentials and logarithms. Emphasis is placed on the use of calculus in the study of rate of change, determination of extrema and area under the curve. <b>Prerequisites: MATH 102 or placement test</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 104	Analytical Geometry	This is a course in plane analytic geometry emphasizing the correspondence between geometric curves and algebraic equations in both 2D and 3D. This correspondence makes it possible to reformulate problems in geometry as equivalent problems in algebra, and vice versa. Curves studied include straight lines, circles, parabolas, ellipses, and hyperbolas. Other topics include coordinate transformations, polar coordinates, and parametric equations. Sequences, series, and selected topics in solid analytical geometry are also studied. The course assumes a sound background in algebra, geometry, and trigonometry. <b>Prerequisite: MATH102 (Minimum Grade C-) or MATH103 (Minimum Grade C-)</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 110	Pre-Calculus for Sci & Engrs	The fundamentals of college algebra, analytic geometry and trigonometry will be covered, with particular emphasis on those topics necessary for the calculus sequence. <b>Prerequisite: Math 100 or MATH 101 or placement test</b>	Credit Hours: 4.000 Schedule Types: Lecture
MATH 111	Calculus I	Functions, slope and rate of change, limits, derivations of algebraic functions, maxima and minima applications, indefinite integration, integration by substitution, sigma notation, area between two curves. Knowledge of algebra, geometry and trigonometric functions is assumed. <b>Prerequisites: MATH 102 or placement test</b>	Credit Hours: 4.000 Schedule Types: Lecture, On-Line
MATH 112	Calculus II	Differentiation and integration of transcendental functions. Theory and methods of integration and applications. Infinite series, convergent tests, Maclaurin and Taylor series. Convergence of Taylor series. <b>Prerequisites: MATH 111 (Minimum Grade D)</b>	Credit Hours: 4.000 Schedule Types: Lecture, On-Line
MATH 213	Calculus III	Study of analytic geometry in 3D-space; algebra of vectors, differentiation and integration of vectors; partial differentiation, multiple integrals; infinite series. <b>Prerequisites: MATH 112 (Minimum Grade D)</b>	Credit Hours: 4.000 Schedule Types: Lecture, On-Line
MATH 214	Linear Algebra	Theory and solution techniques for systems of linear equations; vectors, matrices, determinants; eigenvalues and eigenvectors; vector spaces; linear transformations. <b>Prerequisite: MATH 112</b>	Credit Hours: 3.000 Schedule Types: Lecture

MATH 225	Differential Equations	First-order equations; constant-coefficient, nth-order homogeneous and non-homogeneous equations; special nonlinear equations; elementary applications; power series solutions. May also include elementary numerical techniques for solutions of ordinary differential equations and other computer topics.	Credit Hours: 3.000 Schedule Types: Lecture
MATH 301	Data Visualization	This course introduces techniques and methodologies for creating effective visualizations based on principles from graphic design, visual art, perceptual psychology, and cognitive science. Topics include: data and image models, color, graph layout, communication design, infographics, identification of "chart junk", matters of scientific integrity, and optimization of data-ink in multivariate data sets. Although there is no pre-requisite for this course, basic working knowledge of, or willingness to learn, data analysis tools (e.g., R, Excel, Matlab/Octave) will be useful. <b>Prerequisites: MATH 101</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 316	Partial Differential Equations	How modeling physical phenomena leads to partial differential equations; the heat conduction, wave propagation and potential equations; classification of linear second-order equations; boundary-value problems; Fourier series; separation of variables and special functions. <b>Prerequisite: MATH 225</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 317	Real Variables	Study of topics related to functions of a real variable, including measure and integration; differentiation; abstract spaces; general measure and integration theory. <b>Prerequisite: MATH 225</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 318	Complex Variables	Study of analytical functions; Cauchy-Riemann equations; power series; infinite series; calculus of residues; contour integration; conformal mapping. <b>Prerequisite: MATH 225</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 321	Probability and Statistics	Fundamentals of probability, discrete and continuous random variables, probability distributions, hypothesis testing. <b>Prerequisite: MATH 112</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 323	Mathematical Statistics	This course is designed to give the student some of the background needed to pursue more advanced courses that use statistical techniques. The content of the course will include topics from probability theory that are necessary for an understanding of the mathematical foundations of statistics. These topics will include: probability distributions, likelihood functions, properties of expectation operators, moment-generating functions, the central-limit theorem, confidence intervals and hypothesis testing. The student will be expected to be familiar with the topics of calculus through multiple integrals. <b>Prerequisite: MATH 321</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 326	Modern Algebra	Study of sets and mappings; group, ring and field theory; homomorphisms and isomorphisms; Lagrange's theorem; abelian and cyclic groups; symmetric groups; polynomial rings. <b>Prerequisite: MATH 214</b>	Credit Hours: 3.000 Schedule Types: Lecture
MATH 331	Math Methods in Chemistry, Physics & Engineering	This is an advanced course covering topics chosen from the following: matrix algebra, Fourier series, Sturm-Liouville systems, boundary-value problems for ordinary differential equations, Laplace's equation, introduction to Bessel's equation and Bessel functions. <b>Prerequisite: MATH 112 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>MECHANICAL ENGINEERING</b>			
MENG 301	Machine Design	Kinematics and dynamics of machinery, including analytical kinematics, force analysis, cam design and balancing. Application of elementary mechanics of solids to analyze and size machine components for stress and deflection. Introduction to finite element analysis with emphasis on beam and plate models. <b>Prerequisites ENGR 218, ENGR 301</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture

MENG 325	Engineering Vibrations	Vibrations will be a thorough treatment of vibration theory and its engineering applications, from simple degree to multi degree-of-freedom system. Topics will include harmonic excitation, forced responses, multiple degree-of-freedom systems, design for vibration suppression, distributed parameter systems, vibration testing and experimental modal analysis, and finite element method.	Credit Hours: 3.000 Schedule Types: Lecture
MENG 399	Mechanical Engineering Design Seminar	The purpose of the Mechanical Engineering Design Seminar is to support student success as Mechanical Engineering students prepare to move into their senior design experience. As a prerequisite for the Engineering senior design experience, the course is built around didactic and experiential educational components, pre-project research assignments, and independent research. Included in the course are elements that teach and reinforce the project proposal process, refine technical report writing skills, and promote lifelong learning and continuing professional development. <b>Prerequisites: ENGR 311 and ENGR 301</b>	Credit Hours: 0.500 Schedule Types: Lecture
MENG 405	Intro to Mechatronics	This course will prepare students in the interdisciplinary field of engineering that comprises the integration of mechanics, electronics and computer technology coordinated by control architecture. Emphasis on computer-integrated electromechanical systems will help the students to understand the design, analysis and practical approach of system integration. <b>Prerequisite: ENGR 322</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
MENG 407	Thermodynamics	This course considers fundamental laws governing the transformation of heat into mechanical energy. Properties of gases and vapors and the processes between states are explored as are applications of the first and second laws of thermodynamics. A study of the transfer of heat by conduction, convection and radiation in steady and unsteady flow is also conducted. <b>Prerequisites PHYC 201/201L, MATH 112</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture
MENG 427	System Dynamics and Controls	Students will study modeling of physical systems including electromechanical systems; reduction of block diagrams; signal flow graphs and Mason's gain formula; response of second order systems: natural frequency and damping ratio and how they relate to rise-time, peak-time, settling-time, and overshoot; stability and the Routh-Hurwitz criterion; steady-state error and sensitivity; root locus; and Design of cascade compensators using root locus and frequency response. <b>Prerequisites ENGR 311, ENGR 215, ENGR 314</b>	Credit hours: 3.000 Schedule Types: Lecture
MENG 428	Heat Transfer	This course covers energy analysis; vapor and gas power cycles; vapor and gas refrigeration cycles; thermodynamic properties of mixtures and solutions; psychrometry and air-conditioning; reacting mixtures and combustion. <b>Prerequisites: MENG 407</b>	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture
<b>MEDICAL DOSIMETRY</b>			
RSD 322	Patient Care in Radiation Oncology	A comprehensive overview of the patient receiving radiation therapy and other oncology care. The course is designed to provide a foundation for patient assessment, physical needs, psychological needs, diagnosis and treatment modalities, and factors impacting treatment. This is a hybrid course which consists of a face-to-face and online component.	Credit Hours: 2.000 Schedule Types: Lecture, On-Line
RSD 401	Cross Sectional Anatomy I	This course is designed specifically for the Medical Dosimetry and Radiation Therapy student. It is customized to focus on structures that are vitally important to identify in the field of Radiation Oncology. This course is designed to introduce the student to human gross anatomy as seen in the axial, sagittal and coronal planes. Correlations with CT, MRI and ultrasound will be presented as well as some clinical correlations. Anatomic regions studied in this course will include: an introduction into the historical development of CT, structures in the pelvic and thoracic regions.	Credit Hours: 2.000 Schedule Types: Lecture

RSD 402	Cross Sec Anatomy II	This course is designed specifically for the Medical Dosimetry and Radiation Therapy student. It is customized to focus on structures that are vitally important to identify in the field of Radiation Oncology. This course is designed to introduce the student to human gross anatomy as seen in the axial, sagittal and coronal planes. Correlations with CT, MRI and ultrasound will be presented as well as some clinical correlations. Additionally, VERT will be used to complement the information presented. Anatomic regions studied in this course will include: bones of the entire skeleton, and structures of the following areas: brain, head and neck, and thorax. <b>Prerequisite: RSD 401</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSD 412	Clinical Medical Dosimetry	Provides the opportunity to work with the clinical personnel in a team approach to radiation therapy treatment, planning and patient care. Includes clinical experience such as dose calculations and treatment planning, radiation safety, quality assurance and annual calibrations of equipment with a physicist.	Credit Hours: 6.000 Schedule Types: Clinical
RSD 413	Clinical Medical Dosimetry II	Clinical Medical Dosimetry II is an extension of the clinical experiences developed during Medical Dosimetry I. The students continue to develop more advanced treatment planning skills under the direct supervision of a certified medical dosimetrist. <b>Prerequisite: RSD 412</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSD 414	Clinical Medical Dosimetry III	Clinical Medical Dosimetry III is an extension of the clinical experiences developed during Medical Dosimetry I and II. The students continue to develop more advanced treatment planning skills under the direct supervision of a certified medical dosimetrist. <b>Prerequisite: RSD 413</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSD 415	Clinical Radiation Oncology	The purpose of the course is to expose the oncology student to important topics in radiation oncology. Specifically this course will focus on the following two topics: Research and issues of safety and quality assurance <b>Prerequisites: RSD 435, RSD 401, and RSD 412</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSD 430	Case Studies in Dosimetry	Case Studies in Dosimetry is designed as an independent study to complement the knowledge acquired as a TJU Radiation Therapy graduate in the simulation, treatment planning calculation/design, and clinical setup for a breast treatment.	Credit Hours: 1.000 Schedule Types: Lecture, On-Line
RSD 435	Medical Dosimetry Physics I	The first semester of a two-semester course sequence presents the basics principles of physics and technology in dosimetry of radiation therapy focusing on describing the productions of ionizing radiations, the radiation producing machines, basic measurements of dosimetric parameters, MU calculations, treatment planning, and their medical and clinical applications to therapy of human diseases.	Credit Hours: 3.000 Schedule Types: Lecture
RSD 436	Medical Dosimetry Physics II	The second semester of a two-semester course sequence presents the basic physical and dosimetric principles of radiological and nuclear science and technology, focusing on the generation and measurement of ionizing radiations, atomic and nuclear transformations, the characteristics of radiations, interactions of radiation with matter, charged particle physics, and their medical and clinical applications to therapy of human diseases. <b>Prerequisite: RSD 435</b>	Credit Hours: 3.000 Schedule Types: Lecture
RSD 439	Radiation Protection	Presents basic principles of radiation protection and safety for patients, staff, and members of the general public, in the radiation therapy environment. Discusses radiation safety requirements of federal and state regulatory agencies, accreditation agencies and healthcare organizations. Radiation detection and measurement instrumentation and methods, as well as personnel monitoring, is also presented.	Credit Hours: 1.000 Schedule Types: Lecture

RSD 440	Intro to Radiobiology	This course will present concepts, theories, and principles of modern radiation biology. The physical properties of radiation and how radiation interacts with biological matter will be discussed. The effects of radiation on DNA, cells, and individuals, as well as the concepts and practice of clinical radiation therapy will be examined in detail. Specific topics will include human cellular biology; molecular and cellular radiobiology, including early and late effects, cellular survival curves, and factors affecting cellular radiosensitivity; establishing risk estimates; and regulations pertaining to current radiation protection practices. This is a hybrid course which consists of a face-to-face and online component.	Credit Hours: 2.000 Schedule Types: Lecture, On-Line
RSD 442	Quality Assurance & Instrument	Presents the procedures for quality assurance of the following: radiation producing devices, sealed and unsealed radioactive sources used for therapy, treatment planning computers, and treatment simulators. Also presents quality assurance procedures for treatment delivery, record-keeping, radiation exposure monitoring for patients and staff. The class will discuss the issue of compliance with governmental rules and regulations.	Credit Hours: 2.000 Schedule Types: Lecture, On-Line
RSD 443	Brachytherapy	Presents the introduction of properties of radioactive isotopes used in brachytherapy and basics clinical procedures of brachytherapy including low-dose-rate temporary or permanent interstitial implants, gynecological intracavitary insertions, high-dose rate (HDR) remote afterloader and inter-vascular brachytherapy. Also, presents the essential rules of safe-handling of radioactive materials, radiation protection and the basic requirements in compliances with governmental rules and regulations.	Credit Hours: 2.000 Schedule Types: Lecture
RSD 444	Special Proceed for Radiotherapy	Presents introduction and basic clinical procedures of high dose rate remote afterloader (HDR), stereotactic radiosurgery (SRS), linac-based stereotactic radiotherapy (SRT), three dimensional conformal radiotherapy (3DCRT), intensity modulated radiotherapy (static and rotational IMRT) and image guided radiotherapy (IGRT). Additionally, this course presents multiple advancements in the field of radiation oncology.	Credit Hours: 2.000 Schedule Types: Lecture
RSD 480	Survey of Medical Imaging	Presents a comprehensive survey of the physical principles, technology concepts, equipment and procedures used in medical imaging.	Credit Hours:2.000 Schedule Types: Lecture
RSD 499	Medical Dosimetry Independent Study	A research project taught in an independent study manner. Students will produce a written literature review paper and present research projects on Medical Dosimetry topics agreed to by the instructor.	Credit Hours: 1.000 TO 4.000 Schedule Types: Independent Study
<b>MEDICAL LABORATORY SCIENCES</b>			
MLS 301	Molecular Biology	Principles and mechanisms of cellular function at the molecular level, including an overview of experimental techniques; protein structure and function, gene expression, chromosome structure and replication; the cell cycle; transcription and translation, cell signaling pathways; molecular basis of genetic disease and cancer, and diagnostic applications.	Credit Hours: 3.000
MLS 304	Biochemistry	Examines structure and function of biological macromolecules, polysaccharides, proteins and nucleic acids; lipids; enzymes and metabolism; bioenergetics; control mechanisms; hormones; body fluids; nutrition; and biochemical pathology.	Credit Hours: 3.000
MLS 310	Introduction to Molecular Diagnostics	Course focusing on the techniques, procedures and protocols used in the molecular preparation and interpretation of biologic fluids and other human specimens using genetic technologies, nucleic acid hybridization and amplification techniques, immunochemistry and biosensor technology. Laboratory sessions cover contemporary procedures for diagnostic testing such as prognostic markers, DNA analysis, FISH, PCR, blotting techniques and DNA sequencing. Lecture and Laboratory.	Credit Hours: 2.000
MLS 311	Functional Histology	Microscopic study of the human body including normal histology and physiology and relationships to life processes through interactive lecture and microscopy laboratory sessions.	Credit Hours: 2.500

MLS 312	Clinical Microbiology I	Examines the biology of clinically significant bacteria. Emphasizes physiology and morphology of pathogenic bacteria and the key laboratory diagnostic tests used for their identification. Discusses pathogenic bacteria with respect to their associated clinical syndromes, epidemiology, mechanisms of infection, antimicrobial treatment and susceptibility testing. Contemporary laboratory methodologies used to examine clinical specimens are reviewed. Lecture and laboratory.	Credit Hours: 3.500 Schedule Types: Lab, Lecture, Lecture/Lab
MLS 313	Clinical Microbiology II	Continuation of MT 312/512. Epidemiology, pathogenesis, laboratory diagnosis and treatment of the following classes of microorganisms: parasites, fungi, mycobacteria, Nocardia, Chlamydia, Rickettsiae, mycoplasma, spirochetes and virology. Uses contemporary laboratory methodologies and clinical correlations to examine prepared specimens and infectious processes. Lecture and laboratory. <b>Prerequisite: MLS 312/512</b>	Credit Hours: 3.500 Schedule Types: Lab, Lecture, Lecture/Lab
MLS 323	Clinical Chemistry I	Study of the significance of chemical analytes indicative of human health and disease. Theory, operating principles and utilization of biochemical instrumentation and techniques for research in and testing of clinically significant analytes. Photometric and electrophoretic methodologies are used to test analytes including but not limited to carbohydrates, proteins, enzymes, lipids, drugs of abuse, therapeutic drugs and tumor markers. Quality control and preventive maintenance methods are emphasized. Lecture and laboratory.	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab
MLS 324	Clinical Chemistry II	Continued study in the theory, operating principles and utilization of biochemical instrumentation and techniques for testing of clinically significant analytes, with correlation of test data to a patient's clinical status. Emphasis on the study of hormones, electrolytes, water metabolism, blood gases, renal, hepatic and pancreatic functions and nutrition. Lecture and laboratory. <b>Prerequisite: Medical Laboratory Science 323/52</b>	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab
MLS 331	Immunology	Examines basic principles and mechanisms of the immune system in the physiologic condition and in the disease. Contains didactic and laboratory practical modules. Immune mechanisms in infections, hypersensitivity reactions, autoimmunity, immunodeficiencies, as well as tumor and transplantation immunology are discussed. The lectures are provided on the BBL as PowerPoint presentations with written notes under each slide.	Credit Hours: 3.000
MLS 341	Clinical Hematology I	Introduction to the hematopoietic system through study of the origin, development, and function of red blood cells, including normal physiology and metabolism of red cells. Normal and abnormal red and white blood cell morphology, and associated pathological findings are examined. Basic techniques employed in clinical hematology laboratories are taught and testing is performed on human blood samples. Introduction to blood collection techniques.	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab
MLS 343	Clinical Hematology II	Continued study of the hematopoietic system through study of abnormal white blood cell morphology and associated pathological findings. Normal and pathologic conditions of the coagulation process are examined. Basic techniques employed in clinical hematology laboratories are taught and testing is performed on human blood samples. Students continue to practice blood collection techniques. Lecture and laboratory. <b>Prerequisite: MLS 341/541</b>	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab
MLS 352	Immuno-hematology	Principles and protocols of modern transfusion services, covering blood typing, testing for antibodies and antigens, crossmatching, neonatal testing, and quality systems; immunology of hematologic diseases. Lecture and laboratory. <b>Prerequisite: MLS 331/531</b>	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab

MLS 375	Medical Laboratory Science Seminar	This seminar course is designed to allow students to evaluate their readiness to begin practicing as a medical laboratory scientist. Students explore personal and professional development related to transitioning into the medical laboratory science field. Topics include certification preparedness, resume writing, networking, interview and communication skills, and advocacy for the profession. Topics are covered through lectures, active learning activities, case studies, review questions, examinations, resume development and critique, and mock interviews.	Credit Hours: 2.000 Schedule Types: Lecture
MLS 376	Urinalysis and Body Fluids	This course provides the medical laboratory science student with foundational knowledge in urinalysis and body fluids. Basic anatomy and physiology of the urinary tract are reviewed with emphasis on urine formation. Physical examination, chemical analysis, and microscopic examination of urine and various body fluids are discussed. Renal, extrarenal, and other conditions and diseases as they relate to urinalysis and body fluid findings are examined. Lecture and laboratory.	Credit Hours: 3.000 Schedule Types: Clinical, Lab, Lecture, Lecture/Lab
MLS 412	Med Lab Sci Practicum I	Undergraduate practical internships in clinical and/or research laboratories. Students participate in all phases of laboratory functions common to contemporary clinical laboratory practice including, but not limited to, microbiology (routine and specialized procedures in bacteriology, mycology, parasitology, virology and serology), chemistry (routine and specialized procedures in general chemistry, toxicology, therapeutic drug monitoring and chemical immunoassay), hematology (routine and specialized procedures in clinical hematology, coagulation and other biologic fluids), immunohematology (routine and specialized procedures in blood banking and transfusion medicine) and immunopathology (immunodiagnostics, serology). Students also participate in relevant continuing education activities and engage in other professionally-related activities. <b>Prerequisite: Completion of pre-practicum medical laboratory science and core curriculum coursework.</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
MLS 416	Comprehensive Exam	Self-administered review materials followed by a pass/fail comprehensive exam in the discipline-specific body of knowledge and scope of practice necessary to prepare for national certification examination(s). <b>Prerequisite: Completion pre-practicum MLS and Core Curriculum coursework and the completion of at least two practicum courses.</b>	Credit Hours: 0.000 Schedule Types: Exam, On-Line, Seminar
MLS 575	Medical Laboratory Science Seminar	This seminar course is designed to allow students to evaluate their readiness to begin practicing as a medical laboratory scientist. Students explore personal and professional development related to transitioning into the medical laboratory science field. Topics include certification preparedness, presentation skills, resume writing, networking, interview and communication skills, and advocacy for the profession. Topics are covered through lectures, active learning activities, case studies, review questions, examinations, resume development and critique, and mock interviews.	Credit Hours: 2.000 Schedule Types: Lecture
<b>MEDICAL TECHNOLOGY</b>			
MT 302	Phlebotomy & Lab Practice		Credit Hours: 0.000 or 1.000 Schedule Types: Clinical, Lab, Lecture, Practicum
MT 303	Hematology Lecture		Credit Hours: 2.000 Schedule Types: Lecture



MT 304	Hematology Lab		Credit Hours: 1.000 Schedule Types: Lab
MT 307	Clinical & Molecular Lab Tech	modular course focusing on the techniques, procedures and protocols used in the chemical, microscopic and molecular preparation and interpretation of biologic fluids and other human specimens using clinical analysis, genetic technologies, flow cytometry, HLA tissue typing, nucleic acid hybridization and amplification techniques, immunochemistry and biosensor technology. Laboratory sessions cover contemporary procedures for diagnostic testing such as prognostic markers, DNA analysis FISH, PCR, blotting techniques and DNA sequencing. Lecture and laboratory <b>Prerequisite: MT 323/523 and MT 331/531 or permission of program</b>	Credit Hours: 4.000 Schedule Types: Lecture/Lab
MT 308	Instrumentation Lab		Credit Hours: 1.000 Schedule Types: Lab
MT 309	Biologic Fluids		Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab
MT 311	Intro to Medical Microbiology		Credit Hours: 4.000 Schedule Types: Lecture
MT 312	Microbiology I	Examines the biology of clinically significant bacteria. Emphasizes physiology and morphology of pathogenic bacteria and the key laboratory diagnostic tests used for their identification. Discusses pathogenic bacteria with respect to their associated clinical syndromes, epidemiology, mechanisms of infection, antimicrobial treatment and susceptibility testing. Contemporary laboratory methodologies used to examine clinical specimens are reviewed. Lecture and laboratory.	Credit Hours: 0.000 or 3.000 Schedule Types: Lab
MT 313	Microbiology II	Continuation of MT 312. Epidemiology, pathogenesis, laboratory diagnosis and treatment of the following classes of microorganisms: parasites, fungi, mycobacteria, Nocardia, Chlamydia, rickettsiae, mycoplasma, spirochetes and virology. Uses contemporary laboratory methodologies and clinical correlations to examine prepared specimens and infectious processes. Lecture and laboratory. <b>Prerequisite: MT 312/512</b>	Credit Hours: 0.000 or 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
MT 315	Clinical Chemistry		Credit Hours: 4.000 Schedule Types: Lecture
MT 316	Clinical Chemistry Lab		Credit Hours: 1.000 Schedule Types: Lab
MT 321	Clinical Chemistry I		Credit Hours: 0.000 or 3.000 Schedule Types: Lab, Lecture
MT 322	Clinical Chemistry II		Credit Hours: 0.000 or 3.000 Schedule Types: Lab, Lecture
MT 323	Clinical Chemistry I	Study of the significance of chemical analytes indicative of human health and disease. Theory, operating principles and utilization of biochemical instrumentation and techniques for research in and testing of clinically significant analytes. Photometric and electrophoretic methodologies are used to test analytes including but not limited to carbohydrates, proteins, enzymes, lipids, drugs of abuse, therapeutic drugs and tumor markers. Quality control and preventive maintenance methods are emphasized. Lecture and laboratory.	Credit Hours: 0.000 or 3.000 Schedule Types: Lab, Lecture

MT 324	Chemistry II	Continued study in the theory, operating principles and utilization of biochemical instrumentation and techniques for testing of clinically significant analytes, with correlation of test data to a patient's clinical status. Emphasis on the study of hormones, electrolytes, water metabolism, blood gases, renal, hepatic and pancreatic functions and nutrition. Lecture and laboratory. <b>Prerequisite: MT323/523</b>	Credit Hours: 0.000 to 3.000
MT 325	Medical Technology Seminar		Credit Hours: 1.000 Schedule Types: Seminar
MT 330	Clinical Chemistry I		Credit Hours: 4.000 Schedule Types: Lecture
MT 331	Immunology	Examines the human immune system as it relates to health and disease. Topics include structure, function and generation of antibody molecules, and cellular recognition, response and regulation of the immune response. Mechanisms of hypersensitivity, autoimmunity, responses to microbiological agents especially viruses, HLA, transplantation and tumor immunology are covered. Principles and applications of diagnostic immunologic laboratory methods are discussed. Lecture and Laboratory. Lecture portion available online with permission of program director.	Credit Hours: 0.000 to 3.000 Schedule Types: Lab, Lecture, On-Line
MT 335	Immuno-hematology I		Credit Hours: 3.000 Schedule Types: Lecture
MT 340	Clinical Microbiology I		Credit Hours: 3.000 Schedule Types: Lecture
MT 341	Hematology I	Introduction to the hematopoietic system through study of the origin, development, and function of red blood cells, including normal physiology and metabolism of red cells. Normal and abnormal red and white blood cell morphology, and associated pathological findings are examined. Basic techniques employed in clinical hematology laboratories are taught and testing is performed on human blood samples. Introduction to blood collection techniques. Lecture and laboratory.	Credit Hours: 0.000 or 3.000 Schedule Types: Clinical, Lab, Lecture
MT 343	Hematology II	Continued study of the hematopoietic system through study of abnormal white blood cell morphology and associated pathological findings. Normal and pathologic conditions of the coagulation process are examined. Basic techniques employed in clinical hematology laboratories are taught and testing is performed on human blood samples. Students continue to practice blood collection techniques. Lecture and laboratory. <b>Prerequisite: MT 341/541</b>	Credit Hours: 0.000 to 3.000 3.000 Lecture hours, 0.000 Lab hours Schedule Types: Lab, Lecture
MT 344	Immuno-hematology		Credit Hours: 5.000 Schedule Types: Lecture
MT 352	Immuno-hematology	Principles and protocols of modern transfusion services, covering blood typing, testing for antibodies and antigens, crossmatching, neonatal testing, and quality systems; immunology of hematologic diseases. Lecture and laboratory. <b>Prerequisite: MT 331/531</b>	Credit Hours: 0.000 or 3.000 Schedule Types: Lab, Lecture
MT 374	Basic Clinical Techniques		Credit Hours: 1.000 Schedule Types: Lab
MT 375	MLS Seminar		Credit Hours: 2.000 Schedule Types: Seminar
MT 376	Urinalysis and Body Fluids		Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
MT 401	Lab Administration		Credit Hours: 1.000 Schedule Types: Lecture
MT 402	Hematology Practicum		Credit Hours: 4.000 Schedule Types: Clinical
MT 407	Clinical Chemistry Practicum		Credit Hours: 4.000 Schedule Types: Clinical

MT 408	Clinical Microbiology		Credit hours: 3.000 Schedule Types: Lecture
MT 409	Clinical Microbiology Lab		Credit hours: 1.000 Schedule Types: Lab
MT 410	Clinical Microbiology Practicum		Credit Hours: 4.000 Schedule Types: Clinical
MT 411	Clinical Microbiology II		Credit Hours: 3.000 Schedule Types: Lecture
MT 412,422, 42, 454	Clinical Practica I, II, III, IV	Undergraduate practical internships in clinical and/or research laboratories. Students participate in all phases of laboratory functions common to contemporary clinical laboratory practice including, but not limited to, microbiology (routine and specialized procedures in bacteriology, mycology, parasitology, virology and serology), chemistry (routine and specialized procedures in general chemistry, toxicology, therapeutic drug monitoring and chemical immunoassay), hematology (routine and specialized procedures in clinical hematology, coagulation and other biologic fluids), immunohematology (routine and specialized procedures in blood banking and transfusion medicine) and immunopathology (immunodiagnosics, serology). Students also participate in relevant continuing education activities and engage in other professionally-related activities. <b>Prerequisites: Completion of pre-practicum Medical Laboratory Science and Core Curriculum coursework</b>	Credit Hours: 4.000 (each) Schedule Types: Clinical, Practicum
MT 415	Clinical Immunology Practicum		Credit Hours: 1.000 Schedule Types: Clinical
MT 422	Med Tech Practicum II	<b>Prerequisites: MT 324 and MT 313 and MT 331 and MT 343 and MT 352</b>	Credit Hours: 3.000 Schedule Types: Clinical, Practicum
MT 427	Immuno-hematology Practicum		Credit Hours: 2.000 Schedule Types: Clinical
MT 429	Research Seminar		Credit Hours: 3.000 Schedule Types: Seminar
MT 430	Clinical Chemistry II		Credit Hours: 3.000 Schedule Types: Lecture
MT 431	Clinical Immunology Practicum		Credit Hours: 1.000 Schedule Types: Clinical
MT 435	Immuno-hematology II		Credit Hours: 3.000 Schedule Types: Lecture
MT 442	Med Tech Practicum III		Credit Hours: 3.000 Schedule Types: Clinical, Practicum
MT 452	Immuno-hematology Practicum		Credit Hours: 2.000 Schedule Types: Clinical
MT 453	Immuno-pathology Practicum		Credit Hours: 2.000 Schedule Types: Clinical
MT 454	Med Tech Practicum IV		Credit Hours: 2.00 Schedule Types: Clinical, Practicum
MT 499	Independent Study	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b>	Credit Hours: 1.000 to 6.000 Schedule Types: Independent Study
<b>MOLECULAR BIOLOGY</b>			

MB 452	Practicum: Clinical Applic		Credit Hours: 2.000 Schedule Types: Practicum
MB 453	Practicum: Research Applic		Credit Hours: 2.000 Schedule Types: Practicum
MB 454	Practicum: Forensic Applic		Credit Hours: 2.000 Schedule Types: Practicum
<b>NURSING</b>			
NU 315	Health Assessment across the Lifespan	This course emphasizes normal assessment findings and common variations in health status across the lifespan continuum. This course focuses on the development of foundational assessment and communication skills necessary to acquire subjective and objective health information from patients. This course includes a laboratory component.	Credit Hours: 3.000 Schedule Types: Exam, Lab, Lecture, Lecture/Lab
NU 340	Medication Calculations in Nursing	This course incorporates previously learned arithmetic and mathematical skills to facilitate the mastery of medication calculation skills in preparation for clinical practice. Students will learn how to accurately calculate medication dosages for the administration of medications for the oral and parenteral routes. In addition, students will learn about safety and ethical principles and interprofessional collaboration skills underlying the administration of medications via various routes of administration. Successful completion of this course is a requirement for medication administration in the clinical setting.	Credit Hours: 1.000 Schedule Types: Lecture
NU 341	Foundations in Nursing	This course builds a foundation for successful entry into the clinical environment. Concepts of communication, quality and safety, intra- and interprofessional collaboration, health care technology, medication administration, and clinical reasoning are introduced to provide the foundation for professional nursing practice. Concepts basic to the physical, psychosocial, and spiritual health of patients across the care continuum are explored with a focus on evidence-based practice. The course develops the knowledge, skills, and attitudes necessary for patient interactions to provide high quality health care to a diverse patient population throughout the lifespan. This course includes a laboratory component.	Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab
NU 342	Health Promotion Applications Across the Lifespan I	This course prepares the student for the promotion of health in individuals, families and communities across the lifespan through primary, secondary and tertiary prevention strategies using an evidence base. This course introduces students to foundational concepts, related to individuals, families and populations throughout the care continuum. This course integrates pathophysiology, pharmacology and principles of growth and development related to specific exemplars of selected concepts. It also introduces the student to the role of genetics and genomics in health and illness. The clinical component of this course focuses on the unique needs of patients, families, and communities experiencing acute and chronic physical conditions with an emphasis on foundational skills and assessments. Students' clinical experiences are in both acute care and transition settings, supplemented with simulation.	Credit Hours: 7.500 Schedule Types: Exam, Lecture/Lab
NU 343	Patho- physiology	This course provides an overview of pathophysiologic concepts across the lifespan. The course will address basic principles, processes, and concept associated with common health problems as well as the pathophysiological alterations related to body systems.	Credit hours: 3.000 Credit hours Schedule Types: Exam, Lecture

NU 344	Health Promotion across the Lifespan II	This course continues preparation of the student for the promotion of health in individuals, families and communities across the lifespan through primary, secondary, and tertiary prevention strategies. This course further explores physical, behavioral and social problems faced by persons, families and communities across the care continuum through the integration of pathophysiology, pharmacology and nursing care related to specific exemplars of selected concepts. This course includes a clinical component in both acute and mental health, supplemented with simulation experiences. By continuing to build on the foundation of nursing knowledge, clinical reasoning and communication skills, as well as knowledge from the biopsychosocial disciplines, the clinical experience will focus on the unique needs of patients and their families experiencing acute and chronic conditions along the care continuum. The clinical experience will provide the students with an opportunity to build on previous knowledge in order to delivery safe and effective patient-centered care as a member of the interprofessional healthcare team.	Credit Hours: 10.000 Schedule Types: Exam, Lecture/Lab
NU 345	Pharmacology	This course builds a foundation of pharmacology emphasizing the nurse's role and responsibility in safe, effective drug administration. Pharmacotherapeutic agents used in the treatment of illness as well as those used in health maintenance and promotion across the lifespan will be examined with focus on specific drug classifications. Indications for use, modes of action, effects, contraindications, interactions, along with the principles of pharmacokinetics and pharmacodynamics will be explored. Legal, ethical, and cultural considerations related to pharmacotherapeutics and medication administration are presented.	Credit Hours: 3.000 Schedule Types: Exam, Lecture
NU 346	Professional Practice in Nursing	In this course students are introduced to the role of the professional nurse through the curricular themes of practice excellence, interprofessional collaboration, population health, and innovation. Students will learn about models of healthcare delivery and the incorporation of evidence into person-centered care. This course also examines the dimensions of professional practice that include nursing theories, role expectations of the professional nurse, and the person-centered care.	Credit Hours: 2.000 Schedule Types: Exam, Lecture
NU 347	Discovery and Evidence-Based Practice	This course focuses on the process of discovering evidence that will improve the quality and safety of nursing care. The concepts of evidence-based practice, ethics, quality and safety, and health care technology will be addressed and examined in the context of the research process. The importance of interprofessional collaboration to improved practice through scientific discovery is emphasized.	Credit Hours: 2.000 Schedule Types: Exam, Lecture
NU 493B	Informatics	This course focuses on innovation in healthcare, informatics, and interprofessional collaboration related to information exchange and practice excellence. Data collected for the purpose of improving health outcomes for patients, families and communities is examined. The role of the professional nurse using informatics, technology and implementing innovations to change health care is discussed.	Credit Hours: 2.000 Schedule Types: Exam, Lecture
NU 493C	Global Health	This course provides an overview of global health and the intersection of nursing practice related to global health initiatives. Basic principles of global health will be explored. This course emphasizes the importance of understanding cultural health beliefs, cultural humility, ethics, and their impact on initiatives to improve global health. The role of the nurse as a leader in global health initiatives will be explored through the review of nurse-led health improvement initiatives.	Credit hours: 2.000 Schedule Types: Exam, Lecture

NU 493E	Holistic and End-of-Life Care	<p>This course introduces undergraduate nursing students to holistic nursing which incorporates the care of the mind, body, and spirit. The learner will be prepared to bridge the gap between traditional and holistic interventions in the care of patients. This course will provide an in-depth overview regarding holistic end-of-life care for patients throughout the life span. The student will be prepared to care for patients and families who require an interdisciplinary and holistic approach when facing a life-threatening illnesses and/or death.</p> <p>This course will explore spirituality and cultural considerations; family dynamics and caregiving; symptom management; loss, grief, and bereavement; and complementary/integrative approaches to holistic and end-of-life care.</p>	<p><b>Credit hours: 2.000</b>  <b>Schedule Types: Exam, Lecture</b></p>
NU 494	Population Health and Care Transition Management	<p>This course provides the student with an understanding of determinants of health and health disparities on a population level. Health promotion of populations through primary, secondary, and tertiary prevention will be identified in connection with nursing and public health principles. This course also explores the practice and theory of care transitions management using interdisciplinary teams. Strategies used to improve patient outcomes through person-centered, cost effective care are highlighted using relevant Clinical exemplars.</p>	<p><b>Credit hours: 4.000</b>  <b>Schedule Types: Exam, Lecture/Lab</b></p>
NU 495	Health Promotion Applications Across the Lifespan III: Childbearing & Childbearing Families	<p>Building upon Health Promotion Applications across the Lifespan I, this course further expands the students' preparation in the promotion and delivery of healthcare across the lifespan through primary, secondary, and tertiary prevention strategies, using an evidence base, with a concentrated focus on childbearing and childrearing families. The course integrates pathophysiology, pharmacology and nursing care related to specific exemplars of selected concepts and relate them to childbearing and childrearing families when in the clinical setting and along the health care continuum. Students participate in collaborative partnerships with other healthcare professionals to improve patient outcomes. The clinical experiences are in both acute care and simulation settings.</p>	<p><b>Credit Hours: 9.500</b>  <b>Schedule Types: Exam, Lecture/Lab</b></p>
NU 496	Clinical Judgment Applications	<p>This course prepares students to critically analyze complex clinical situations and to recognize patterns of how specific conditions present in different patient populations. The course builds upon previous coursework and clinical practicums to synthesize the scientific process, evidence, clinical judgement, and creative problem-solving to support clinical decision-making across the care continuum. Students use concepts from health promotion, disease prevention, health restoration, and health maintenance for personcentered care. This course includes simulation and two clinical components: an advanced medical/surgical clinical rotation, and a selected placement rotation from available clinical settings.</p>	<p><b>Credit hours: 10.000</b>  <b>Schedule Types: Clinical, Lecture/Lab</b></p>
NU 497	Transitions to Professional Practice & NCLEX-RN Prep	<p>The first half of this course provides the nursing student with advanced professional nursing skills that seek integration of essential transition to practice concepts; such as nursing excellence, interprofessional collaboration, and innovative healthcare improvement strategies that comprehensively evaluate current workforce issues and trends. Additionally, this course incorporates professional nurse leadership, technology and healthcare reform that focuses on patient and family centered care that optimize care outcomes. The second half of this course provides the nursing student with the opportunity to explore test-taking strategies and to devise a personal plan of study for the NCLEX-RN preparation that is designed to ensure successful completion of licensure requirements. Course content emphasizes NCLEX-RN style test question practice, electronic testing practice, refinement of test-taking strategies, assessment, and readiness.</p>	<p><b>Credit hours: 3.000</b>  <b>Schedule Types: Lecture</b></p>

NU 498	Promoting Health and Quality of Life along the Care Continuum	Students will have the opportunity to participate in one of four sections surrounding curricular themes: patient-centered care, interprofessional partnerships, population health, and innovation. All themes have core commonalities of promoting health and quality of life across the care continuum. Within each section, students will explore aspects such as interprofessional team models, healthcare entrepreneurialism and environmental health, with a focus on leadership and communication skills, patient advocacy, innovation, and culturally sensitive strategies to promote healthy people, communities, and populations. The patient-centered care section of the course is presented as a seminar and will explore the concepts of caring, clinical reasoning, evidence-based practice, leadership, and quality and safety. Throughout the semester students will examine patient-centered care from various perspectives (patient, nurse, healthcare system, and globally) through discussion, guest speakers, small group work, and individual assignments. The goal of the course is to have students embrace patient-centered care as an integral part of their identity as a professional nurse.	Credit Hours: 3.000
<b>OCCUPATIONAL THERAPY (CENTER CITY)</b>			
OT 302	Applied Anatomy & Kinesiology	This course provides an overview of human anatomy systems as well as principles of biomechanics and kinesiology. Study of the musculoskeletal and peripheral nervous systems regionally will facilitate the application of anatomical and biomechanical knowledge to clinical observation and activity analysis. Includes a laboratory class in surface anatomy, osteology, and kinesiology, with opportunities to practice special clinical screening tests. Lecture and laboratory. <b>Prerequisites:</b> BIOL 101 and BIOL 102 and BIOL 110 and BIOL 111 <b>Restrictions:</b> Must be enrolled in Occupational Therapy program	Credit Hours: 4.000 Schedule Types: Lecture/Lab
OT 306	Understanding Research Principles	This course provides an opportunity to understand and apply research methods (from qualitative and descriptive to quasi-experimental and experimental), apply research approaches to health professionsbased research questions, and analyze reported research. This course prepares and requires learners to conduct literature searches relevant to the development of researchable questions and appropriate research designs. <b>Restrictions:</b> Must be enrolled in Occupational Therapy program	Credit Hours: 3.000 Schedule Types: Lecture, Seminar
OT 308	Neuroscience Foundations of Occupational Therapy	This course will provide knowledge of neuroscience from a structural, developmental and functional perspective to provide a foundation for understanding of health conditions, occupational performance and occupational therapy evaluation and treatment. Principles of neuroplasticity will be discussed to provide a framework for occupational therapy interventions. Students will apply their understanding of the nervous system to understand occupational performance deficits, development of an evaluation plan and to articulate the rationale for intervention. <b>Prerequisites:</b> BIOL 101 and BIOL 102 and BIOL 110 and BIOL 111 <b>Restrictions:</b> Must be enrolled in Occupational Therapy program	Credit hours: 4.000 Schedule Types: Lecture/Lab, Small Group
OT 311	Health and Health Conditions	This foundational course includes a survey of pathological conditions that may affect one's occupational performance. Students will examine common pathological conditions, understand diagnostic methods and be able to explain medical and psychiatric treatment approaches (including medications) commonly used to treat these disorders. Students will also begin to identify the effects of disability, disease or traumatic injury to individuals and their ability to engage in occupations within the context of family and society. <b>Restrictions:</b> Must be enrolled in Occupational Therapy program	Credit Hours: 4.000 Schedule Types: Lecture/Lab, Small Group

OT 321	Foundations of Occupation-Centered Practice I	<p>This course introduces students to selected foundational skills used in occupation-centered practice. To develop basic competence, students engage in learning activities and practice in three modules - Basic Clinical Skills: manual muscle testing, goniometry, monitoring vital signs, transfers; Occupation and Early Development: occupational performance in infants and toddlers, influences on young children's development; Interpersonal Foundations: group dynamics, communication, interviewing skills, Health Mentors Interprofessional team work, time management and life balance.</p> <p><b>Restrictions: Must be enrolled in Occupational Therapy program</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types:</b>  Lecture/Lab, small group</p>
OT 322	Foundations of Occupation-Centered Practice II	<p>This course, a continuation of OT 321, emphasizes theoretical underpinnings and evidence based approaches within the context of occupational therapy practice. Students explore areas of occupationbased practice and relate new and innovative ideas to clinical practice. Opportunities are included to practice frequently used screening and evaluation measures and fabricate orthotic interventions for selected clinical conditions. Additionally, Health Mentors Interprofessional teamwork, occupation and typical development in children 2-7 years are included.</p> <p><b>Restrictions: Must be enrolled in Occupational Therapy program</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types:</b>  Lecture/Lab, small group</p>
OCC 336	Occupation through the Life Span	<p>This course examines participation in occupation as an organizing force throughout the life span and as a key determinant of health. The course emphasizes foundational skills and knowledge concerning the nature of occupation and ways that participation in occupation is affected by individual and environmental contextual factors. Problem solving and analytical skills relative to activity analysis principles and the occupational therapy process are taught in conjunction with the Occupational Therapy Practice Framework. Students apply professional tools of analyzing, selecting, grading and adapting occupations, in order to address the impact of disability and dysfunction on participation in occupations.</p> <p><b>Restrictions: Must be enrolled in Occupational Therapy program</b></p>	<p><b>Credit Hours: 5.000</b>  <b>Schedule Types: Lecture, Small Group</b></p>
OT 340	Domains of Occupational Therapy Practice Fieldwork Level I	<p>This course provides an understanding of the parameters of occupational therapy practice through guided observation and participation in clinical and/or community settings. Particular emphasis is placed on developing and analyzing observation, clinical reasoning, interpersonal skills and professional behavior skills while observing and participating with individuals in a variety of self-care, work, social participation and leisure/play interventions.</p> <p><b>Restrictions: Must be enrolled in Occupational Therapy program</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Clinical, Seminar, Small Group</b></p>
OT 341	Occupational Analysis and Evaluation - Fieldwork Level I	<p>This course provides opportunities for students to observe and/or participate in patient/client evaluation and intervention, and to apply their understanding of the evaluation process, activity analysis and the use of occupation. Each student is placed in an environment that offers an opportunity to integrate didactic and clinical knowledge. Students engage in supervised observation, evaluation and intervention activities with individuals across the lifespan with a variety of conditions. Students continue to develop their clinical reasoning, professional communication and behavior skills, and therapeutic use of self through practice and guided self-reflection.</p> <p><b>Restrictions: Must be enrolled in Occupational Therapy program</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Clinical, Seminar, Small Group</b></p>



OT 357	Evaluation Process	<p>Occupational therapy evaluation requires a therapist to develop an occupational profile and to analyze the individual's ability to perform occupations. This course provides students with the knowledge and skills necessary for the client evaluation process according to the Occupational Therapy Practice Framework. Students learn about a range of tests and assessments that evaluate individual needs within a variety of clinical practice areas. Course emphasis includes the use of skilled clinical observation and principles of assessment selection, administration, interpretation, and scoring. Translating evaluation results for the purposes of planning occupational therapy intervention and establishing therapy goals are covered. Scientific communication skills are developed by completing evaluation reports and disseminating findings via oral and written documentation. Opportunities for practicing evaluation and assessment skills are highlighted in active learning class assignments.</p> <p><b>Prerequisites:</b> OT 311 and OT 336</p> <p><b>Restrictions:</b> Must be enrolled in Occupational Therapy program</p>	<p><b>Credit Hours:</b> 4.000</p> <p><b>Schedule Types:</b> Lecture/Lab, small group</p>
OT 400	Inter-professional Care Planning	<p>This course provides students with an in-depth, comprehensive look at interprofessional practice focusing on the role this course refines BSMS students' skills in observation of environmental factors that impact occupational performance. Students analyze the layers of the environment to identify factors that have the greatest impact in supporting and/or hindering occupational performance of individuals, groups and populations. Students are introduced to theories of the environment as well as models of design thinking to facilitate their critical thinking and support development of clinical reasoning used in occupational therapy intervention. Students apply their understanding of the impact of the environment and design thinking by identifying an area of occupational performance dysfunction and creating a prototype to alleviate this issue.</p> <p><b>Restrictions:</b> Must be enrolled in Occupational Therapy program</p>	<p><b>Credit Hours:</b> 3.000</p> <p><b>Schedule Types:</b> Seminar, small group</p>
OT 440	Clinical Intervention/Fieldwrk	<p>This course provides an in-depth understanding of the clinical intervention process from a problem-solving perspective. Each student is placed in an environment that offers an opportunity to integrate didactic and clinical knowledge and examine the process of clinical reasoning. Emphasis is placed on treatment planning and goal development, treatment implementation, and documentation of clientcentered, occupation-based care. Students also continue to hone professional behavior, clinical reasoning, and clinical skills.</p> <p><b>Prerequisite:</b> OT 341</p> <p><b>Restrictions:</b> Must be enrolled in Occupational Therapy program</p>	<p><b>Credit Hours:</b> 2.000</p> <p><b>Schedule Types:</b> Clinical, Seminar, small group</p>
OT 441	Interventions: Enhancing Social Participation-Fieldwork Level I	<p>This course addresses the role of occupational therapy in providing psychosocial group program development and implementation in emerging, practice settings. As occupational therapists move out of medical environments and into the community, they need to apply skills in needs assessment, program development, program evaluation, consultation and marketing, as well as the ability to work independently. Students engage in developing occupation based group programming in a variety of community settings where occupational therapy services are minimally or non-existent.</p> <p>Each student is placed in an environment, which offers an opportunity to integrate didactic and clinical knowledge. Emphasis is placed on developing, implementing and justifying theory-based psychosocial intervention at the group program level.</p> <p><b>Prerequisite:</b> OT 440 (previous to or concurrent with OT 558) <b>Restrictions:</b> Must be enrolled in Occupational Therapy program</p>	<p><b>Credit Hours:</b> 2.000</p> <p><b>Schedule Types:</b> Clinical, Seminar, small group</p>

OT 467	Health Services Administration	This course addresses the knowledge needed to be a professional occupational therapist within complex systems at the staff level and at various levels of management. Key focus areas include: structure of healthcare organizations, management and evaluation of programs, supervision methods and guidelines, funding and reimbursement mechanisms for services and the influence of external factors such as policy, law and social trends. Professional development trajectories and concepts of ethical practice and ethical problem-solving are presented. These issues and the roles and responsibilities of the occupational therapist will be analyzed within the contexts of current occupational therapy environments of practice in healthcare, education and social service systems.	Credit Hours: 2.000 Schedule Types: Lecture
OT 480	Level II Fieldwork A	The full-time, 12-week supervised fieldwork experience emphasizes the application of the academically acquired body of knowledge. This clinical affiliation will provide an in-depth experience in the practice and application of the occupational therapy process with individuals who are experiencing deficits in occupational performance or are at-risk for occupational dysfunction as a result of physical, psychosocial, developmental, learning or cognitive factors. Fieldwork placements will include traditional and/or community-based delivery systems. <b>Corequisite OT 578</b> <b>Restrictions: Must be enrolled in Occupational Therapy program</b>	Credit Hours: 6.000 Schedule Types: Clinical
OT 482	Level II Fieldwork B	The full-time, 12-week supervised fieldwork experience emphasizes the application of the academically acquired body of knowledge. This clinical affiliation will provide an in-depth experience in the practice and application of the occupational therapy process with individuals who are experiencing deficits in occupational performance or are at-risk for occupational dysfunction as a result of physical, psychosocial, developmental, learning or cognitive factors. Fieldwork placements will include traditional and/or community-based delivery systems. <b>Corequisite OT 579</b> <b>Prerequisite: OT 480</b> <b>Restrictions: Must be enrolled in Occupational Therapy program</b>	Credit Hours: 6.000 Schedule Types: Clinical
<b>OPERATIONAL EXCELLENCE</b>			
OPX 325	Lean Thinking		Credit Hours: 3.000 Schedule Types: Lecture, On-Line, Seminar
OPX 327	OpEx: Lean Project		Credit Hours: 1.000 Schedule Types: Independent Study, Lecture, On-Line, Seminar
OPX 530	OpEx: Accelerating Transform		Credit Hours: 3.000 Schedule Types: Lecture, On-Line
<b>PHILOSOPHY</b>			
PHIL 101	Introduction to Philosophy	Introduces problems and methods of philosophic thought, including the influence of philosophy in everyday life. Examines the thinking of great philosophers on the nature of reality, human freedom, foundations of knowledge, standards of values and the existence of God.	Credit hours: 3.000
PHIL 102	Philosophy of the Individual		Credit hours: 3.000
PHIL 104	Logic		Credit hours: 3.000
PHIL 201	Philosophy of the Human Person		Credit hours: 3.000
PHLX 203	Ethics	This course includes an analysis of some of the major classical and contemporary ethical theories. Topics include ethical relativism, ethical absolutism, egoism, natural law, utilitarianism, and situation ethics. Application of ethical theories to moral issues in our society are discussed. Issues of pornography, abortion, euthanasia, affirmative action, capital punishment, and environmental issues may also be discussed.	Credit Hours: 3.000

PHIL 222	Applied Professional Ethics	This course provides an examination of theories and methods used in ethical decision-making, with application to common issues in business, law, journalism, technology, research, education, and the health professions. <b>Prerequisite: ENGL 101 or ENGL 110</b>	Credit Hours: 3.000
PHIL 301	Healthcare Ethics	Examines moral questions arising from advances in technology, life sciences, medicine, nursing and other health professions. Defines moral theories, principles virtues, rights and obligations relevant to bioethical concerns such as informed consent, human experimentation allocation of medical resources, truth-telling and death. Analyzes case studies and current news reports for bioethical issues. <b>Prerequisite: HCA 300</b>	Credit Hours: 3.000
PHIL 499	Philosophies of the Good Life	The final course in the Hallmarks Core, "Philosophies of the Good Life" invites Jefferson seniors to define their personal values and to plan for how they might pursue and practice them in their post-college life. Students will survey philosophical understandings of "the good life" and consider how various world cultures and spiritual traditions have answered questions about the meaning of life. The course also covers topics in happiness studies and examines the roles that work and profession can play in a meaningful life. In a final project, students will draw upon course topics to reach their own conclusions about "the good life," expressing these in both academic and creative formats. As the last Touchstone course in the Hallmarks Core curriculum, the course guides students in reviewing and completing their e-portfolios.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>PHOTOGRAPHY</b>			
POTO 101	Introduction to Photography: Black and White	This course introduces the technical aspects and controls of a manual 35mm camera together with silver-based black & white film developing and printing methods. Students will develop a fundamental vocabulary for constructive critique of photographs and will generate a photographic portfolio piece, exploring a subject of interest.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio Course Attributes: Science Level I, Science Level II, Scientific Understanding
POTO 102	Introduction to Photography: Digital	digital photography through projects, presentations, critiques and lectures based on both classical and constructed methods of image creation. Topics include: basic camera functions, importing files from digital media, color management, image improvement and manipulation using Adobe Photoshop, Bridge, and Light Room and preparing final images for print and/or screen presentation.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
POTO 201	Studio Photography	This course introduces students to the fundamentals of photographic image making within the controlled environment of the studio. Emphasis is given to lighting techniques using professional strobe equipment; single-lens reflex digital capture on the computer, software for capturing digital photographs, as well as the role of props and setting in the generation of portraiture, fashion and still-life images.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
POTO 204	Intro to Photo Graphic Design	Required for Graphic Design Communication majors, this course focuses upon photography as a tool for graphic designers. Students are introduced to: film and digital camera use, exposure, image processing, and printing; table-top setups with professional studio lighting equipment; and digital documentation of work for portfolios. Prerequisite: DSGNFND-203/GRAPH-102 or permission of prog director. <b>Prerequisites: DSGF 203 (Minimum Grade D) or GRPH 102 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
POTO 205	Photography as Communication	Photography is, quite arguably, the most persuasive form of communication today. In this course we will examine both the history and current role of the camera in news gathering, media and communications, giving special attention to the varied uses of narrative visual storytelling in journalism, marketing, advertising, and social activism. We will analyze the subtle but important differences between photojournalism and documentary photography, with attention to both the ethical standards of the profession and the technical elements of the single-lens digital camera.	Credit Hours: 3.000 Schedule Types: Lecture, Studio

POTO 302	Architectural Photography	In this course students acquire the skills to apply a documentary methodology to thematic explorations of subject matter, specifically related to architecture and the built environment, interiors and cultural landscapes. Students learn to critique photographs of buildings and spaces and to produce high-quality black and white prints.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
POTO 303	Photograph Medical Experimentation	Alternative printing processes, including salted paper, cyanotype, tintype and platinum/palladium, are examined as a complement to contemporary methods. Emphasis upon medium format and the view camera as tools for documentation, narration, and expression supplement consideration of photography's technical aspects. Through exploration of traditional subjects including architecture, landscape, still life and portraiture, students learn exposure, film processing, film scanning, and large scale inkjet printing.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio Course Attributes: Nexus Design Experience
POTO 307	History of Photography	Since its invention in 1839, photography has played a pivotal role in the formation of modern visual culture. Focusing upon chronological, thematic, and technological developments, this course investigates the diverse expressions and applications of the photographic image within a nexus of philosophical, social, economic, scientific, and aesthetic contexts. Particular emphasis is placed upon: debates concerning the nature and function of images; the medium's impact upon portraiture, high art, popular culture, fashion, and social documentation; and the rise of photojournalism and advertising. Photography as a discreet language of signs, symbols, and metaphors with implied narratives is emphasized	Prerequisites: WRTG 2xx
POTO 381	Independent Study in Photography	Independent Study in Photography is a one term student initiated project limited to those students who have finished the full sequence of photography courses. A student proposes a project and works independently with guidance from the instructor. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b>	Credit hours: 3.000 Schedule Types: Independent Study Course Attributes: Nexus Design Experience
POTO 436	Historic Pres Doc: Photography	Begun in 1933, the Historic American Building Survey (HABS) is the first federal preservation program established to document America's architectural heritage. In this course students learn the fundamentals of HABS documentation methods for the production of archival records of historic structures and places, utilizing the 4 x 5 large-format camera. Through field work and labs, students photograph, print, research and narrate comprehensive, technically proficient photographic essays that represent the salient aspects of historic structures, complexes and sites in accordance with HABS standards.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
<b>PHYSICAL EDUCATION</b>			
PE 00	Varsity Athlete	Varsity Athlete Students who have participated on one of the University's 12 intercollegiate sports teams for one season will satisfy the requirement for this course. Students must register for this course in the semester they expect to receive the course credit. Students may register for this course two times.	Credit Hours: 0.500 Schedule Types: By Appointment/Lab, By Appointment, Lab
PE 02	Recreation and Wellness	Students participate in 15 or more hours of recreation and wellness activities offered through the Department of Athletics. Opportunities include participation in intramural sports, recreational courses in team and individual sports, and wellness courses such as yoga, stress management, and tailored exercise programs. All activities must be validated by a representative from the Department of Athletics to earn credit. Students must register for the course at the beginning of the semester to receive course credit. Note: For PE 02 Credit, all students must complete the Recreation/ Wellness form with at least 15 signatures from the group exercise instructor to verify completion of 15 hours. At the end of the semester based on your completed form verifying completion of 15 hours, your PE grade of CR will be recorded. This form can be picked up at the Gallagher Center Front Desk or may be printed from the web.	Credit Hours: 0.500 Schedule Types: By Appointment/Lab, By Appointment, Lab

PE 02B	Recreation and Wellness	Students participate in 15 or more hours of recreation and wellness activities offered through the Department of Athletics. Opportunities include participation in intramural sports, recreational courses in team and individual sports, and wellness courses such as yoga, stress management, and tailored exercise programs. All activities must be validated by a representative from the Department of Athletics to earn credit. Students must register for the course at the beginning of the semester to receive course credit. Note: For PE 02 Credit, all students must complete the Recreation/ Wellness form with at least 15 signatures from the group exercise instructor to verify completion of 15 hours. At the end of the semester based on your completed form verifying completion of 15 hours, your PE grade of CR will be recorded. This form can be picked up at the Gallagher Center Front Desk or may be printed from the web.	Credit Hours: 0.500 Schedule Types: Lab
<b>PHYSICIAN ASSISTANT</b>			
PAST 400	Medical Terminology	Medical Terminology This competency-based course covers the structure, definition and utilization of basic medical terminology for students entering the health professions. The course is designed for students with some health care experience. Independent reading, workbook exercises, case studies and interactive computer software are the learning modalities used in this experience.	Credit Hours: 1.000 Schedule Types: On-Line
PAST 403	Evidence Based Medicine	This lecture/seminar course provides a foundation for clinical decision making that will be necessary for the future practice of the physician assistant student. The course teaches the basic principles of evidence-based medicine and how to apply them to clinical decision making. Students will learn basic principles of evidence-based medicine, how to formulate a good clinical question, how to access and search the literature, how to evaluate the validity of the literature and how to apply it to answer a clinical question. After the foundational principles have been presented through lectures, students will work in small groups to practice using case based scenarios to apply the principle that they have learned.	Credit Hours: 2.000 Schedule Types: Lecture, Lecture/Phys Asst Group Mtg, Physician Asst Group Meeting
PAST 407A	Advanced Anatomy (A)	This lecture and laboratory course will review basic histology along with the major anatomical structures of the human using a regional organization. Laboratory sessions utilizing microscopic examination, models and cadaver specimen dissection will augment lecture material. <b>Prerequisite: BIOL 202 Minimum Grade of D and BIOL 202L Minimum Grade of D</b>	Credit Hours: 2.000 Schedule Types: Lab, Lecture, Lecture/Lab
PAST 407B	Advanced Anatomy (B)	Advanced Anatomy This lecture and laboratory course will review basic histology along with the major anatomical structures of the human using a regional organization. Laboratory sessions utilizing microscopic examination, models and cadaver specimen dissection will augment lecture material. <b>Prerequisite: BIOL-202 and BIOL-202L</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
PAST 410	Medical & Professional Ethics	Understanding the philosophical principles related to biomedical ethics, patient-practitioner relationships and the role of the physician assistant provider within the health care system are the main topics encompassed in this lecture and discussion seminar course.	Credit Hours: 2.000 Schedule Types: Lecture
PAST 411	Applied Behavioral Science	The topics of developmental psychology, abnormal psychology, human sexuality, stress responses, behaviors related to psychological health and illness and the diagnosis and management of common psychological disorders are the focus of this lecture course.	Credit Hours: 3.000 Schedule Types: Lecture
PAST 413	Med Physiology & Pathophysiology	This lecture course is designed to teach the principles of human medical physiology along with the physiological mechanisms of common disease states. <b>Prerequisites: BIOL 202 Minimum Grade of D and BIOL 202L Minimum Grade of D and BIOL 221 Minimum Grade of D and BIOL 221L Minimum Grade of D</b>	Credit Hours: 3.000 Credit hours Schedule Types: Lecture

PAST 417	Medical History and Physical Diagnosis	This lecture and practical laboratory course will introduce the physician assistant student to the techniques for eliciting a medical history and performing a complete physical examination on humans. The interpretation of history and physical examination findings as applicable to physiological and disease states will also be discussed. Laboratory sessions, hospital experiences and writing assignments will enhance the learning experience.	Credit hours: 5.000 Schedule Types: Lab, Lecture, Lecture/Lab, Lecture/Phys Asst Group Mtg
PAST 421	Medical Genetics and Microbiology	This lecture course presents current concepts and issues in medical genetics, immunology and microbiology. It focuses on diseases of genetic origin, the function of the immune system and emerging trends in disorders caused by microorganisms. <b>Prerequisites: BIOL 221 Minimum Grade of D and BIOL 221L Minimum Grade of D</b>	Credit Hours: 2.000 Schedule Types: Lecture
<b>PHYSICS</b>			
PHYC 101	General Physics	(for non-science majors) The basic laws of mechanics and thermodynamics are covered. The emphasis will be on understanding the major laws of physics and the way they manifest themselves in practical applications and in laboratory experiments. The areas of importance for architecture and interior design, such as sound and illumination, are discussed. <b>Prerequisite: MATH 102, or MATH 103 or MATH 111</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab, On-Line
PHYC 102	Conceptual Physics	Conceptual Physics is a one-semester course in physics for Industrial Design and other interested students. The course will include a brief introduction to some important laws of physics, and focus on sound, electricity, and electromagnetic waves. The physical principles underlying commonly used technologies such as MRI scanners, microwave ovens, and generators are discussed. The Conceptual approach used in this course puts physics before mathematics, although mathematics (algebra and trigonometry) is still used to reinforce the concepts. Interactive lectures and discussions as well as student-centered individual and group activities in the lab serve as teaching methods.	Credit Hours: 3.000 Schedule Types: Lab, Lecture Course Attributes: Scientific Understanding
PHYC 111	Algebra-based PHYC I - Mech & Thermodyn	An algebra-based course covering the basic laws of mechanics and thermodynamics. The emphasis will be on understanding the major laws of physics and the way they manifest themselves in practical applications and in laboratory experiments. Topics include Newton's laws, conservation laws, statics, torque, and viscous fluid dynamics.	Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab
PHYC 112	Algebra-Based PHYS II- Electrici	An algebra-based course covering the concepts of electricity, magnetism, and optics. This course uses real world examples to enhance comprehension of physical principles. Additional topics will include radiation, imaging, and basic atomic theory. <b>Prerequisite: PHSY 112, mimimum grade D</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
PHYC 201	Physics I	(required for science and Engineering majors) A calculus-based course emphasizing Newton's three laws of motion and the conservation laws of energy, linear momentum and angular momentum as first integrals of the dynamics. Additional topics in mechanics include stress and strain, simple harmonic motion and hydrostatics. Absolute temperature scales, thermal expansion, specific heats, methods of transfer of heat energy, ideal gases and real gases are considered before studying the first and second laws of thermodynamics, with the concept of entropy emphasized in the latter. <b>Corequisite: PHYS 201L</b> <b>Prerequisites: MATH 111( Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, On-Line Course Attributes: Science Level II, Scientific Understanding

PHYC 201L	Physics I Lab	In this one-credit laboratory course students perform, analyze and submit lab reports based on experiments which test the theories developed in mechanics and heat and they take quizzes based both on the lab instructions and material from the lectures. <b>Corequisites: PHYC 201</b>	<b>Credit Hours: 1.000</b> <b>Schedule Types: Lab, On-Line</b> <b>Course Attributes: Science Level II, Scientific Understanding</b>
PHYC 203	Physics II	The mathematical representation of traveling sinusoidal waves and standing-wave patterns is emphasized. Applications are made to sound waves. Electrostatics include Gauss's law, electric potentials and the potential gradient equation. The field concepts are used to interpret elementary D.C. circuits including Kirchoff's Rules. Capacitors as circuit elements and dielectrics are also studied. The effects of the magnetic field, its sources, induced EMFs and magnetic materials are considered. Series AC circuits conclude electromagnetism. Geometric optics includes lenses, mirrors and optical instruments. Physical optics includes interference and polarization of light waves. <b>Corequisite: PHYS 203L</b> <b>Prerequisites: PHYC 201 (Minimum Grade D) and PHYC 201L (Minimum Grade D)</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
PHYC 203L		In this one-credit laboratory course students perform, analyze and submit lab reports based on experiments which test the theories developed in waves, electricity and magnetism, and light. They take quizzes based both on the lab instructions and material from the lectures. <b>Corequisite: PHYS 203</b>	<b>Credit Hours: 1.000</b> <b>Schedule Types: Lab</b>
PHYC 301	Introduction to Physics		<b>Credit Hours: .000 OR 4.000</b> <b>Schedule Types: Independent Study,</b>
PHYC 314	Elements of Quantum Mechanics	The experimental background of quantum mechanics is reviewed before its postulates are introduced, and the theory is used to solve one-dimensional examples including the harmonic oscillator, then ' in three dimensions ' the hydrogen atom, electron spin and atomic spectra. Applications to chemistry are stressed. <b>Prerequisite: MATH 22 and PHYS 201</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
<b>POLITICAL SCIENCE</b>			
POSC 101	Government of the U.S.	Examines principles of democracy and presents background description and analysis of the national government of the United States.	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
POSC 104	Intro to Political Science		<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture</b>
POSC 499	Independent Study		<b>3.000 Credit hours</b>
<b>PRINT DESIGN</b>			
PRNT 101	Intro to Print Design	This course introduces the basic concepts and processes of analog and digital printing methods. Students will learn the hands on process of screen-printing as well as the technical process of large format digital printing. This class explores the use of printing as a vehicle for both creative expression and visual communication. This course is closed to all Textile Design majors. <b>Prerequisites: ARFD 102 (Minimum Grade D) or DSGF 203 (Minimum Grade D) or VDES 101 (Minimum Grade D) or INDD 102 (Minimum Grade D)</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture, Studio</b>
PRNT 301	Printing Practices	This course introduces production of printed textiles by hand-screen and digital fabric printing methods. Students will learn a technical process of color separations, screen making and printing in both digital and conventional (hands-on) modes. Integration of digital and hands-on printing are encouraged toward the end of the course. The main focus is placed on aesthetics of color and styling in textile design on fabric. Sketchbook study will be required to document design processes, ideas and drawings. <b>Prerequisite: TEXT 206 or PRINT 305 of by permission of instructor.</b>	<b>Credit Hours: 3.000</b> <b>Schedule Types: Lecture, Studio</b>

PRNT 303	Print Design Studio I	Techniques, materials, tools and basic information needed for the design on paper of printed fabrics for the apparel and home furnishing fields are studied. Hands on approaches with gouache and watercolor are used to prepare colorway and repeats. Students prepare a portfolio and learn to keep a sketchbook. A brief introduction to printing methods is included <b>Prerequisite: DRAW 303</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio Course Attributes: Honors Assignment
PRNT 305	Textile Printing Technology	The theory and practice of all aspects of industrial printing techniques are presented in a lecture/demonstration/lab format. Cloth preparation and finishing, machinery, dyestuffs and various print styles are included. This course offers practical background knowledge to students with primary interest in textile design, styling, marketing, quality control and textile	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
PRNT 307	Printing Technology	The course consists of lecture and lab that focuses on the principles, techniques and chemical processes involved with printing technologies. This course covers printing mechanisms, chemistry, coloration systems and styles for impact, non-impact, additive and subtractive printing. Media preparation, post treatment (fixation) and industrial testing standards are also examined. At the same time, the course also introduces the principal of surface Imaging supply chains, including design, manufacturing, marketing, product distribution and as well as ecological practices. This is an undergraduate elective course for all students. At the same time, it is one of designated elective courses for Textile Design major.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
PRNT 315	Print Design Studio II	This course focuses on creative use of CAD in surface patterning, which integrates with hands-on design applications that students acquired in PRINT-303 Print Design I. Digital workflow, which includes scanning croquis, designing pattern on CAD, digital color matching and color ways will be introduced. At the same time, strong emphasis is placed on making croquis, which develop from drawings and paintings in the sketchbook. Students will create printed textile designs and patterns for Jacquard designs on paper with digital printers for apparel and home furnishing fields. Throughout the semester, sketchbook study will also be required to document the working process, as well as drawings and paintings. <b>Prerequisite: TEXT 306</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio Course Attributes: Honors Assignment
PRNT 331	Print Design Studio III	Advanced course to give students further necessary experience in developing and producing creative designs for special markets, end uses and fabrics. Market research is required before projects are begun. <b>Prerequisite: PRINT 315</b>	Credit Hours: 3.000 Schedule Types: Lecture, Studio
<b>PSYCHOLOGY</b>			
PSYC 101	Intro to Psychology	This course is an introduction to the methodology, concepts, principles and issues in the study of behavior. Topics to be covered include: the biological bases of behavior; sensory and perceptual processes; learning, memory and cognition; motivation and emotion; personality, psychopathology and psychological approaches to therapy; and social interactions. This course is a requirement for enrollment in all higher-level psychology courses.	Schedule Types: By Appointment - 4 students, Lecture, Lecture/On-Line, On-Line Course Attributes: Honors Assignment, Psychology Course
PSYC 103	Physiological Psychology	This course will expand upon the biological bases of behavior. An emphasis will be placed on the relationship between the brain and behavior. Topics will include synthesis of neurotransmitters, an introduction to drugs and behavior and neural substrates that underlie behaviors. <b>Prerequisite: PSYCH 101</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Pseudo, Psychology Course
PSYC 201	Abnormal Psychology	Consideration of the various classifications and symptomatology of psychopathological disorders ' their origin, assessment, prognosis, treatment and prevention. <b>Prerequisite: PSYCH 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Lecture, On-Line Course Attributes: Honors



PSYC 210	Forensic Psychology	Students will examine the interplay between the disciplines of psychology and law. The course will examine the psychological and behavioral issues that impact the legal and criminal-justice systems, and how law and justice affect human behavior. Topics to be covered include crime and criminal behavior, victims, law enforcement, trials, witnesses, mental illness and criminal justice, corrections, family law, crime intervention and prevention. <b>Prerequisites: PSYC 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 211	Learning Theory	Students will study the acquisition, activation, direction and retention of human and animal behavior. Topics to be covered include instincts, drive, conditioning and instrumental learning, human verbal learning and language learning and memory processes. <b>Prerequisites: PSYC 101 (Minimum Grade of D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 212	Cognitive Psychology	Study of human thinking, memory, problem solving and the relationship between damage to the cortex and information processing. Empirical research and applied examples and demonstrations will be presented to address such topics as the content of memory, memory improvement, strategies and approaches for solving different kinds of problems, and pathologies and problems of thought.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 213	Developmental Psychology	Students will analyze the process of human development and change throughout the lifespan. Research on both humans and animals will be presented to promote understanding of human physical, social, emotional and cognitive development. Topics include prenatal and postnatal development, issues and theories of human development, genetic influences and personality and issues related to <b>Prerequisites: PSYC 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment, Psychology Course
PSYC 214	History of Psychology	Students will study the historical development of significant psychological concepts, theories and systems. The focus and far-ranging content of this course serves to provide an overall synthesis of the major subfields of psychology. <b>Prerequisites: PSYC 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 215	Sports Psychology	This course is an overview of basic concepts and principles essential to understanding the psychological and behavioral aspects of sport and exercise. Emphasis is given to the conceptual frameworks and the applied aspects of sport performance enhancement and mental skills, exercise behavior and motivation, sociological factors, and health and well-being. Applications are made to future practitioners of coaching, teaching, sports medicine, counseling, sport management, and fitness instruction	Credit Hours: 3.000 Schedule Types: Lecture
PSYC 220	Clinical Psychology	This course will provide students with an opportunity to use current theories to address individuals with mental-health issues. Topics will include professional duties and skills of the clinical psychologist, treatment procedures and resources, and the diagnosis and management of common psychological disorders. Emphasis will be placed on humanistic and behavioral theories of etiology, treatment and the enhancement of psychological well-being. <b>Prerequisite: PSYCH 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 221	Personality Theory	This course is a survey and comparative analysis of the major representative theories of personality, both traditional and contemporary. Special topics such as the effects of genetic predisposition, physical status and environmental factors on personality configurations will also be discussed. <b>Prerequisite: PSYCH 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course

PSYC 222	Counseling Psychology	<p>This course provides an overview and general understanding of the field of counseling psychology. The course is designed to familiarize students with the basic concepts, interventions, scientific research, professional practices and contemporary issues of the profession of counseling psychology. Students will learn a variety of theoretical approaches and psychotherapy techniques to counseling, including psychoanalytic, behavioral, cognitive and humanistic approaches. The course contains both didactic and skill application to encourage competency in the performance of counseling skills.</p> <p><b>Prerequisite: PSYCH 201 (Minimum Grade D)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>
PSYC 223	Marriage and Family	<p>This course is a survey of family systems and theories underlying marriage and family counseling. The course will explore the history of marriage, the choosing of a partner, parenting styles, and issues that create marital discord and divorce. Specific course objectives are to provide information about the therapeutic process and the practical elements of counseling interactions with families, to identify differences between individual- and system-oriented therapies, and to encourage the integration of theoretical and experiential learning.</p> <p><b>Prerequisite: PSYCH 101 (Minimum Grade D)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>
PSYC 224	Psychology of Addiction	<p>This course is a survey of current psychological theories of the addiction process and treatment modalities based on each. Physiology and neurobiology will be considered, but are not the primary focus of the course. Theoretical models include: the disease model, psychoanalytic formulations, conditioning theory, social-learning theory, family-systems theory and the opponent process model. Sociocultural perspectives, including deviance theory, will also be discussed.</p> <p><b>Prerequisite: PSYCH 101 (Minimum Grade D)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>
PSYC 226	Psychology of Trauma	<p>Psychology of Trauma provides a survey of the phenomena of psychological trauma. Discussion includes the conceptualization of trauma, defining a trauma event, and the identification of major types of trauma, as well as human responses in the neurobiological, cognitive and behavioral, and relational domains.</p> <p><b>Prerequisite: PSYCH 101 (Minimum Grade D)</b></p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Honors Assignment, Psychology Course</b></p>
PSYC 227	Introduction to Art Therapy	<p>This course will give undergraduate students an overview of the art therapy profession, including foundations, history, philosophies, theory, and applications. Students will identify and discuss the roots of art therapy in culture and the relevance in modern healthcare and treatment. Students will examine the value of creativity in healing, the role of metaphor, and the importance of skill, talent, experience, performance and mastery as pertains to making artwork for expression. This course is experiential and students will explore the use of art making for expressive, communicative, collaborative, and commemorative purposes.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>
PSYC 230	Industrial Organization Psych	<p>Students will study the more recent methods in testing, interviewing and selection of workers. Training, motivation, performance appraisal, job satisfaction, morale, job analysis, decision making, leadership and organization theory are other topics discussed.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>
PSYC 231	Psychological Assessment	<p>This is a methods course concerning the basic concepts and techniques of psychological assessment tools (tests) as they are used in the profession if psychology in employment, school, clinical and medical settings. Emphasis will be placed on understanding test design, or what goes into a test, as well as understanding test scores and profiles, or what comes out of a test. Many specific tests will be highlighted throughout the course to help students appreciate psychological tests and become aware of their functions and limitations.</p>	<p><b>Credit Hours: 3.000</b>  <b>Schedule Types: Lecture</b>  <b>Course Attributes: Psychology Course</b></p>

PSYC 232	Social Psychology	Students will study the experimental analysis of the individual as subjected to the social influence of other individuals or social groups. Topics to be covered include persuasion, conformity, aggression, altruism, prejudice and interpersonal attraction and an analysis of the research methods used to study these behaviors. <b>Prerequisite: PSYCH 101 Minimum Grade of D</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 233	Interpers Relt & Smll Grp Dynam	This course is designed to provide a theoretical and experiential exposure to group formation, group process and group dynamics, as well as to interpersonal relationships within and between groups.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/On-Line, On-Line
PSYC 234	Cultural and Social Diversity	The ability to work with individuals from different cultures is increasingly recognized as an essential skill for success, particularly in the fields of human services, business, communications, and medicine. Still, most people have not mastered a cross-cultural skill set. This course examines the changing demographics of the United States, teaches the core competencies for successful cross-cultural interactions, and prepares students for cross-cultural teamwork and leadership.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Courses, Psychology Course
PSYC 240	Comparative Psychology	This course will provide a survey of the study of animal behavior as related to psychology. Students will become familiar with approaches, fundamental concepts and contemporary research findings of the field. Topics include patterns and development of behavior in animals, neural and hormonal influences, animal learning and cognition and the evolution of behavior.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 241	Psycho-pharmacology	Students will study the basic principles of drug action in the central nervous system. Topics will include effects of stimulants, depressants, intoxicants and drug abuse on behavioral function. The clinical use of drugs in the treatment of psychological and psychiatric disorders will be discussed. <b>Prerequisite: PSYCH 103 (Minimum Grade D) or BIOL 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 242	Sensations and Perceptions	Sensations refer to information about the environment gathered through the senses. Perception is the process by which sensory information is interpreted and made meaningful. This course will provide a survey of the study of sensation and perception from structural, functional and cognitive viewpoints.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 243	Human Sexuality	This course involves a rigorous examination of the biological, behavioral and mental aspects of human sexuality. Among the topics to be studied are anatomy and physiology, conception and contraception, sex roles, love, sexual communication, sexual dysfunctions and social issues such as pornography.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
PSYC 302	Psychology of Creativity	This course provides students with a survey of theories of creativity and introduces them to facets of the concept of creativity beyond the traditional domains of art and design. Students will apply a case-study method to exemplars of creativity—both eminent and everyday creators—as a means of understanding the nature of creative phenomena across the broad spectrum of the construct. This course satisfies a portion of the creativity core curriculum requirements for all undergraduate students at Jefferson. <b>Prerequisites: WRIT 201 (Minimum Grade D) or WRIT 202 (Minimum Grade</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
PSYC 322	Research Method Behavior Sci	This course introduces psychology as an experimental science in which hypotheses are generated and tested. Major topics will include various types of experimental designs, subject selection and randomization. Students will be introduced to various data collection methods and research designs specific to the different branches of psychology. <b>Prerequisites: STAT 321 (Minimum Grade D) or STAT 220 Minimum Grade of D</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab Course Attributes: Psychology Course
PSYC 371	Selected Topics in Psychology	An in-depth consideration of a particular topic, issue or problem in psychology that is of special interest to students and faculty. Recent sections have discussed topics such as educational psychology, psychosexual development and the psychology of trauma. Topic selection will be done in advance of registration.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course

PSYC 381	Indep Study in Psychology	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. <b>Permission required. See the statement on Independent Study under 'Academic Policies.</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Independent Study Course Attributes: Psychology Course
PSYC 391	Adv Research in Psychology	This course will involve an in-depth exploration of research methods in psychology. Students will conduct an original research project individually or as part of a research team. Through this course, students will apply their psychological training to designing, conducting, analyzing, discussing and presenting their own research project. <b>Prerequisite: PSYCH322 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course, Writing Intensive
PSYC 410	SR Colloquium in Psychology	This course is a senior-level seminar dealing with current controversial issues in psychology. Students will perform a search of the scientific literature on issues chosen from a list provided by the instructor and organize, analyze, orally present and discuss material with the class. Finally, students will propose a question generated from this activity and design a research structure to answer it.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
<b>RADIATION THERAPY</b>			
RST 322	Patient Care in Radiation Oncology	A comprehensive overview of the patient receiving radiation therapy and other oncology care. The course is designed to provide a foundation for patient assessment, physical needs, psychological needs, diagnosis and treatment modalities, and factors impacting treatment. This is a hybrid course which consists of a face to-face and online component.	Credit Hours: 2.000 Schedule Types: On-Line
RST 401	Cross Sectional Anatomy I	This course is designed specifically for the Medical Dosimetry and Radiation Therapy student. It is customized to focus on structures that are vitally important to identify in the field of Radiation Oncology. This course is designed to introduce the student to human gross anatomy as seen in the axial, sagittal and coronal planes. Correlations with CT, MRI and ultrasound will be presented as well as some clinical correlations. Anatomic regions studied in this course will include: an introduction into the historical development of CT, structures in the pelvic, abdominal and thoracic regions.	Credit Hours: 2.000 Schedule Types: Lecture
RST 402	Cross-Sectional Anatomy II	This course is designed specifically for the Medical Dosimetry and Radiation Therapy student. It is customized to focus on structures that are vitally important to identify in the field of Radiation Oncology. This course is designed to introduce the student to human gross anatomy as seen in the axial, sagittal and coronal planes. Correlations with CT, MRI and ultrasound will be presented as well as some clinical correlations. Additionally, VERT will be used to complement the information presented. Anatomic regions studied in this course will include: bones of the entire skeleton, and structures of the following areas: brain, head and neck, and thorax. <b>Prerequisite: RST 401</b>	Credit Hours: 2.000 Schedule Types: Lecture
RST 409	Radiation Therapy Principles & Procedures I	Content is designed to provide an overview of cancer and the specialty of Radiation Therapy. The medical, biological and pathological aspect as well as the physical and technical aspects will be discussed. This course also introduces the multi-disciplinary approach to oncology and develops related topics such as: pathology, cancer growth and sampling, tumor response, blood counts and values, critical organs and reactions. It also describes the patient process in treatment planning emphasizing therapists' responsibilities in simulation and daily treatment delivery. It includes topics such as: documentation, positioning, beam divergence and magnification, treatment modalities, etc. Also, this course may use a laboratory format in order to demonstrate basic principles associated with the delivery of basic treatments.	Credit Hours: 3.000 Schedule Types: Lecture
RST 409L	Rad Therapy Prin & Proc I Lab	course is designed to provide the radiation therapy student with a foundation of the technical aspects of radiation therapy. The course is designed to complement and enhance the student's clinical radiation therapy experience. The use of virtual reality labs as well as labs held in the radiation oncology clinic are utilized to achieve the objectives of the course.	Credit Hours: 1.000 Schedule Types: Lab

RST 412	Clinical Radiation Therapy I	Clinical Radiation Therapy I is the introduction to the clinical education experience. Students begin to develop basic skills under the direct supervision of a registered radiation therapist. Students are expected complete basic competencies in patient care, treatments, and simulations. This course supplements RST 409 Principles and Procedures of Radiation Therapy I. Together the courses represent a combination of lecture material, text readings, clinical experience and labs. Through these different approaches, a variety of learning experiences are provided to facilitate the required clinical education for the program.	Credit Hours: 6.000 Schedule Types: Clinical
RST 413	Clinical Radiation Therapy II	Clinical Radiation Therapy II is a continuation of RST 412, Clinical Radiation Therapy I. There is an added emphasis on image guidance during this experience. There is also an increased number of required competencies. This clinical experience is intended to supplement RST 419. <b>Prerequisite: RST 412</b>	Credit Hours: 6.000 Schedule Types: Clinical
RST 414	Clinical Radiation Therapy III	Clinical Practicum III is a continuation of the clinical experience in which students continue to develop basic competencies under the direct supervision of a registered radiation therapist. Students are expected to exhibit the skills of an entry level radiation therapist at the end of this course. <b>Prerequisite: RST 413</b>	Credit Hours: 10.000 Schedule Types: Clinical
RST 415	Clinical Radiation Oncology	The purpose of the course is to expose the oncology student to important topics in radiation oncology. Specifically this course will focus on the following two topics: Research and issues of safety and quality assurance <b>Prerequisites: RST 435, RST 401, and RST 412</b>	Credit Hours: 2.000 Schedule Types: Clinical, Lecture
RST 416	Principles of Radiation Dosimetry	This course is designed to present the fundamentals of dose calculations and treatment planning for the delivery of therapeutic doses of radiation. The course covers basic calculations in detail including beam modifying devices. This course is intended to provide a basic foundation to supplement the treatment planning rotation in the clinic.	Credit Hours: 2.000 Schedule Types: Lecture
RST 419	Radiation Therapy Principles and Procedures II	Content is designed to examine and evaluate the management of neoplastic disease and other disorders of body systems with an emphasis on current standard radiation therapy techniques utilized for different forms of cancer. The epidemiology, etiology, detection, diagnosis, patient condition, treatment and prognosis of neoplastic disease will be presented, discussed, and evaluated in relationship to histology, anatomical site and patterns of spread. The radiation therapist's role in the management and care of the cancer patient will also be examined. This is a hybrid course. <b>Prerequisite: RST 409</b>	Credit Hours: 3.000 Schedule Types: Lecture
RST 429	Radiation Therapy Principles and Procedures III	Content is designed as a continuation of Principles and Procedures II. The purpose is to further examine and evaluate the management of neoplastic diseases—specifically skin cancer, lymphoma, bone, cartilage & soft tissue sarcomas and pediatric solid tumors. The epidemiology, etiology, detection, diagnosis, patient condition, treatment and prognosis of neoplastic disease will be presented, discussed and evaluated in relationship to histology, anatomical site and patterns of spread. Additionally, this course will examine the common patho-physiology of these body systems. Rare types of cancers and benign conditions will also be examined. The radiation therapist's role in the management of neoplastic disease will be examined and linked to the skills required to analyze complex issues and make informed decisions while appreciating the character of the profession. Issues relating to billing and special procedures will be studied. <b>Prerequisite: RST 419</b>	Credit Hours: 2.000 Schedule Types: Lecture, On-Line
RST 435	Radiation Therapy Physics I	This course is designed to establish a basic knowledge of physics pertinent to developing an understanding of radiation used in the clinical environment. Fundamental physics units, measurements, principles, anatomic structure and types of radiation are emphasized. Also presented are the fundamentals of x-ray generating equipment, x-ray production and its interaction with matter.	Credit Hours: 2.000 Schedule Types: Lecture

RST 436	Radiation Therapy Physics II	This course is designed to expand concepts and theories in radiation physics. The first part of this course is concentrated on the basic photon and electron dosimetry and MU calculation. The second part is concentrated on some special topics in the area of radiation therapy as well as the quality assurance (QA) program used in radiation oncology facilities. A QA program is essential to maintain the quality of patient care. Topics will include: the need for QA checks, the types of evaluation and test performed in radiation therapy equipment such as simulators, treatment planning systems, and linacs, the role of the radiation therapist in the quality management process, legal and regulatory implications for maintaining appropriate QA guidelines. <b>Prerequisite: RST 435</b>	Credit Hours: 3.000 Schedule Types: Lecture
RST 439	Radiation Protection	Presents basic principles of radiation protection and safety for patients, staff, and members of the general public, in the radiation therapy environment. Discusses relevant radiation safety requirements or recommendations of federal and state regulatory agencies, accreditation agencies and healthcare organizations. Radiation detection and measurement instrumentation and methods, as well as personnel monitoring, is also presented.	Credit Hours: 1.000 Schedule Types: Lecture
RST 440	Intro to Radiobiology	This course will present concepts, theories, and principles of modern radiation biology. The physical properties of radiation and how radiation interacts with biological matter will be discussed. The effects of radiation on DNA, cells, and individuals, as well as the concepts and practice of clinical radiation therapy will be examined in detail. Specific topics will include human cellular biology; molecular and cellular radiobiology, including early and late effects, cellular survival curves, and factors affecting cellular radiosensitivity; establishing risk estimates; and regulations pertaining to current radiation protection practices. This is a hybrid course which consists of a face-to-face and online component.	Credit Hours: 2.000 Schedule Types: Lecture, On-Line
RST 473	Radiation Therapy Review Seminar	Content of this course is designed to be used as a review seminar in preparation for the ARRT certification exam. Information concerning principles and practices of radiation therapy, principles of radiation and health safety, clinical planning of patient treatment with ionizing radiation, theories of disease causation, concepts of patient assessment and evaluation and radiation interactions with cells, tissues and biophysical events will be presented.	Credit Hours: 2.000 Schedule Types: Lecture
RST 499	Radiation Therapy Independent Study	A research project taught in an independent study manner. Students will produce a written literature review paper and present research projects on Radiation Therapy topics agreed to by the instructor.	Credit Hours: 1.000 to 4.000 Schedule Types: Independent Study
		<b>RADIOGRAPHY</b>	
RSR 313	Radiation Biology and Health Physics	Content is designed to present an overview of the principles and practices of radiation protection including the responsibilities of the radiographer for patients, personnel, and the public. Radiation health and safety requirements of federal and state regulatory agencies, accreditation agencies, and health care organizations are incorporated. Content is designed to provide an overview of the principles of the interaction of radiation with living systems. Radiation effects on molecules, cells, tissues and the body as a whole will be presented. Factors affecting biological response are presented, including acute and chronic effects of radiation.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 321	Patient Care and Services in Diagnostic Imaging	This course presents an introduction to basic medical techniques in patient care, safety, infection control, pharmacology, medico-legal issues, bioethics, health care delivery environments, diversity and an overview of the various imaging specialties in the Radiologic Sciences. Current issues in the Radiologic Sciences will also be addressed.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 331	Radiographic Procedures I	This course provides the knowledge base necessary to perform standard imaging procedures and special studies. Content includes basic anatomy, terminology and radiographic positioning of the human body in examination of the chest, abdomen, upper extremity, lower extremity.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 331L	Radiographic Procedures I Lab	Practical application of Radiographic Procedures I class, to include radiography of the chest, abdomen, upper extremity, lower extremity, and trauma and mobile examinations of adults and pediatric patients.	Credit Hours: 1.000 Schedule Types: Lab

RSR 332	Radiographic Procedures II	This course provides the knowledge base necessary to perform standard imaging procedures and special studies. Content includes basic anatomy, terminology and radiographic positioning of the human body in examination of the contrast studies of the abdomen, spine, skull, trauma, geriatric, pediatric, and bony thorax. <b>Prerequisite: Radiologic Sciences RSR 331</b>	Credit Hours: 1.000 or 2.000 Schedule Types: Lab, Lecture
RSR 332L	Radiographic Procedures II Lab	Practical application of Radiographic Procedures II class, to include radiography of the spine, skull, thorax, mobile and OR examinations, trauma, pediatrics and geriatrics. <b>Prerequisite: Radiologic Sciences RSR 331L</b>	Credit Hours:1.000 Schedule Types: Lab
RSR 333	Advanced Radiographic Procedures	This course will provide the student with an overview of advanced radiographic, fluoroscopic and angiographic procedures and their role in diagnostic imaging. Specialized imaging equipment and techniques will also be discussed. Computed tomography and cross sectional anatomy will be introduced and discussed. Contrast media will be discussed. Peer reviewed articles will be used as a basis for discussion <b>Prerequisite: RSR 332</b>	Credit Hours: 1.000 Schedule Types: Lab, Lecture, On-Line
RSR 333L	Advanced Radiographic Procedures Lab	Practical application of Radiographic Procedures I and II courses. Also includes simulation competencies. <b>Prerequisite: RS R 332L</b>	Credit Hours:1.000 Schedule Types: Clinical, Lab
RSR 341	Radiographic Physics & Instrumentation I	This course will provide the student with content that establishes a knowledge base in radiographic, fluoroscopic and mobile equipment requirements and design. The content also provides a basic knowledge of quality control. Content establishes a basic knowledge of atomic structure and terminology. Also presented are the nature and characteristics of radiation, x-ray production and the fundamentals of photon interactions with matter.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 342	Radiography Physics & Instrumentation II	This course will provide the student with content that establishes a knowledge base in radiographic, fluoroscopic and mobile equipment requirements and design. The content also provides a basic knowledge of quality control. Content establishes a basic knowledge of atomic structure and terminology. Also presented are the nature and characteristics of radiation, x-ray production and the fundamentals of photon interactions with matter. Content imparts an understanding of the components, principles and operation of digital imaging systems found in diagnostic radiology. Factors that impact image acquisition, display, archiving and retrieval are discussed. Principles of digital system quality assurance and maintenance are presented. <b>Prerequisite: RSR 341</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSR 353	Radiographic Imaging Principles 1	This course will provide the student with content that establishes a knowledge base in technical factors that govern and influence the image production and recording process.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 354	Radiographic Imaging Principles II	This course will provide the student with content that establishes a knowledge base in technical factors that govern and influence the image production and recording process. Special Note: Digital imaging is a rapidly evolving technology. Every effort has been made to provide content that reflects, as accurately as possible, the state of the art of this discipline. Every effort will be made to provide up-to-date information as it becomes available from vendors, clinical sites, textbooks, and technical representatives. <b>Prerequisite: RSR 353</b>	Credit Hours: 2.000 Schedule Types: Lecture
RSR 361	Image Analysis I	This course provides a basis for analyzing radiographic images. It includes the importance of optimal imaging standards, discussion of a problem-solving technique for image evaluation and the factors that can affect image quality. Includes images of the chest, abdomen, upper and lower extremities for analysis. Students will learn to thoroughly evaluate radiographic images, identify any problems and offer suggestions to correct the problem.	Credit Hours: 2.000 Schedule Types: Lecture

RSR 362	Image Analysis II	<p>This course provides a basis for analyzing radiographic images. It includes the importance of optimal imaging standards, discussion of a problem-solving technique for image evaluation and the factors that can affect image quality. Includes images of the spine, skull, thorax, trauma, pediatrics, geriatrics, and digestive This course provides a basis for analyzing radiographic images. It includes the importance of optimal imaging standards, discussion of a problem-solving technique for image evaluation and the factors that can affect image quality. Includes images of the spine, skull, thorax, trauma, pediatrics, geriatrics, and digestive system for analysis. Students will learn to thoroughly evaluate radiographic images, identify any problems and offer suggestions to correct the problem.</p> <p><b>Prerequisite: RSR 361</b></p>	<p><b>Credit Hours: 2.000</b>  <b>Schedule Types: Lecture</b></p>
RSR 371	Clinical Radiography I	<p>Students participate in the diagnostic process of performing radiographic examinations at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various radiographic examination protocols required for proper patient positioning, as well as the technical factors necessary to obtain optimal diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of radiographic examinations under the supervision of a staff radiographer. Evaluation is based upon competency in positioning, patient care skills and technical factors. Observing and applying healthcare principles. Students continue application of radiographic positioning skills. Students must demonstrate competency in the performance of radiographic procedures.</p>	<p><b>Credit Hours: 4.000</b>  <b>Schedule Types: Clinical</b></p>
RSR 372	Clinical Radiography II	<p>Students participate in the diagnostic process of performing radiographic examinations at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various radiographic examination protocols required for proper patient positioning, as well as the technical factors necessary to obtain optimal diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of radiographic examinations under the supervision of a staff radiographer. Evaluation is based upon competency in positioning, patient care skills and technical factors. Observing and applying healthcare principles. Students continue application of radiographic positioning skills. Students must demonstrate competency in the performance of radiographic procedures. Content and clinical practice experiences should be designed to sequentially develop, apply, critically analyze, integrate, synthesize and evaluate concepts and theories in the performance of radiologic procedures. Through structured, sequential, competency-based clinical assignments, concepts of team practice, patient-centered clinical practice and professional development are discussed, examined and evaluated. Clinical practice experiences should be designed to provide patient care and assessment, competent performance of radiologic imaging and total quality management. Levels of competency and outcomes measurement ensure the well-being of the patient prior to, during and following the radiologic procedure.</p> <p><b>Prerequisite: RSR 371</b></p>	



RSR 373	Clin Radiography III	Students participate in the diagnostic process of performing radiographic examinations at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various radiographic examination protocols required for proper patient positioning, as well as the technical factors necessary to obtain optimal diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of radiographic examinations under the supervision of a staff radiographer. Evaluation is based upon competency in positioning, patient care skills and technical factors. Observing and applying healthcare principles. Students continue application of radiographic positioning skills. Students must demonstrate competency in the performance of radiographic procedures. Content and clinical practice experiences should be designed to sequentially develop, apply, critically analyze, integrate, synthesize and evaluate concepts and theories in the performance of radiologic procedures. <b>Prerequisite: RSR 372</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSR 412	Radiographic Pathology I	This course will examine the pathologic processes on the various anatomical systems and identify their appearance and effect on the diagnostic medical image.	Credit Hours: 2.000 Schedule Types: Lecture
RSR 414	Radiography Capstone	The capstone experience is designed to provide opportunities for students to integrate their knowledge from their core concentration, and reflect on the meaning of professional practice so that they can contribute to the body of knowledge and be able to effectively analyze resources to promote growth in the profession. Introduces the key strategies and skills required to undertake research in the field of radiology. Includes the research process and presentation of research findings.	Credit Hours: 1.000 Schedule Types: Lecture
RSR 471	Radiography Review Seminar	Presents a comprehensive review with a lecture/testing format with retrospect of Radiologic Sciences in order to correlate and integrate the following topics: patient care, safety, image production, and procedures.	Credit Hours: 2 000 Schedule Types: Lecture
RSR 499	Radiographic Independent Study	A research project taught in an independent study manner. Students will produce a written literature review paper and present research projects on Radiography topics agreed to by the instructor.	Credit Hours: 2.000 Schedule Types: Independent Study
<b>SCIENCE</b>			
SCI 101	Environmental Science	Environmental Science is the study of how humans and the natural environment interact. Critical issues that affect our daily lives such as clean drinking water, urban renewal, energy availability, pesticides, global warming, acid rain and recycling are explored from social, ecological, chemical and political perspectives. Students will tackle a real-life environmental problem in a professional manner using critical thinking and analytical skills, library research skills, teamwork and presentation skills.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Scientific Understanding
SCI 102	Exploring Science	(for non-science majors) This hands-on science course delves into public health issues. Field and laboratory sessions focus on data analysis based on issues from students' daily lives which leads to an examination of alternatives. How do you quit smoking? What is in the water you drink and the food you eat? The course culminates in a project that explores the historical, political, and environmental aspects of an unsolved scientific problem and presents the findings to a regional scientific agency.	Credit Hours: 3.000 Schedule Types: Lab, Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding

SCI 106	Biology for Design	The goal of this course is to increase the sophistication of design, engineering, business, and other students regarding how design manifests itself in nature as biological adaptation, and to use that knowledge as a launching pad for thinking about biomimetic design. Biomimicry is a hot topic in architecture and design. Work in this field is usually done by designers working in collaboration with biologists who are highly specialized in a particular area, often plant or animal physiology. However, there are certain conceptual underpinnings pertaining to design and adaptation in nature that designers are often lacking that will prepare them for further exploration of this field. The course consists of two major units, the first focusing on the biology of adaptation from an evolutionary and ecological perspective. The second section consists of a survey of biomimetic design and how biomimicry has been employed to solve a range of design problems in architecture, materials science, systems design, and technology.	Credit Hours: 3.000 Schedule Types: Lab, Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
SCI 108	Sustainability & Eco-Innovation	The emerging fields of sustainability and environmental sciences will be surveyed to highlight how entrepreneurs are capitalizing on rapid environmental transformation. The rate, scale and degree of global environmental change, key scientific feedback loops the regional differences in terms of impacts and opportunities will be analyzed. Case studies of eco-innovation strategies employed by businesses and designers will be explored so that students can create their own scientific monitoring and evaluation plan for implementing a simple eco-innovation.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
SCI 110	Landscape Ecology	Landscape Ecology combines the spatial approach of the planner and designer with the functional approach of the ecologist. As a field it is an integrative and multidisciplinary science that combines geology, botany, zoology and human settlements at the "landscape" scale. For this course the focus will be various land use scales, i.e., the block, neighborhood, city, and region and how ecological processes function at each scale. Students learn the key principles of landscape ecology and then how to apply them to preservation, conservation, planning and the design process.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab Course Attributes: Science Level II, Scientific Understanding
SCI 112	Materials Selection	The materials available to meet design requirements for a specific application often limit performance in disciplines ranging from engineering and architecture, through industrial design, to fashion design and textiles. In fact, material selection is often the limiting performance factor in designing new products and processes. This course explores the governing principles of materials science, with a specific emphasis on using the scientific method to develop a "system approach" to materials selection at various stages of the design process. (This course can be used to satisfy a general Education Science requirement.)	Credit Hours: 3.000 Schedule Types: Lecture Lecture/Lab Course Attributes: Science Level II, Scientific Understanding
SCI 200	Intro to Science Research Methods	What does it mean to conduct research? What are the distinct stages of the research process? What are the requirements of modern scientific research? How do you analyze a scientific article? This course will teach you to conduct research in accordance with scientific methodology. You'll learn to critically review scientific literature, and to design and conduct scientific experiments. The course will help you to develop the core skill sets required in any research setting. Topics in scientific communication and data analysis will also be discussed.	Credit hours: 3.000 Schedule Types: Lecture Course Attributes: Science Level I, Science Level II, Scientific Understanding
SCI 300	Basic Pharmacology	This course introduces the student to the basic principles of pharmacology including pharmacokinetics and pharmacodynamics. The course will cover frequently prescribed medications, their uses, actions and common side effects. The student will learn about the various drug classification systems, as well as the effects of those drug classes on specific patient populations, and the process of preventing medication errors deriving from the use of pharmacologic agents.	Credit Hours: 3.000 Schedule Types: Lecture

SCI 381	Independent Study in Science	Students interested in pursuing independent study in science must submit a proposal to the academic associate dean of undergraduate programs in the College of Science, Health and the Liberal Arts for approval at least two weeks before pre-registration. Detailed guidelines for development of the proposal may be obtained from the College. See "Independent Study" in "University Academic Policies and Procedures: Common Academic Policies for All Students."	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, Independent Study
SCI 399	Selected Topics Abroad in Science	International experience is invaluable in all scientific disciplines and strongly encouraged by the School of Science & Health. Students will collect, analyze and present data in a scientific discipline both in the host country and to the University community. All students will have assignments and immersion in the cultural, social, environmental and historic foundations of the host country. <b>Prerequisite 6 credits; From SCI 101 SCI 102 BIOL 101 BIOL 103, CHEM 101, CHEM 103, PHYS 101, PHYS-201</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
SCI 402	Science Seminar	This communication intensive course covers recent advances in biological, physical, and medical sciences by way of presentation, journal reviews, and discussions involve both students and invited faculty. This course is designed to sharpen students' critical thinking skills through evaluation of modern scientific discoveries and analysis of their impact on society and humanity as a whole. Integration of knowledge and ideas from various sources is required.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>SPANISH</b>			
SPAN 100	Basic Spanish for Health Professionals	Conversational course. Stresses useful phrases, grammar and conversational tools that facilitate everyday communication with Spanish-speaking patients. Emphasizes medical vocabulary, including medications, procedures body parts and foods, as well as grammar geared toward dialogue in medical situations.	Credit Hours: 3.000 Schedule Types: Lecture
SPAN 102	Elementary Spanish II		Credit Hours: 3.000 Schedule Types: Lecture
SPAN 103	Spanish Med Health Profession I		Credit Hours: 3.000 Schedule Types: Lecture
SPAN 104	Spanish Med Health Profession II		Credit Hours: 3.000 Schedule Types: Lecture
<b>SERVICE</b>			
SERV 101	Service Learning in Philadelphia	Through the completion of a 10-hour service project, online journaling, attending four class meetings, and participation in a service-learning showcase, students will serve the greater Philadelphia community in an area of interest and explore the reciprocal nature and responsibility of citizenship for the individual and community. This course may be taken in place of the twocourse physical education requirement, and it may be taken an additional three times for free elective credits.	Credit Hours: 1.000 Schedule Types: Lab
SERV 102	Service Learning Outside Philadelphia	Through the completion of at least 10 hours of a service project, online journaling, attending at least 4 hours of class meetings, and participation in a culminating service-learning showcase students will serve people in need and explore the reciprocal nature and responsibility of citizenship for the individual and community. SERVE 102 is a study away course that will be offered in various destinations in the United States and abroad. This course may be taken in place of the two-course physical education requirement, and it may be taken an additional three times for free elective credits. As off-campus study is a component of the course, a GPA of 2.5 is required.	Credit Hours: 1.000 Schedule Types: Lab
<b>SOCIOLOGY</b>			

SOC 101	Introduction to Sociology	Studies society through a social or group perspective by reexamining issues such as welfare, street crime and the homeless. Covers social structure, basic human institutions analysis of social processes and major social forces, including the family, deviance, health, education, social change, and social and cultural diversity.	Credit Hours: 3.000 Schedule Types: Lecture
SOC 302	Introduction to Group Dynamics	Introduces general principles of behavior processes and their applications within established groups and organizations.	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/On-Line, On-Line
SOC 305	Sociology Marriage & Family & Substance Abuse	Provides constructs of the functional versus dysfunctional family system. Presents a multicultural perspective of the development of marriage and family in the United States. Readings relate to family development, gender relations and crisis and change.	Credit Hours: 3.000 Schedule Types: Lecture
SOC 310	Sociology of Workplace	This General Education Core course examines the contemporary world of work using analytic tools from a variety of disciplines, including sociology, psychology, and anthropology. Key themes include: the social organization of work, contemporary changes in occupations and professions, technology and the information age, the impact of globalization on work, the role of class, gender, race and ethnicity in shaping work experiences and worker identities, and the relationship between work and family. Students learn about basic social science research techniques, practice interpreting data and thinking critically about contemporary work issues, and develop their own arguments about the world of work.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
SOC 322	Victim Women & Child	Covers relevant social aberrations: wife abuse, child battering, neglect, incest and abuse of the elderly. Focuses on causes of this violence, the victim of the offense, the characteristics of the abuser, and the social, legal and treatment issues that arise as a result of this social problem.	Credit Hours: 3.000 Schedule Types: Lecture, On-Line
SOC 401	Sociology of Health	Reviews health and health services delivery systems as viewed by the social scientist, including factors affecting mortality, morbidity and demography of health. Addresses the influences of values, culture and customs on health and health-seeking behavior, as well as roles and relationships of the patient, the health professional and others in the care giving process.	Credit Hours: 3.000 Schedule Types: Lecture
<b>SPANISH</b>			
SPAN 101	Spanish I	A beginner's course designed for students with very little or no knowledge of the language. The focus is on basic oral expression, listening comprehension and acquiring simple reading and writing skills, so that students can gain confidence in the language and to begin to have conversations. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language
SPAN 201	Spanish II	A beginner's course designed for students who have completed one semester of college-level language or the equivalent. The focus is on oral expression, listening comprehension and the acquisition of simple reading and writing skills, so that students can gain confidence in the language and conduct conversations and other social interactions in the language with some level of ease. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions. <b>Prerequisites: SPAN 101</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language
SPAN 202	Medical Spanish	Medical Spanish is a second-semester course designed for students to gain conversational competence to communicate effectively at a basic level with Spanish-speaking patients in a medical setting. The course focuses on practical vocabulary, grammar, idiomatic expressions, medical terminology as well as developing students' oral communication skills. A main component of the class is the focus on cultural issues relevant to Spanish-speaking patients and particular health concerns relating to the Hispanic community in the U.S.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language

SPAN 301	Spanish III	An intermediate course designed for students who have completed two semesters of college-level language or the equivalent. The focus is on advancing oral expression, listening comprehension and the development of reading and writing skills, so that students can gain confidence and express themselves fluidly entirely in the target language. The course will also develop cultural understanding, a key element to language learning, through the analysis of authentic visual media, written materials and cross-cultural interactions.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language
SPAN 302	Intermediate Medical Spanish	Intermediate medical Spanish 302 is a third-semester elementary-intermediate Spanish course designed for students to gain conversational competence to communicate effectively with Spanish-speaking patients in a medical setting. The course builds on Spanish 202 and focuses on practical vocabulary, grammar, idiomatic expressions, medical terminology as well as developing students' oral communication skills. A main component of the class is the focus on cultural issues relevant to Spanish-speaking patients and particular health concerns relating to the Hispanic community in the U.S.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language
SPAN 401	Spanish IV	An intermediate course that provides students with the opportunity to communicate in a fluent and sophisticated manner. The focus is on expanding the knowledge of structures and vocabulary that students have acquired in levels I-III. In addition to constant attention to speaking, writing, listening and reading, more complex ways of expression are also emphasized. Contemporary culture is explored through authentic visual media and written materials.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Global Citizenship, Global Diversity, Global Courses, Spanish Language
<b>SPECIAL TOPICS IN DESIGN</b>			
DSGN 371	Special Topics:	An upper-level course designed to take advantage of resident/adjunct/visiting faculty members' expertise or a special focus wanted by the School for one or two terms. These courses might provide an in-depth treatment of recent advances in subjects of current interest in a given field whose subject matter is not necessarily needed to be offered long term. A specific "topic" may be delivered a maximum of two term.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
DSGN 661	Japanese Craft Production	This is a short course for international study to explore traditional craft production in Japan. This will include: Touki (pottery), Washi (paper), Urushi (lacquer), Mokuhanga (wood block), Some / Ori (resist dyeing and woven textiles), Takezaiku (bamboo), etc. Visitation to craft studios, museums, historical gardens and traditional architectures will also provide cultural context, history of style and significance of fine hand craft production processes. Throughout the tours, the course will also emphasize the role of crafted control in mechanical / digital productions that will be utilized in students' future design developments in their major studies.	Credit Hours: 3.000 Schedule Types: Lecture
<b>STATISTICS</b>			
STAT 201	Introduction to Statistics	Descriptive statistical measures and probability theory are combined to provide the basis for statistical decision-making techniques. Areas covered: data presentation; measures of central tendency; measures of variability; basic probability laws, Bayes' theorem; binomial; Poisson; and normal distributions; confidence intervals; hypothesis testing. <b>Prerequisites: MATH 100 Minimum Grade D) or MATH 101 or MATH 102 or MATH 103 or MATH 111 (Minimum Grade of D)</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Lecture, On-Line
STAT 202	Applied Business Statistics	Review of sampling distribution, confidence intervals and hypothesis tests for two-samples; simple linear regression, multiple linear regression with emphasis on computer output; one- and two-way analysis of variance; application of the Chi-square statistic; non-parametric statistical techniques. <b>Prerequisites: STAT 201</b>	Credit Hours: 3.000 Schedule Types: Lecture, On-Line Course Attributes: Honors Assignment

STAT 220	Statistics for the Behavioral Sciences	This course will provide an understanding of descriptive and statistical procedures commonly used in psychological research. Descriptive statistic topics include the presentation of data, probability, measures of central tendency and variability, and correlation. Inferential statistics topics will include an introduction to hypothesis testing, t-tests, correlation, analysis of variance, regression and various non-parametric statistics. Particular emphasis will be placed on the interconnection between experimental design in psychology and statistical principles. <b>Prerequisite: PSYCH 101</b>	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
STAT 301	Biostatistics	This course will cover principles of experimental design and statistics for biologists in the environmental and medical fields. Hypothesis testing; data collection and sampling; data analysis and graphing; univariate; bivariate and multivariate analysis, including regression and ANOVA. Students will design an experiment and compare and contrast the results of several different statistical approaches to data analysis and interpretation. Prerequisites: MATH 111 (Minimum Grade C) or <b>Prerequisites: MATH 111 (Minimum Grade C) or MATH 112 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture
STAT 321	Psychology Applications Statistics II	This course will expand on fundamental topics covered in Psychological Applications of Statistics I and will cover advanced topics such as two-sample hypothesis testing, correlation, analysis of variance, regression and various nonparametric statistics. Particular emphasis will be placed on the interconnection between experimental design in psychology and statistical principles.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Psychology Course
<b>STUDY ABROAD</b>			
SUAB 301	Study Abroad Project Documentation	This course will be a vehical for students to analyze and document their study abroad experience and then share it with the university community. Similar to an independent study, students will be required to keep a journal while abroad. When they return, they will document their individual academic and personal experience as well as working on group projects to produce a public exhibition.	Credit Hours: 3.000 Schedule Types: By Appointment
SUAB 302	Study Abroad Project: Discovery & Reflect	This is a 0.5 credit course that will be assessed on a credit/no credit basis. This course is only available to students who are actively participating on a University approved study abroad program. It is a closed course, and permission to enroll must be provided by the Study Abroad Program Manager. Throughout this course, students will be expected to actively engage with their foreign environment and post bi-weekly journal entries responding to specific arguments or questions posed by the instructor, as a method for processing the study abroad experience and identifying the impact it is having on the student's international and global perspective.	Credit Hours: 0.500 Schedule Types: Study Abroad
<b>SURFACE IMAGING DESIGN INTERDISCIPLINARY</b>			
SDE 350	Surface Imaging Design Essential	This is an elective course for undergraduate students to introduce fundamental skills and applications of Surface Imaging. It covers the basic principals of design process and development as well as material selection and fundamental printing processes for Surface Imaging.	Credit Hours: 3.000 Schedule Types: By Appointment, Lecture
SDE 370	Surface Imaging Design Special Topics	This is an upper-level course designed to take advantage of resident/adjunct/visiting faculty members' expertise or a special focus wanted by the School for one or two terms. These courses might providean in-depth treatment of recent advances in subjects of current interest in a given field whose subject matter is not necessarily needed to be offered long term. A specific "topic" may be delivered a maximum of two terms.	Credit Hours: 0.500 Schedule Types: Lecture

SDE 380	Surface Imaging Design Independent Study	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member.	Credit Hours: 0.500 Schedule Types: Independent Study
<b>SUSTAINABILITY</b>			
SUST 100	Fundamentals of Sustainability	As the gateway to the Environmental Sustainability major, this course introduces students to the core concepts of sustainability theory and practice. Students will explore the ethical principles, social structures, technologies, and political and economic processes necessary for humans to live sustainably in community with each other, other species and our natural environment.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 102	Water Resources and the Environment	This course introduces students to different types, amounts, and integrity of water resources on Earth. Through the lens of sustainability, students study the availability and scarcity of types of water, as well as systems that harness them for human use. Topics in the course include water quality, water pollution mitigation, ownership and distribution of water resources, and the legitimacy of water uses. As they explore these issues, students will also learn and apply principles of chemical, geological, and biological science.	Credit Hours: 4.000 Schedule Types: Lecture
SUST 104	The Atmosphere & the Environment	Human disturbances to the atmosphere include degraded ambient air quality, photochemical smog, the greenhouse effect and climate change, radiative incidence and ozone depletion, air pollution-related health effects and dose-response modeling. This course explores the physical structure and chemical composition of the atmosphere and introduces fundamental concepts of chemistry, including atomic and molecular structures, ions and molecular bonding, stoichiometry, acid/base reactions, and basic reaction thermodynamics.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 120	Sustainable Food Chains	This course examines one of the most fundamental sustainability challenges that we will face this century: how to feed 9-10 billion people without depleting the planet's soils, water supplies, oil resources and biodiversity. Sustainable Food Chains explores the environmental impact of modern industrial agriculture and examines alternative approaches to food production that reduce the use of non-renewable resources, respect natural processes, and work in harmony with local ecosystems, communities and economies.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 200	Energy Systems & Politics	The rising international demand for fossil fuels, the increasing concerns about dwindling energy reserves and the growing evidence of climate change are combining to accelerate the search for alternative energy sources. This course will analyze the environmental, economic and political dynamics of the existing energy regime, and help students evaluate the potential and drawbacks of possible energy alternatives.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 202	Ecological Economics	This course introduces students to general economic theory and how it can be applied to the analysis of sustainability issues. Topics include the economics of sustainable development, cost-benefit analysis related to environmental initiatives, and the evaluation of policies for more sustainable production and consumption.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 204	Sustainable Planning & Land Use	This course examines land use and urban planning questions from the perspective of sustainability. Topics include: "smart" growth/development, wilderness conservation, community activism, environmental justice, brownfield and grayfield redevelopment, greenfield preservation, zoning for mixed-use neighborhoods, mass transit planning, and transit-oriented development (TOD).	Credit Hours: 3.000 Schedule Types: Lecture

SUST 206	Environmental Policy	Environmental problems are essentially social, economic and political problems. This course traces the evolution of environmental policy, legislation, and regulations, both in the U.S. and worldwide, including the background and context of environmental policymaking. Students will also examine the substantive problems and political process of environmental movements, and contemporary environmental thought with regard to issues of sustainability and environmental justice.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 300	Sustainable Technology for Architecture	This course provides students with the skills and vocabularies to converse and enhance their ability to collaborate with professionals. This course is intended as an introduction to sustainable architecture and its technologies that are typically used in practice.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 302	Life-Cycle Thinkn & Analysis	Industrial Ecology is the study of how industrial processes affect the environment. Students will learn approaches and tools to evaluate products, processes, and systems in their entire life-cycle, including: material flow analysis, design for environment, input-output analysis, life-cycle assessment, industrial symbiosis, and sustainable consumption. <b>Prerequisites: 2 courses from the Science Group and WRIT 21x</b>	Credit Hours: 3.000 Schedule Types: Lecture
SUST 305	Sustainability Metrics & Report	This course teaches metrics and reporting frameworks that support evaluation and communication of sustainability. With an eye toward program analysis and business analytics, the course approaches sustainability challenges as data and metrics problems confronting public officials, citizen groups, private companies, and colleges and universities. It teaches students to design sustainability communications, including isolating factors driving unsustainability, selecting metrics and marshaling data appropriate for goal setting, and forecasting the impact of initiatives intended to improve sustainability. In the final project students apply course skills to communicate sustainability using metrics and reporting. <b>Prerequisites: WRIT 2xx</b>	Credit Hours: 3.000 Schedule Types: Lecture
SUST 402	Managing Sustainability in Org	This course answers the question, How can we effectively manage sustainability in organizations? The course uses contemporary readings, research, cases, and student projects to explore current and future approaches to sustainability within the context of management and organizations both within and beyond the traditional management framework of planning, organizing, leading, and controlling.	Credit Hours: 3.000 Schedule Types: Lecture
SUST 404	Environmental History	Global Environmental History allows students to develop an historical perspective on the relationship between human societies and the natural environments that surround and support them. As this course illustrates, some societies have succeeded in living in balance with local ecosystems, and some have failed. By analyzing these historical examples, students learn how various cultural, economic and political factors can combine to produce an environmentally sustainable society or a catastrophic ecological collapse.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
<b>TEXTILE</b>			
TEXT 101	Survey of Textile Industry	Introduction to the language and process flow of fibers through finished products. Topics include fiber classification, formation and variants; spun and filament yarn processing, numbering systems, texturing and novelty yarns; woven, knit and nonwoven fabric formation, processing equipment and basic design elements; printing, dyeing and finishing processes; product evaluation; as well as government legislation related to textiles. A laboratory experience provides support for the lectures.	Credit Hours: 3.000 Schedule Types: Lecture
TEXT 104	Foundation Fiber & Yarn Studies	This course introduces the basic knowledge of fiber and yarn technology. Included are the proper use of fiber/yarn terms and definitions, the construction parameters of the various fiber and yarn types and detailed analysis of performance properties of each. This information is then used in the proper selection of fibers and yarns for various fabrics and ultimately for various end use products in apparel, household and industrial applications.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab



TEXT 105	Textile Design Studio 1: Ideation	This is the introductory studio for undergraduate Textile Design majors. It will introduce concept development (inspiration, ideation, narrative, concept boards), color and trend research, Photoshop and Illustrator, mapping skills, branding and portfolio creation. <b>Prerequisites: DRAW 101 (Minimum Grade D) and VDES 101 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Studio
TEXT 113	Yarn	The processes necessary for the manufacture of continuous filament, staple, novelty, bulk and stretch yarns are studied. Staple yarn manufacture, including the processing of natural and manmade fibers on the carded cotton, combed cotton, woolen and worsted staple yarn manufacturing system is covered. Quality-control procedures are emphasized. The laboratory experience exposes the student to all aspects of fiber to yarn formation. <b>Prerequisite:TEXT 101</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
TEXT 201	Textile Production I	This course will focus on the following performance properties of textiles: strength, elongation, thermo-physiological comfort, sensorial-comfort body movement, aesthetic qualities, appearance, maintenance properties, and health/safety/ protection properties. The process of achieving desired fabric properties through the use of appropriate fiber-, yarn and fabric-production technology will be analyzed through theoretical studies and production laboratory exercises. Any student who has received credit for TEXT-113, WEAV-201, KNIT-201, and/or TEXT-321 may not take this course <b>Prerequisite:TEXT 101</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TEXT 204	African Textiles Short Course	This course is an international study tour of the textiles of Africa. Students will tour textile facilities including: an indigo dye village, traditional weaving centers, printing workshops, and cotton cultivation centers. Visits to artisan cooperatives and museums will provide cultural context and history of style, pattern, color and technique, including study of West African Mosse strip cloth. Additionally, the course will explore the role of village weaving cooperatives in the developmental process and will examine the growing role of Africa in the global textile industry.	Credit Hours: 3.000 Schedule Types: Lab, Lecture Course Attributes: Global Courses
TEXT 205	Textile Design Studio 2: Fashion	This is the second in a sequence of four studios. This course focuses on creating a line of textiles for fashion apparel incorporating print, knit and woven design. Students will explore designing for the body using illustrative, sculptural, draping and shaping techniques. <b>Corequisite WEAV 201</b> <b>Prerequisites: KNIT 201 (Minimum Grade D) and TEXT 105 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Studio
TEXT 206	Text Des Studio III: Interiors	This is the third in a sequence of four studios. This course focuses on creating a line of textiles for home furnishings incorporating print, knit and woven design. Students will explore the aesthetic and technical opportunities of interiors, including the business of supply chain. <b>Prerequisites: TEXT 205 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Studio
TEXT 219	Textiles for Interiors & Arch	Focuses upon the unique problems and considerations of servicing the residential and contract textile-products market composed of upholstered furniture, window/wall coverings, carpets/rugs and furnishing accessories. Special textile requirements mandated by government agencies, building codes and industry-performance standards for residential, public and institutional interior spaces are emphasized. <b>Prerequisite:TEXT 101</b>	Credit Hours:3.000 Schedule Types: Lab, Lecture
TEXT 301	Coloring & Finishing	This lecture-based course will focus on coloration techniques, including dyeing and printing; as well as aesthetic and functional finishing. Any student who has previously received credit for PRINT-305 and/or TEXTCHM-242 may not take this course for credit. Fall only. <b>Prerequisite:TEXT 101 and CHEM 101</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture

TEXT 305	Advanced Fabric Performance Evaluation	The objective evaluation of fabric-mechanical properties influencing hand and performance are explored. Comfort-contributing qualities, such as thermal conductivity and air permeability, are also addressed. The influence of fabric-mechanical properties on formability and seaming is assessed with special attention to their role in automated assembly. <b>Prerequisite:</b> TEXT 307 or TEXT 331	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TEXT 306	Text Design Studio IV: Performance	This is the final course in a sequence of four studios. This course enables students to create textiles for contract furnishings, automotive interiors, high performance apparel or smart textile applications. The studio emphasizes the marriage of performance characteristics and aesthetics, with a focus on fitness for use. <b>Prerequisite:</b> TEXT 206	Credit Hours: 3.000 Schedule Types: Studio
TEXT 307	Textile Materials	The interrelationship of fiber selection, yarn processing, fabrication and finishing parameters is used to predict and measure fabric performance for specific end uses. A laboratory experience in textile product evaluation provides practical application of theory. The impact of textile-related government regulations is also emphasized.	Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab
TEXT 313	Textile Costing	The cost of materials, labor, overhead and waste is studied in relation to textile production and finishing. Case studies illustrate cost systems used in textile mills. Interrelationships between labor, machines and facilities are analyzed to determine their relative importance in cost reduction programs. Costing factors for domestic and imported fabrics are considered. <b>Prerequisite:</b> WEAV 201and KNIT 201	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TEXT 314	European Textile Printing	A two-week study tour in the textile printing areas of France, Switzerland and Northern Italy introduces Textile Design and Engineering Technology majors to the expertise of important European printers, screen engravers and studios in the areas of printed textile design, style, color and printing technology. Visits to the two important French historic textile museums and other related textile plants are also included.	Credit Hours: 3.000 Schedule Types: Study Abroad Course Attributes: Global Courses
TEXT 315	Interior Fabric Performance	Evaluations of fabrics and materials intended for end use in home furnishings are covered in this course. The use of physical testing to predict performance potential is emphasized. The use of instrumentations in the evaluation of surface and color change is presented. <b>Prerequisite:</b> TEXT307	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TEXT 316	Textile Quality Management	Recently, quality has emerged as a formal management function ' no longer restricted to manufacturing and operational areas, it now includes the design, purchasing and marketing processes. Through lecture, discussion and experientials, this course examines quality theory and practice ' how a more sophisticated understanding of quality can lead to a strategic approach to quality management that is necessary to compete in today's global marketplace. Factors required for creating and maintaining a corporation's strategies and competitive edge are analyzed. <b>Prerequisite:</b> WEAV 301 or KNIT 205 and MGMT-301 and MGMT 104 and DECPROC 101 and DECFRM 200	Credit Hours: 3.000 Schedule Types: Lecture
TEXT 317	Textile Production Control	Production ' its measurement and control ' is studied through plant and equipment layouts, as well as equipment selection. Methods of managing people and the equipment to optimize production are discussed. <b>Prerequisite:</b> WEAV 201 and KNIT 201	Credit Hours: 3.000 Schedule Types: Lecture
TEXT 321	Nonwovens	The methods of web formation, bonding, end-use and market potential for nonwovens are investigated. In the laboratory, dry-laid and wet-laid nonwovens are manufactured and later evaluated in the testing laboratory for their unique characteristics. <b>Prerequisites:</b> TEXT 101 (Minimum Grade of D)	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TEXT 325	Fibrous Composite Materials	Exploration of properties of various fibers and fibrous constructions as applied to composites; fabrication of fiberreinforced composites; and analysis of properties of new materials and technology. <b>Prerequisite:</b> ENGR 215 & MATH 112	Credit Hours: 3.000 Schedule Types: Lab, Lecture

TEXT 331	Apparel Fabric Performance	The course focuses upon the dependent relationship of the raw materials, manufacturing processes and finishing techniques that influence the actual performance of apparel products. This will enable students to evaluate a garment's suitability for a specific end use when any fabric variable is altered or when a product's construction and composition is examined. Federally mandated and voluntary labeling requirements will be emphasized. This course cannot be taken for credit by students who have taken TEXT-307. <b>Prerequisites: TEXT 101 (Minimum Grade D)</b>	Credit Hours:3.000 Schedule Types: Lecture
TEXT 371	Special Topics in Textiles	A topic of special interest to students majoring in Textile Design, or Textile Engineering Technology. The special topic will vary.	Credit Hours: 3.000 Schedule Types: Lecture
TEXT 381	Independent Study in Textiles I	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. <b>Permission required.</b>	Credit Hours: 3.000 Schedule Types: Independent Study
TEXT 382	Independent Study in Textiles II	This course will allow students to pursue individual areas of interest while working jointly with a faculty member. Enrollment is subject to the availability and approval of both the program director and faculty member. <b>Permission required.</b>	Credit Hours: 3.000 Schedule Types: Independent Study
TEXT 411	Textile/ Apparel Industry Issues	Seminars will expose students to diverse views, as well as enable them to discuss broad issues that cut across several disciplines. New technology and processes, business ethics, industry forecasting and marketing innovations, as well as career information, are effectively presented in this format. One credit of Textile/Apparel Industry Issues is required for TD, TET, FD and FIM majors.	Credit Hours: 1.000 Schedule Types: By Appointment - 1 student, By Appointment, Lecture
TEXT 487	Textile Engineering Technology Senior Project	Design, development, manufacturing, research and other thought-provoking problems are presented. Students will work in teams to analyze information/data on numerous textile- or apparel-related problems. The final project will reflect the work previously conducted in the TET Option and will constitute the final submission to each student's digital portfolio. <b>Prerequisite: WRTG 2XX, completion of 12 credits in TET Option</b>	Credit Hours: Schedule Types: Lecture Course Attributes: Writing Intensive
TEXT 487N	Capstone in Textile Mat. Tech	Design, development, manufacturing, research and other thought-provoking problems are presented. Students will work in teams to analyze information/data on numerous textile- or apparel-related problems. The final project will reflect the work previously conducted in the TMT Option and will constitute the final submission to each student's digital portfolio.	Credit Hours: 6.000 Schedule Types: By Appointment - 2 students, By Appointment, Lab, Lecture, Lecture/Lab
TEXT 490	Textile Design Capstone I	This is the first course of the two-course capstone sequence. Textile Design Capstone students develop projects independently that demonstrate their ability and understanding of textile design theory and practice. In Capstone I, students will discover Textile Design areas of interest through intensive design research and exploration. Resumes, supporting documentation and portfolios will be developed. Prerequisite: TEXT 306 (Textile Design Studio IV) and one Textile Design Designated Elective.	Credit Hours: 3.000 Schedule Types:Lecture, Studio
TEXT 491	Textile Design Capstone II	This is the second course of the two-course capstone sequence. Building on the research and design exploration of Textile Design Capstone I, students will create a resolved collection that is trend-right, market-ready. The capstone collection will result in a culminating exhibit, a final portfolio in actual and digital formats and supporting documentation. Prerequisite: TEXT 490(Textile Design Capstone 1) and two Textile Design Designated Electives.	Credit Hours: 3.000 Schedule Types: Lecture, Studio

TEXT 499	Textile Design Capstone	Textile Design Capstone Students develop projects independently and are required to demonstrate ability and understanding of textile design theory, processes and principles. The final project requires topic research, design exploration, development and final professional presentation. Additionally, a resume, culminating portfolio and support materials will be developed. <b>Prerequisites: PRNT 315 (Minimum Grade of D) or WEAV 307 (Minimum Grade of D) or KNIT 326 (Minimum Grade of D)</b>	Credit Hours: 6.000 Schedule Types: Studio
<b>TEXTILE CHEMISTRY</b>			
TEXC 202	Color, Dyeing and Finishing	This lecture course presents an overview of color science and wet processing of fibers, yarns and fabrics. Included are the preparation, dyeing and finishing of textiles. Some emphasis is placed on the chemistry and technology involved in these operations. Dyes are studied by their method of application and the primary substrates to which they are applied. Chemical, thermal and mechanical processes are discussed for both preparation and finishing of fabrics. This course may not be taken for credit by anyone who previously received credit for TEXTCHM242, TXF516 or C501. <b>Prerequisite: CHEM 101 or CHEM 103</b>	Credit Hours: 3.000 Schedule Types: Lecture
TEXC 202L	Color, Dyeing & Finishing Lab	This hands-on laboratory-based course highlights concepts covered in Color, Dyeing and Finishing Lecture. Emphasis is placed on developing laboratory skills and to reinforce the concepts covered in the weekly lecture throughout the term. Experiments include color measurement, color mixing, dyeing of various classes and finishing using both chemical & mechanical techniques. This course may not be taken for credit by anyone who previously received credit for TEXTCHM242, TXF516 or C501. (First offered Fall 2014) <b>Prerequisite: CHEM 101 or CHEM 103</b>	Credit Hours: 1.000 Schedule Types: Lab
TEXC 338	Organic/ Textile Chemistry	Aliphatic, aromatic and heterocyclic compounds on those syntheses and reactions that play a role in textile chemistry. Also includes the chemistry of carbohydrates and proteins, regenerated polymers, polymerization, synthetic polymers, the synthesis and chemistry of finishing agents and dyes. The laboratory portion illustrates basic techniques and reactions and the applications of textile chemistry. <b>Prerequisite: CHEM 103 or CHEM 101</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture
<b>TEXTILE ENGINEERING</b>			
TENG 306	Textile Engineering I- Lin/ Assem /Fib/Yarn	The molecular structure and morphologies of fibers are explored. The physical, chemical and mechanical properties and behavior of fibers is studied. Fiber-production processes are reviewed. An examination of systems employed in conversion of fibers into textile structures is conducted. Relationships between material/process constraints and product functional quality are analyzed. The laboratory explores the methods of evaluating fiber and yarn properties.	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
TENG 308	Textile Engineering II: planar Assembly	Development and production of basic and complex designs, multiple layer, tubular, and near net shape structures will be discussed for wovens and knits. Additionally, fabric surface and mechanical characteristics will be covered. <b>Prerequisites: TENG 306</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
TENG 310	Textile Engineering III: Nonwovens & Chemical Processing	Textile Engineering III: Nonwovens and Chemical Processing. This lab-based course will focus on the production and evaluation of nonwoven fabrics, including web forming and bonding methods, and on coloration techniques, including dyeing and printing, as well as aesthetic and functional finishing. <b>Prerequisites: TENG 306 and CHEM 103</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture

TENG 320	Textile Engineering IV: Advanced Fibrous & Materials	Textile Engineering IV: Advanced Fibrous Materials Mechanics and processes for producing functionally advanced fibrous materials. Architectural, aerospace, recreational, and biomedical applications of textiles, and concepts of advanced fiber composites will be covered. <b>Prerequisites: TENG 306 and TENG 308 and TENG 310</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture
<b>TEXTUAL ANALYSIS</b>			
ITXA 100	Intro to Textual Analysis	Students in this course will learn strategies for reading and thinking critically, analyzing evidence from a variety of academic sources, and retaining content. Students will complete assignments in academic reading, note taking, review techniques, and critical thinking skills. <b>Students required to take ITXA 100 must not register for HIST 114/DBTU 114 in the same semester.</b> <b>Minimum Grade C or better to receive credit for this course.</b>	Credit Hours: 3.000 Schedule Types: Lecture
ITXA 100G	Intro Textual Analysis Global	This course parallels introduction to Textual Analysis [ITXA-100] but is designed for students who did not learn English as their first language. As with ITXA-100, its main focus is on strategies for reading and thinking critically, analyzing evidence from a variety of academic sources, and retaining content along with vocabulary expansion. Students will complete assignments in academic reading, note taking, review techniques, and critical thinking. <b>Minimum Grade C or better to receive credit for this course.</b>	Credit Hours: 3.000 Schedule Types: Lecture
<b>VASCULAR SONOGRAPHY</b>			
RSV 311	Cardiovascular Physiology	Students will learn the etiology, signs, symptoms, clinical recognition and detection, and treatment of various acquired and congenital cardiovascular disorders. The student will also be introduced to the varied drug classifications that are used to treat cardiovascular disorders. Emphasis will be placed on mechanism of action, indications, contraindications and potential side effects of common cardiac medications.	Credit Hours: 2.000 Schedule Types: Lecture
RSV 321	Patient Care & Services in Diagnostic Imaging	Presents basic concepts of the healthcare delivery system and an introduction to medical imaging and radiation sciences with a focus on sonography. Emphasizes patient care, diversity, sterile procedure, ergonomics and body mechanics, communication, essential sonographer skills, professional ethics and medicolegal issues.	Credit Hours: 2.000 Schedule Types: Lecture
RSV 335	Vascular Procedures I	Lecture presentation and hands-on operation of equipment utilized in a vascular laboratory to evaluate upper and lower extremity arterial and venous disease states and vascular sonography. Emphasizes the clinical application, operation and knobology associated with such equipment. Provides guided practice in the performance of vascular procedures utilized in the assessment of arterial and venous diseases of the upper and lower extremities. Topics include plethysmographic procedures, two-dimensional imaging and nonimaging techniques.	Credit Hours: 2.000 Schedule Types: Lab, Lecture
RSV 336	Vascular Procedures II	Continuation of Radiologic Sciences V 335, Vascular Procedures I. Provides guided practice in the performance of direct and indirect cerebrovascular testing, intracranial Doppler and abdominal procedures. Emphasizes the operation and knobology of the equipment utilized in these procedures via lecture and hands-on experience. <b>Prerequisite: RSV 335</b>	Credit Hours: 2.000 Schedule Types: Lab, Lecture
RSV 353	Vascular Principles I	Introduces the fundamental skills and principles needed to perform vascular diagnostic testing of the upper and lower extremities. Includes arterial and venous vascular procedures with an emphasis upon the physical principles and cross-sectional anatomy common to each of these procedures. Presents the fundamentals necessary to evaluate acquired and congenital vascular disease of the upper and lower extremities.	Credit Hours: 3.000 Schedule Types: Lecture

RSV 354	Vascular Principles II	Continuation of Radiologic Sciences V 353, Vascular Principles I. Emphasizes the anatomy, pathology and pathophysiology of the intracranial and extracranial cerebrovascular vasculature and abdominal vessels. Includes assessment of intracranial and extracranial bloodflow, abdominal vessel diagnostic assessment, current therapies in vascular treatment, two-dimensional imaging and Doppler waveform analysis with an emphasis upon the physical principles common to each of these procedures. Prerequisite: Radiologic Sciences RSV 353	Credit Hours: 2.000 Schedule Types: Lecture
RSV 400	Ultrasound Physics I	Presents general acoustic principles including energy transfer through wave propagation, transducer construction, spatial and temporal resolution, beam steering and focusing, imaging modes, and 3D/4D ultrasound. Emphasizes applied principles of instrumentation, including knobology and image optimization.	Credit Hours: 2.000 Schedule Types: Lecture
RSV 401	Vascular Anatomy	Presents anatomy specific to vascular sonography, consisting of normal anatomy, anomalies and related structures. Includes correlation with radiographic, CT, angiographic and ultrasonographic images as well as cadaver specimens, utilizing a multimedia approach.	Credit Hours: 2.000 Schedule Types: Lecture
RSV 403	Ultrasound Physics II	Presents properties of ultrasound's interaction with tissue and instrumentation of the ultrasound machine. Topics include computer technology, creation and storage of the ultrasound image, hemodynamics, spectral, color and power Doppler, acoustic artifacts, bioeffects & safety, and quality assurance/quality improvement relative to ultrasound. Advanced topics such as new imaging methods and new developments in ultrasound technology will also be introduced. Prerequisite: RSV 400	Credit Hours: 2.000 Schedule Types: Lecture
RSV 421	Clinical Vascular I	Students participate in the diagnostic process of performing sonographic vascular examination and testing at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various sonographic vascular examination protocols and the technical factors necessary to obtain diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of vascular examinations under the supervision of a staff vascular technologist. Evaluation is based upon competency in performing, patient care skills, technical factors, and the observance and application of healthcare principles. Students must demonstrate competency in the performance of vascular testing. Content and clinical practice experiences should be designed to sequentially develop, apply, critically analyze, integrate, synthesize, and evaluate concepts and theories in the performance of vascular testing. Through structured, sequential, competencybased clinical assignments, concepts of team practice, patient-centered clinical practice and professional development are discussed, examined, and evaluated. Clinical practice experiences should be designed to provide patient care and assessment, competent performance of vascular sonography imaging and testing, and total quality management. Levels of competency and outcomes measurement ensure the well-being of the patient prior to, during, and following the procedure.	Credit Hours: 6.000 Schedule Types: Clinical

RSV 422	Clinical Vascular II	Continuation of Radiologic Sciences RSV 421, Clinical Vascular II. Students participate in the diagnostic process of performing sonographic vascular examination and testing at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various sonographic vascular examination protocols and the technical factors necessary to obtain diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of vascular examinations under the supervision of a staff vascular technologist. Evaluation is based upon competency in performing, patient care skills, technical factors, and the observance and application of healthcare principles. Students must demonstrate competency in the performance of vascular testing. Content and clinical practice experiences should be designed to sequentially develop, apply, critically analyze, integrate, synthesize, and evaluate concepts and theories in the performance of vascular testing. Through structured, sequential, competencybased clinical assignments, concepts of team practice, patient-centered clinical practice and professional development are discussed, examined, and evaluated. Clinical practice experiences should be designed to provide patient care and assessment, competent performance of vascular sonography imaging and testing, and total quality management. Levels of competency and outcomes measurement ensure the well-being of the patient prior to, during, and following the procedure. <b>Prerequisite: RSV 421</b>	Credit Hours: 6.000 Schedule Types: Clinical
RSV 423	Clinical Vascular III	Continuation of Radiologic Sciences RSV 422, Clinical Vascular II. Students participate in the diagnostic process of performing sonographic vascular examination and testing at a designated clinical site. They are responsible for obtaining the knowledge and understanding of the various sonographic vascular examination protocols and the technical factors necessary to obtain diagnostic images. This is accomplished by initial observation, hands-on experience and the performance of vascular examinations under the supervision of a staff vascular technologist. Evaluation is based upon competency in performing, patient care skills, technical factors, and the observance and application of healthcare principles. Students must demonstrate competency in the performance of vascular testing. Content and clinical practice experiences should be designed to sequentially develop, apply, critically analyze, integrate, synthesize, and evaluate concepts and theories in the performance of vascular testing. Through structured, sequential, competencybased clinical assignments, concepts of team practice, patient-centered clinical practice and professional development are discussed, examined, and evaluated. Clinical practice experiences should be designed to provide patient care and assessment, competent performance of vascular sonography imaging and testing, and total quality management. Levels of competency and outcomes measurement ensure the well-being of the patient prior to, during, and following the procedure. <b>Prerequisite: RSV 422</b>	Credit Hours: 8.000 Schedule Types: Clinical
RSV 482	Vascular Review Seminar	Presents a comprehensive review of the physical principles, instrumentation and clinical applications of peripheral vascular imaging in preparation for the RVT certification examination.	Credit Hours: 2.000 Schedule Types: Lecture
RSV 493	Special Topics in Vascular Sonography	Presents new techniques and information, clinical experiences and presentation of case studies in a weekly seminar format.	Credit Hours: 2.000 Schedule Types: Lecture
<b>VISUAL STUDIES DRAWING</b>			

VDRW 101	Visual Studies: Drawing	This drawing course emphasizes the understanding of space and alternative approaches for recording and expressing it. Much information in regard to drawing practice will be accumulated during this semester such as mark making skills, developing sensitivity to light and shade, experimentation with media and the use of color as an introduction to figure drawing. This course should not be taken by students who have received credit for DRAW 101 or DRAW 201 in the School of Design & Engineering or the School of Architecture	Credit Hours: 3.000 Schedule Types: Lecture, Studio
<b>WEAVING</b>			
WEAV 201	Weave Technology I	The structures and analysis of woven fabrics will be studied utilizing CAD, print outs and laboratory assignments on industrial equipment. Weave structures will include plain, twills and satins (with their derivatives), color effects, textural effects (cords, piques, etc.) and pile weaves. Fabric will be mathematically analyzed for weight, yarn size, fabric count and yarn crimp to specify fabric structure. Necessary loom controls (draw, chains and reed plans) will be used to relate lectures and laboratory work on dobby looms. <b>Prerequisites: TEXT 101 (Minimum Grade D) or TEXT 104 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lab, Lecture, Lecture/Lab
WEAV 207	Weave Design Studio I	This course focuses on the effects and interactions that yarn, color, texture and structure play in woven design. Working with multi-harness floor looms and dobby looms, students create warps and chains, and weave prototype cloth for various end uses. <b>Prerequisites: WEAV 201 (Minimum Grade D)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Course Attributes: Honors Assignment
WEAV 226	Jacquard	This course focuses on the effects and interactions that yarn, color, texture and structure play in woven design. Working with multi-harness floor looms, students create warps and chains, and weave prototype cloth for various end uses. <b>Prerequisites: WEAV 201 (Minimum Grade D)</b>	Credit Hours: 4.00 Schedule Types: Lecture, Lecture/Studio Combination, Studio
WEAV 301	Weave Technology II	The variations, function, auxiliary devices and design characteristics of cam, dobby and Jacquard weaving machines, and the equipment used to support the weaving process are studied; along with relevant calculations regarding time, materials and production of fabrics. The technique required to accurately analyze fabrics for all critical components and methods to design fabrics for specific weight and compact cover, with consideration given to yarn size, texture, fiber type, weave and other fabric parameters, will be learned. Advanced multi-layer weaves will be studied, analyzed and woven. <b>Prerequisites: WEAV 201 (Minimum Grade D)</b>	Credit Hours: 4.000 Schedule Types: Lab, Lecture, Lecture/Lab
WEAV 307	Weave Design Studio II	The study of elements of woven design is brought to the problems of multi-layered cloth, compound weaves, block designs and other advanced structures. Students use several CAD programs in conjunction with AVL compu-dobbies to increase their design capabilities. Multi-harness floor looms and dobby looms are also used to develop cloth from concept to actuality. <b>Prerequisites: WEAV 207 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: Lecture, Lecture/Studio Combination, Studio
WEAV 327	Weave Design Studio III	Through an advanced study in woven-textile design, students develop a comprehensive working knowledge of the process of styling fabric for specific textile markets. Depending on the projects' parameters, students may use AVL compu-dobbies, multi-harness floor looms and/or dobby looms. <b>Prerequisites: WEAV 307 (Minimum Grade C)</b>	Credit Hours: 3.000 Schedule Types: By Appointment - 1 student, By Appointment, Lecture, Studio
WEAV 401	Introduction to Woven Design	(for non-textile design majors) This course focuses on the effects and interactions that yarn, color, texture and structure play in woven design, as they relate to a range of end use applications. Students will develop fabrics appropriate for their particular area of interest or major field of study. Using multi-harness looms, students will create and weave a variety of samples and prototype cloth.	Credit Hours: 3.000 Schedule Types: Lecture, Studio
<b>WRITING</b>			



WRIT 100	Intro to Academic Writing	Writing 100 teaches writing in the context of reading and thinking about the diversity of American society. The course helps students to learn to write and write to learn. In learning to write, students learn to manipulate and negotiate the genres and conventions of academic discourse. In writing to learn, students develop process-based approaches to writing including invention, revision, and reflection.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
WRIT 100G	Intro to Academic Writing-Global	Writing 100G teaches writing in the context of reading and thinking about the diversity of American society. This course parallels Writing 100 but is designed for students who did not learn English as their first language. As with WRTG 100, its main focus is on using writing as a tool for clarifying thinking, establishing a process-based approach to writing, developing critical reading skills and constructing arguments. Additionally, students will focus on the cultural conventions of academic writing and develop and apply an increasingly complex range of language. Students write both formally and informally and, as with Writing 100, "write to learn."	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
WRIT 101	Writing Sem I: Written Comm.	In Writing Seminar I: Written Communication, students develop skills and practices vital to the writing process: reading, synthesizing, outlining, drafting, and revising. Written Communication asks students to anticipate the needs of an audience and create academic arguments to address those needs. To achieve these goals, students will write in a variety of academic genres and analyze published (student) texts. This course is the first in two writing-specific courses at the University, and it helps students develop their Contextual Communication and Rigorous Inquiry competencies.	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
WRIT 101G	Writing Communication-Global	Global version of Writing Seminar I parallels the content of WRTG-101: students develop skills and practices vital to the writing process: reading, synthesizing, outlining, drafting, and revising. Written Communication asks students to anticipate the needs of an audience and create academic arguments to address those needs. To achieve these goals, students will write in a variety of academic genres and analyze published (student) texts. This course is the first in two writing-specific courses at the University, and it helps students develop their Contextual Communication and Rigorous Inquiry	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Writing Intensive
WRIT 201	Writing Seminar II: Multimedia Communication	In Writing Seminar II: Multimedia Communication, students produce collaborative and individual projects to develop critical reading, writing, thinking and researching skills. Through analyses of professional communication, students consider the rhetorical framework and strategies for effective, ethical communication. Student projects include written, oral and visual presentations, with particular emphasis on project management and process as well as the final products of their work. In the Hallmarks Program, this course helps students develop their Collaboration competency, and it also serves as a Touchstone course in which each student's Hallmarks Folio is reviewed and assessed at its sophomore-level stage of development. First offered Spring 2015 Replaces WRTG-2xx (students who have taken WRTG-2xx should not take this course)	Credit Hours: 3.000 Schedule Types: Lecture Course Attributes: Honors Assignment, Multimedia Communication, Writing Intensive

WRIT 202	<b>Writing Seminar II: Multimedia Communication</b>	<p>This version of Writing Seminar II introduces new transfer students to the Hallmarks Folio process and guides them in posting artifacts and/or reflections for Hallmark competencies that they developed at other institutions. The course also addresses the other goals of Writing Seminar II to help students advance their Collaboration competency: students produce collaborative and individual projects to develop critical reading, writing, thinking and researching skills. Through analyses of professional communication, students consider the rhetorical framework and strategies for effective, ethical communication. Student projects include written, oral and visual presentations, with particular emphasis on project management and process as well as the final products of their work. First offered Spring 2015 Replaces WRTG-2xx (students who have taken WRTG-2xx should not take this course)</p>	<b>Credit Hours: 4.000</b> <b>Schedule Types: Lecture</b> <b>Course Attributes: Multimedia Communication, Writing Intensive</b>
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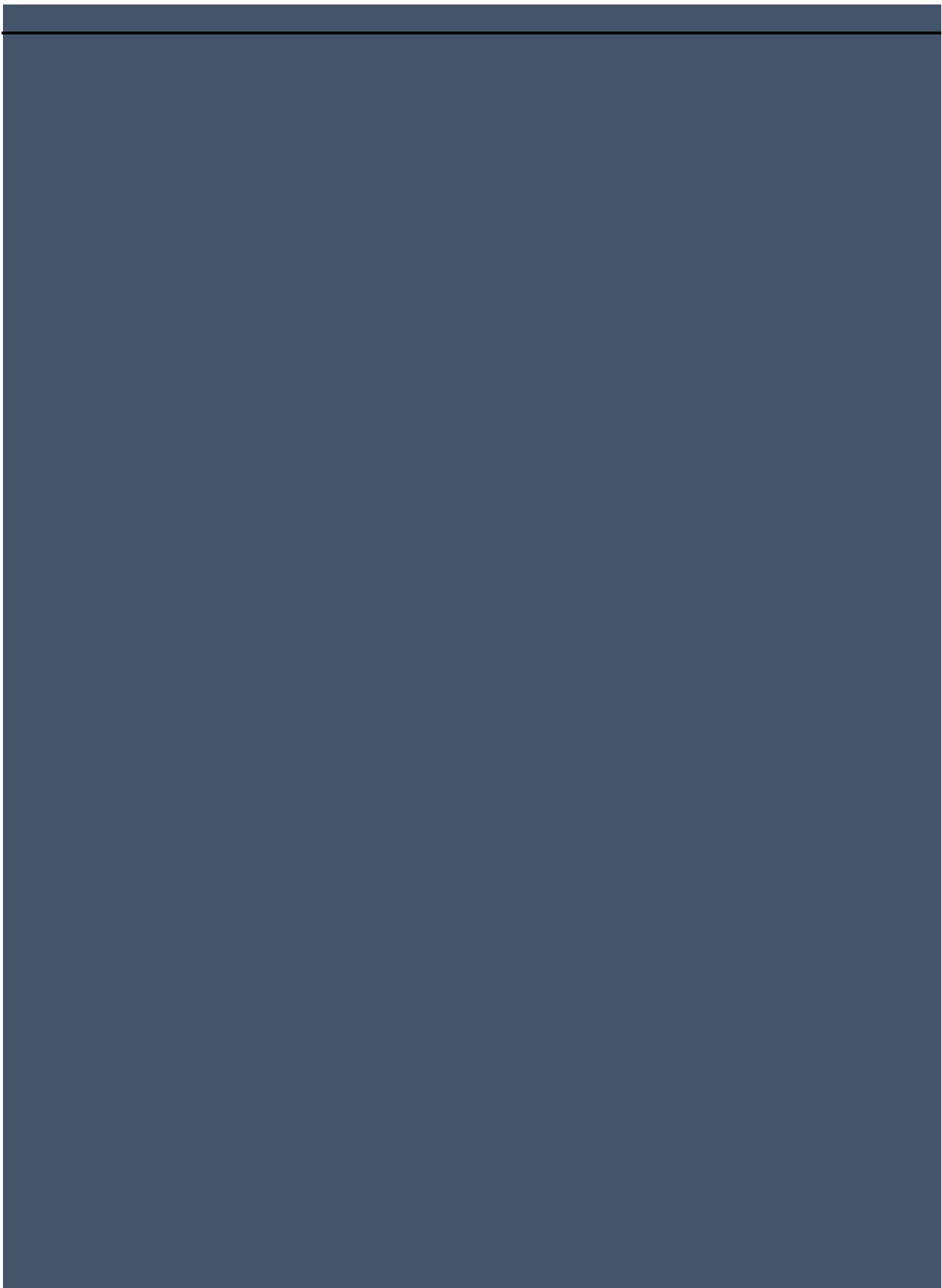


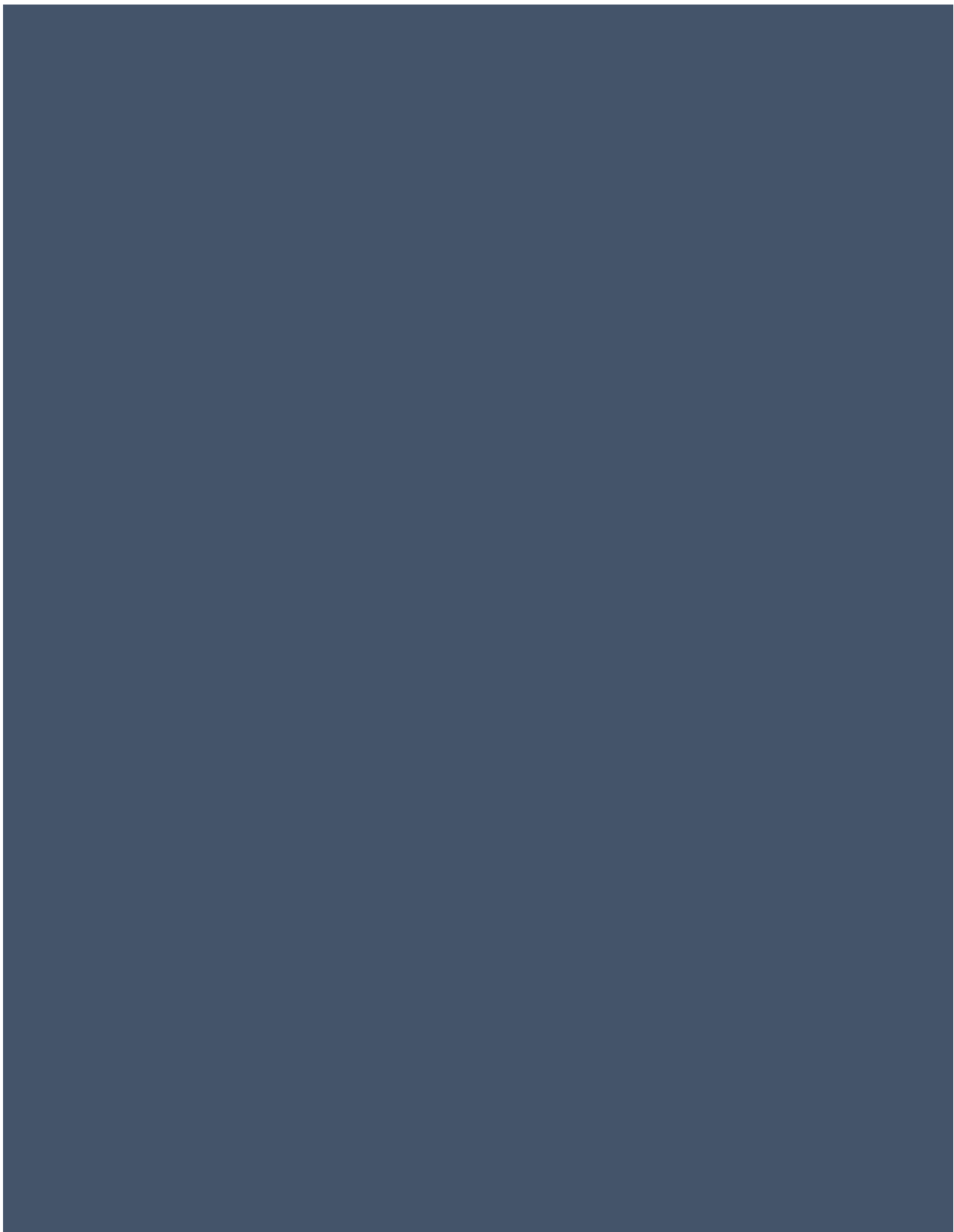


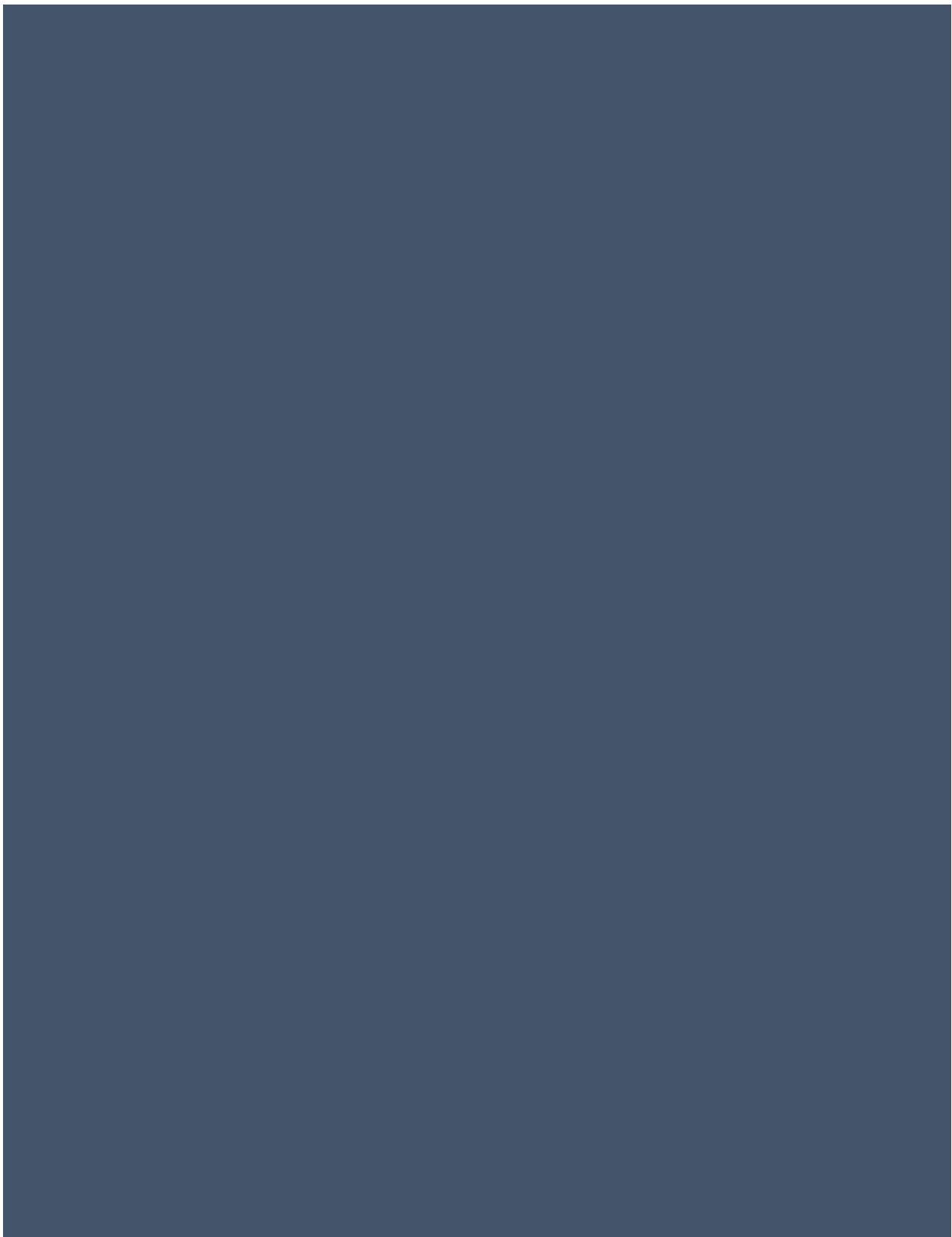


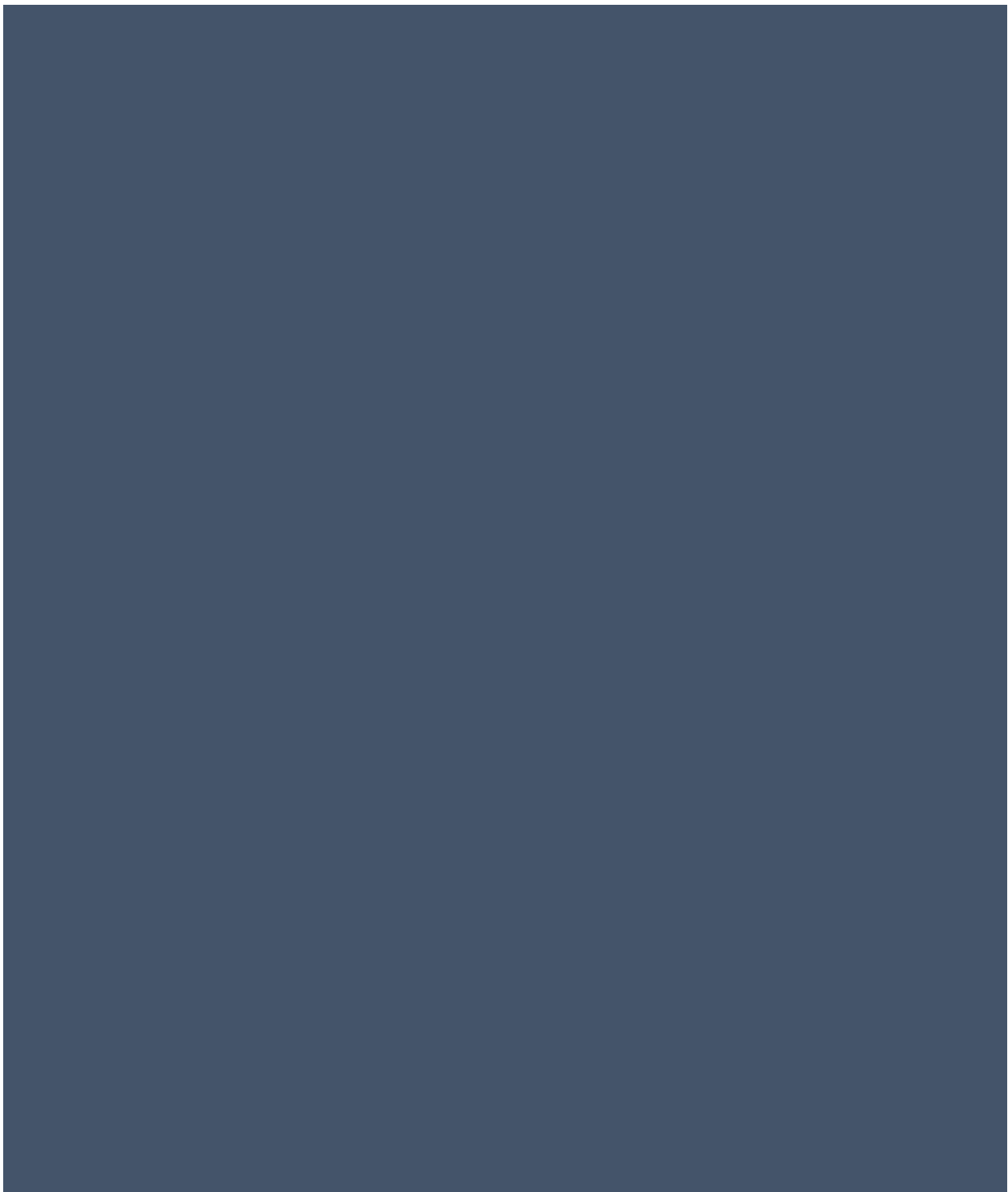


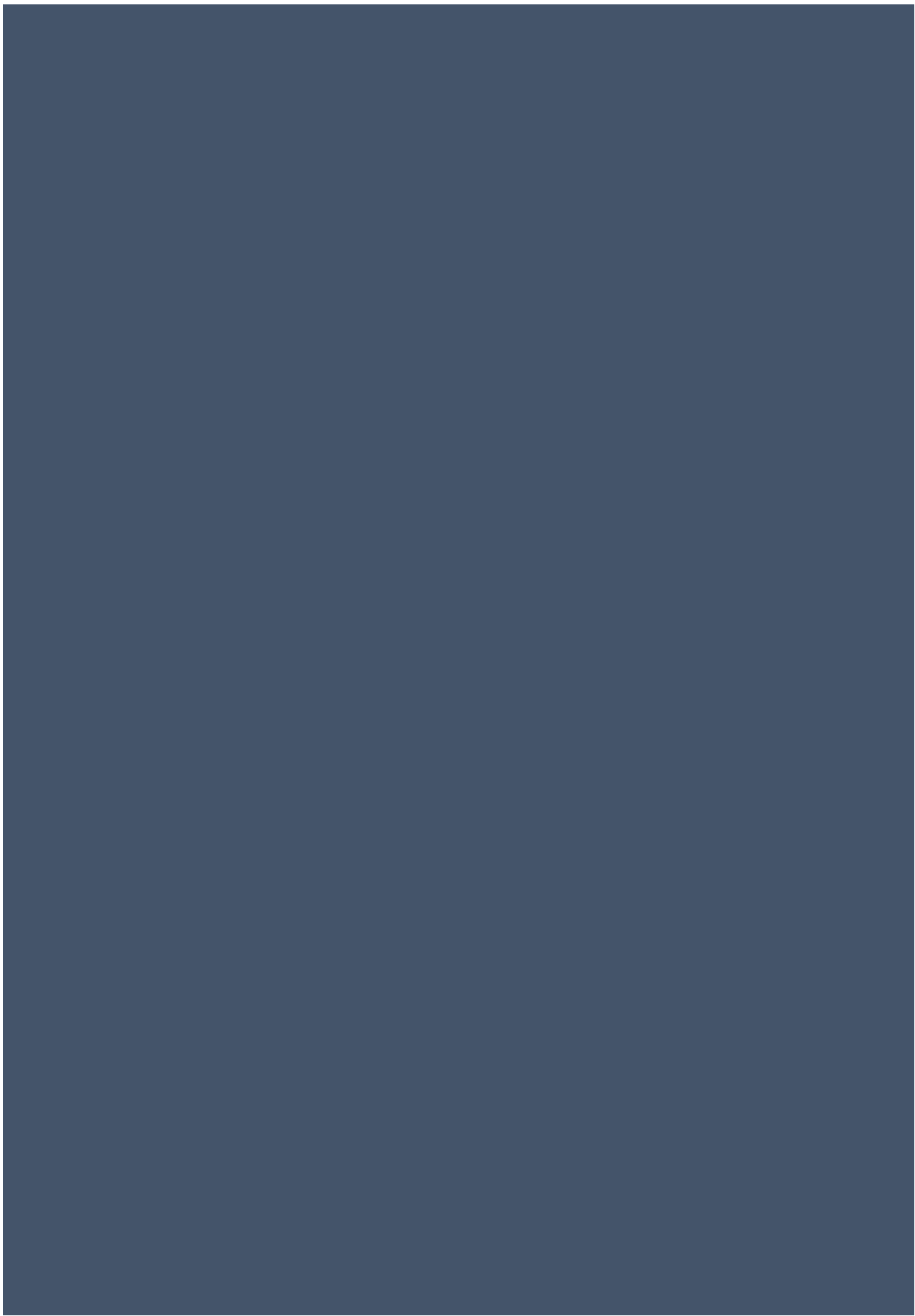


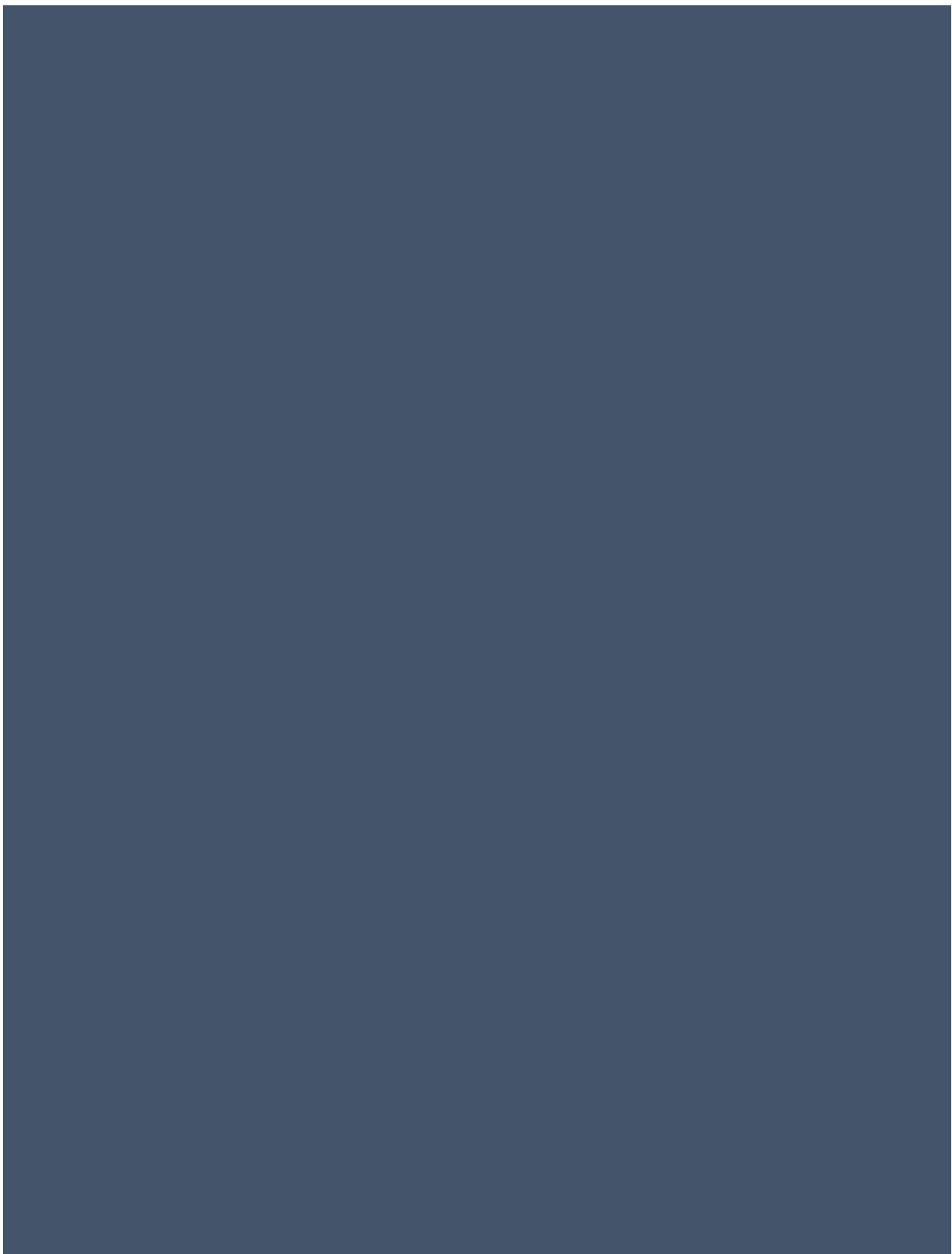


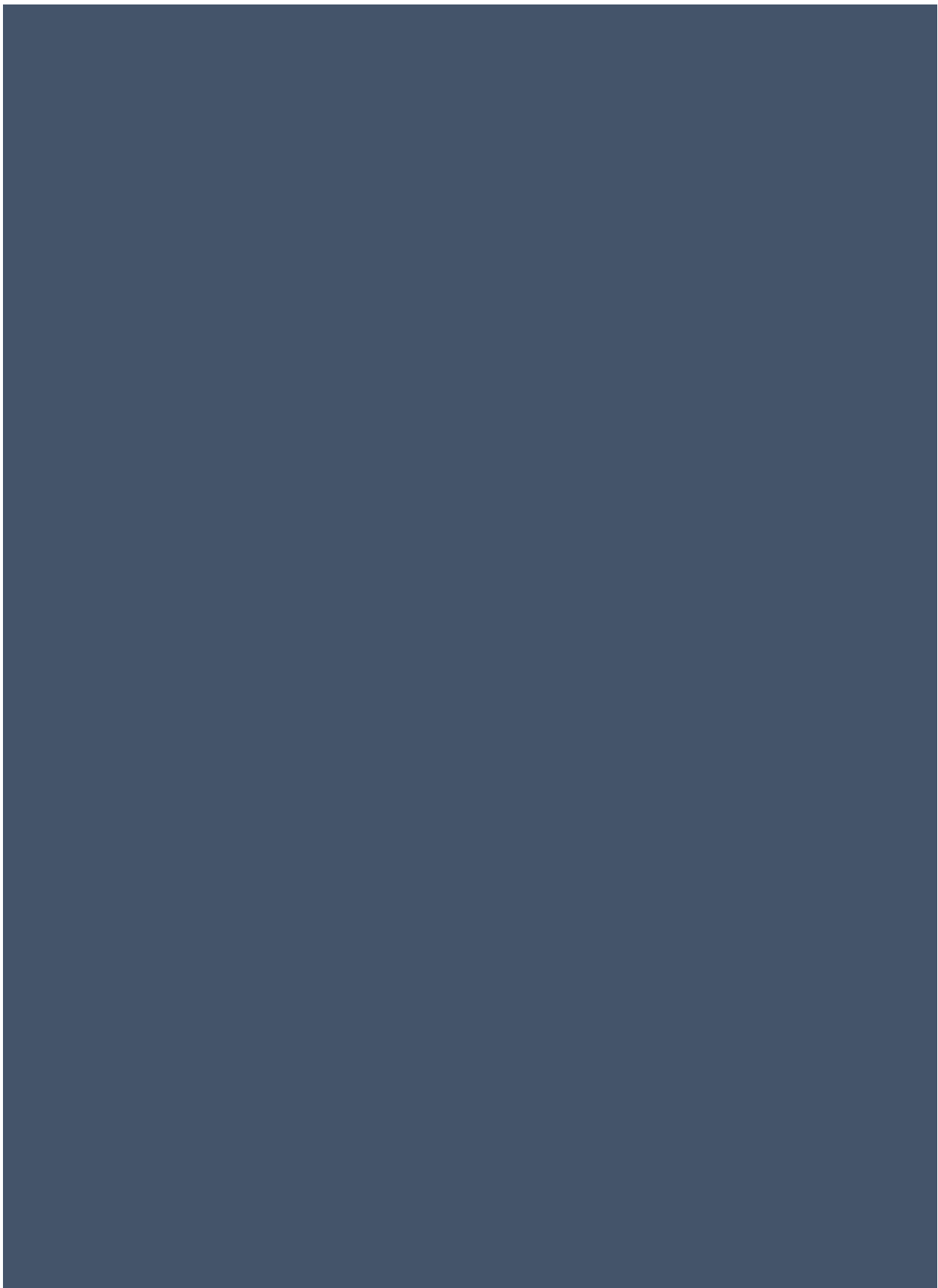




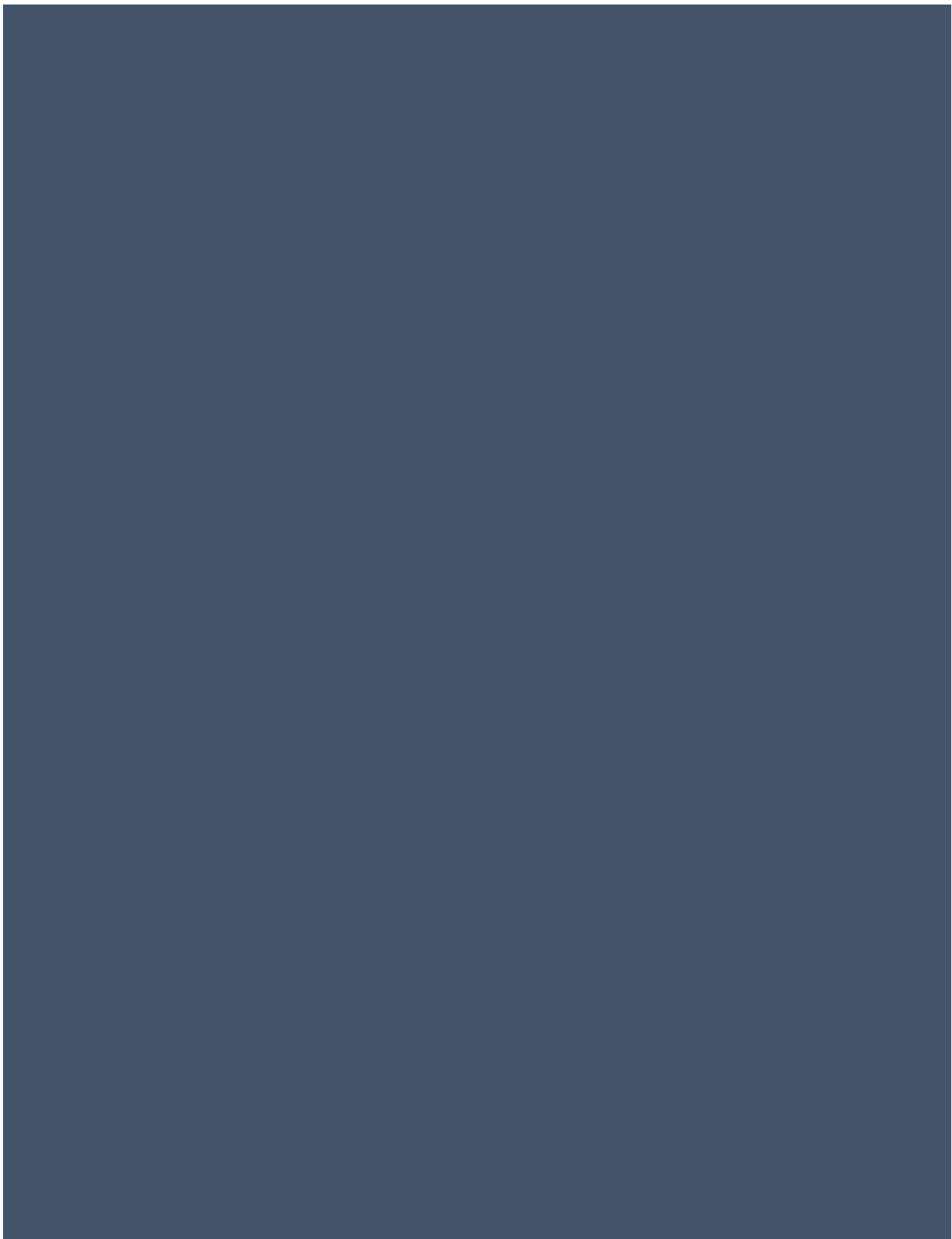


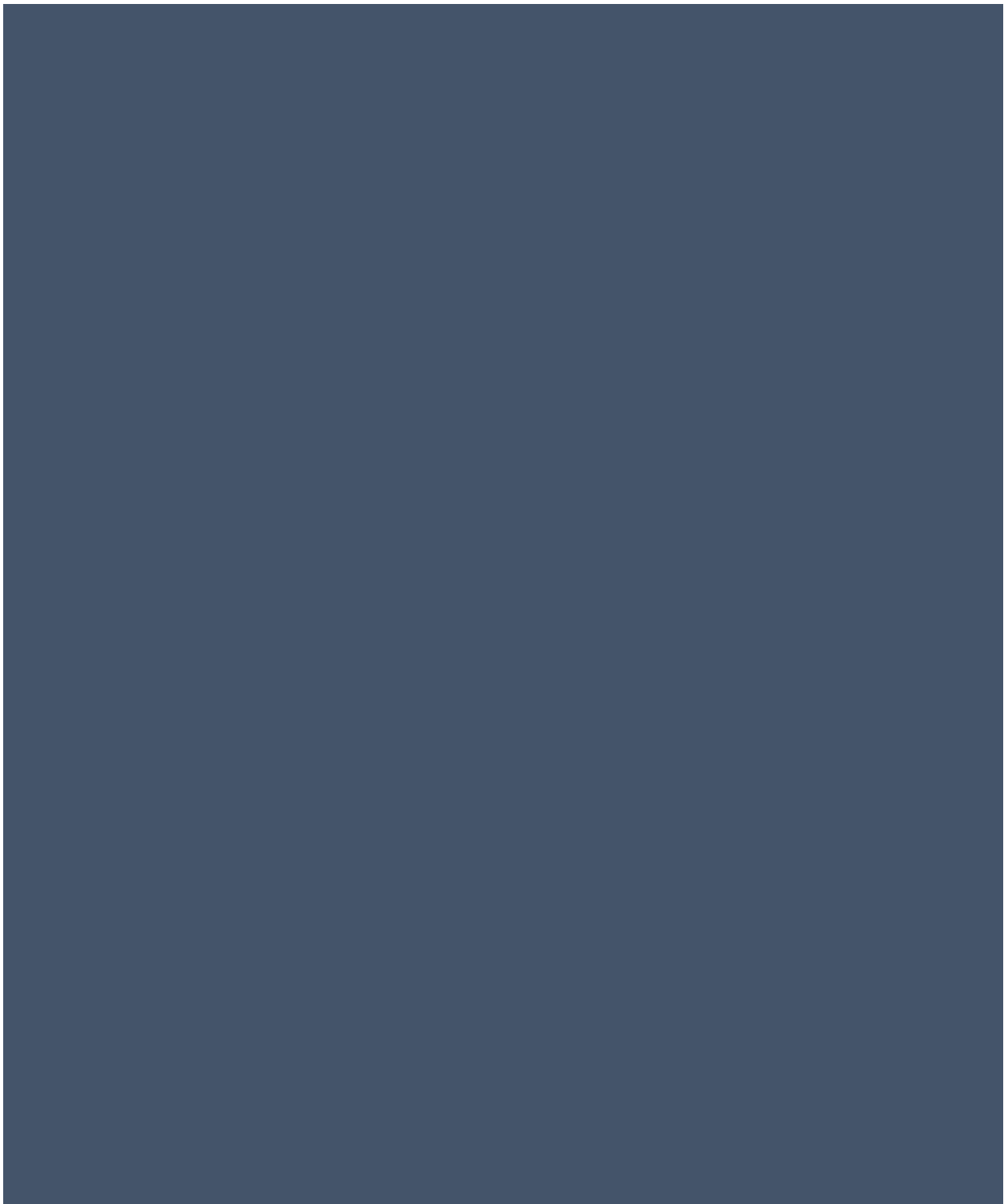


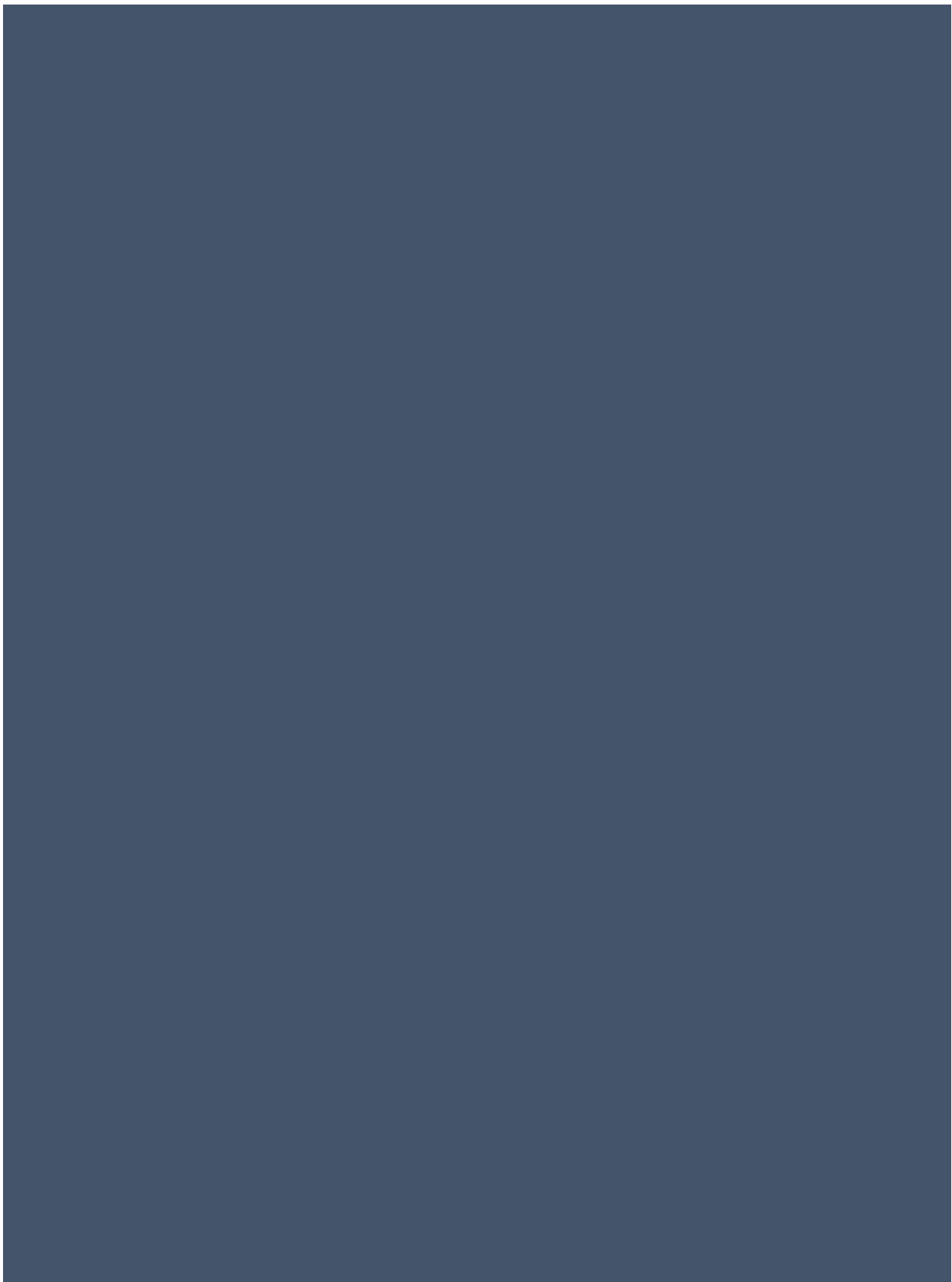


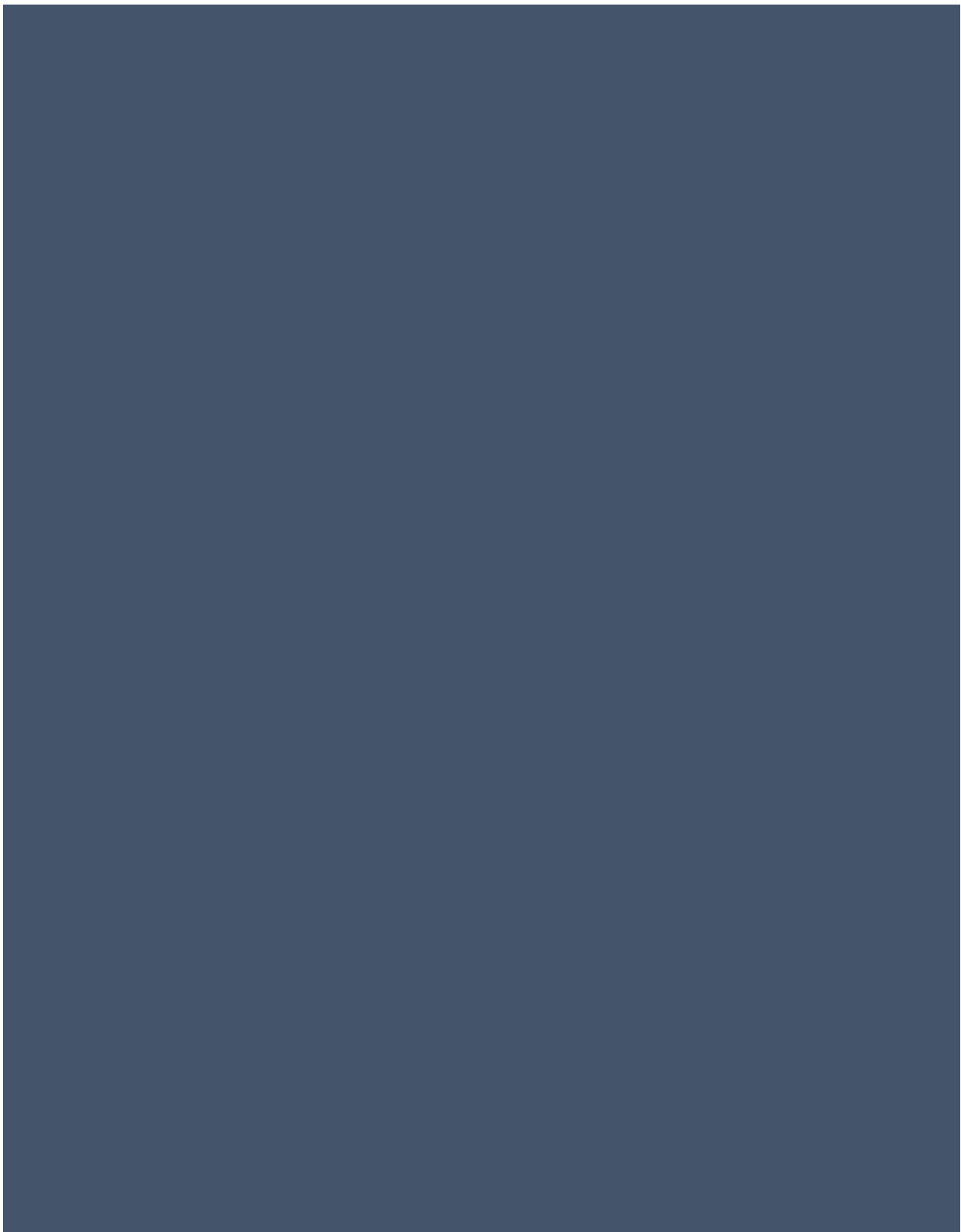


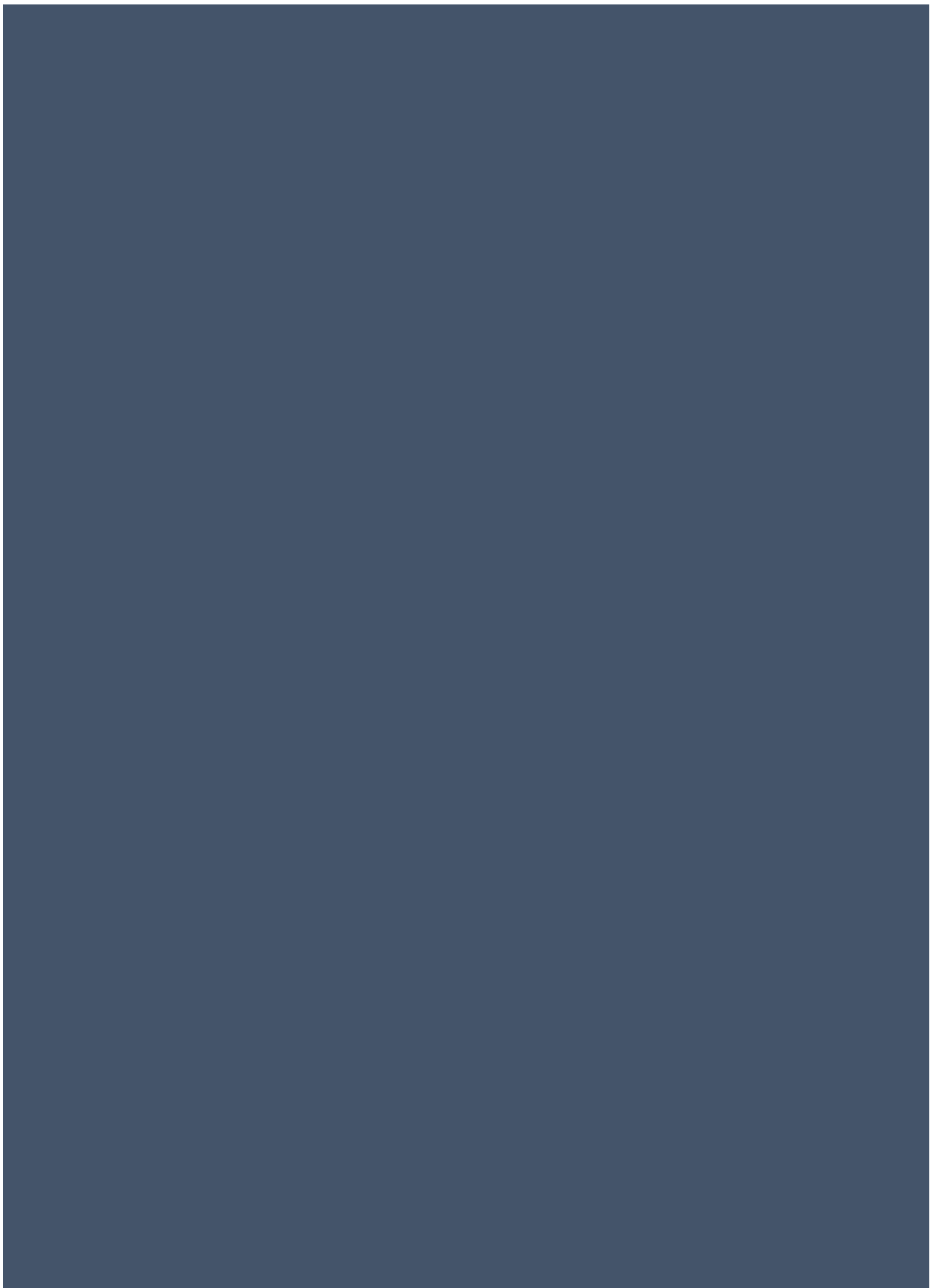


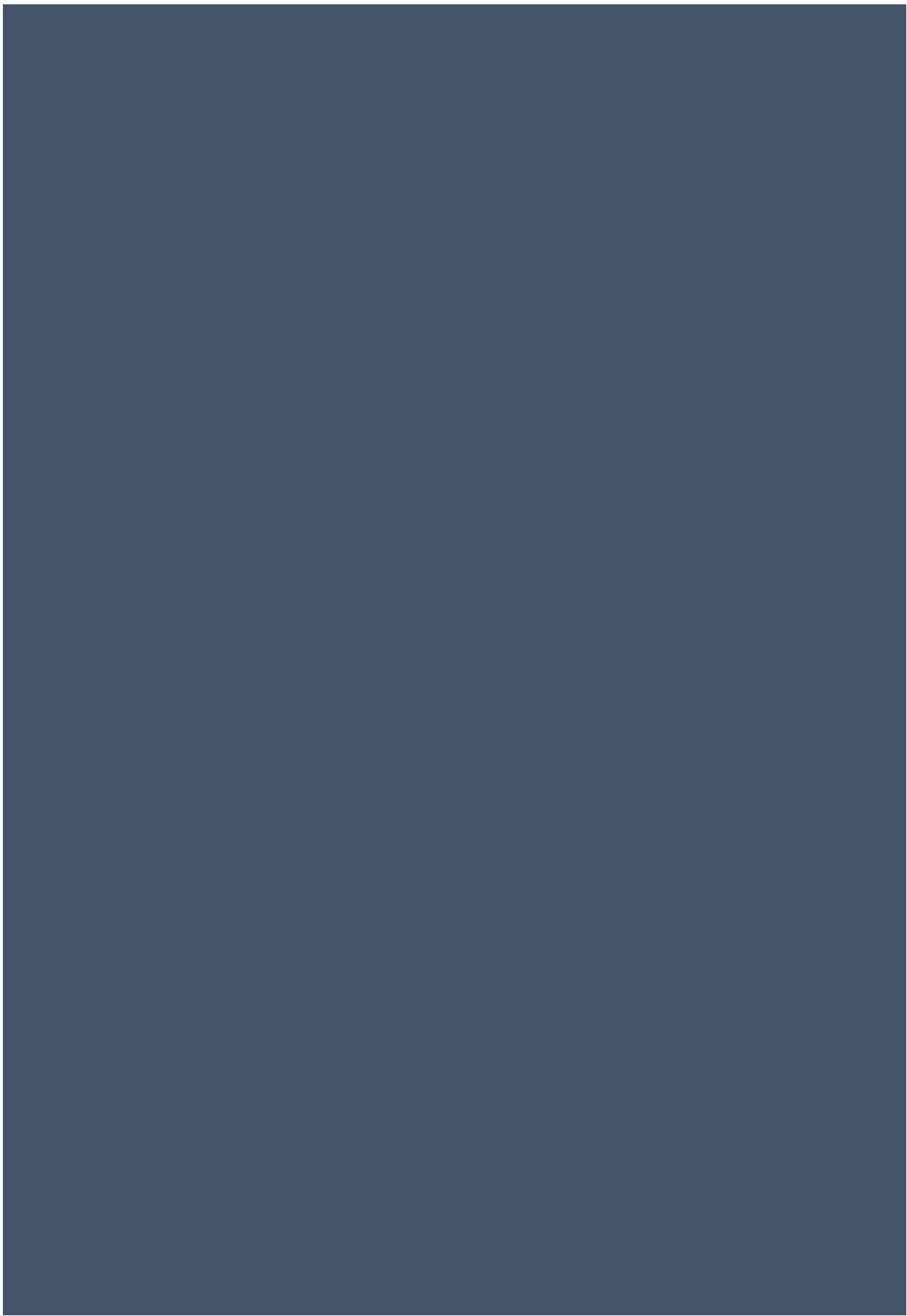


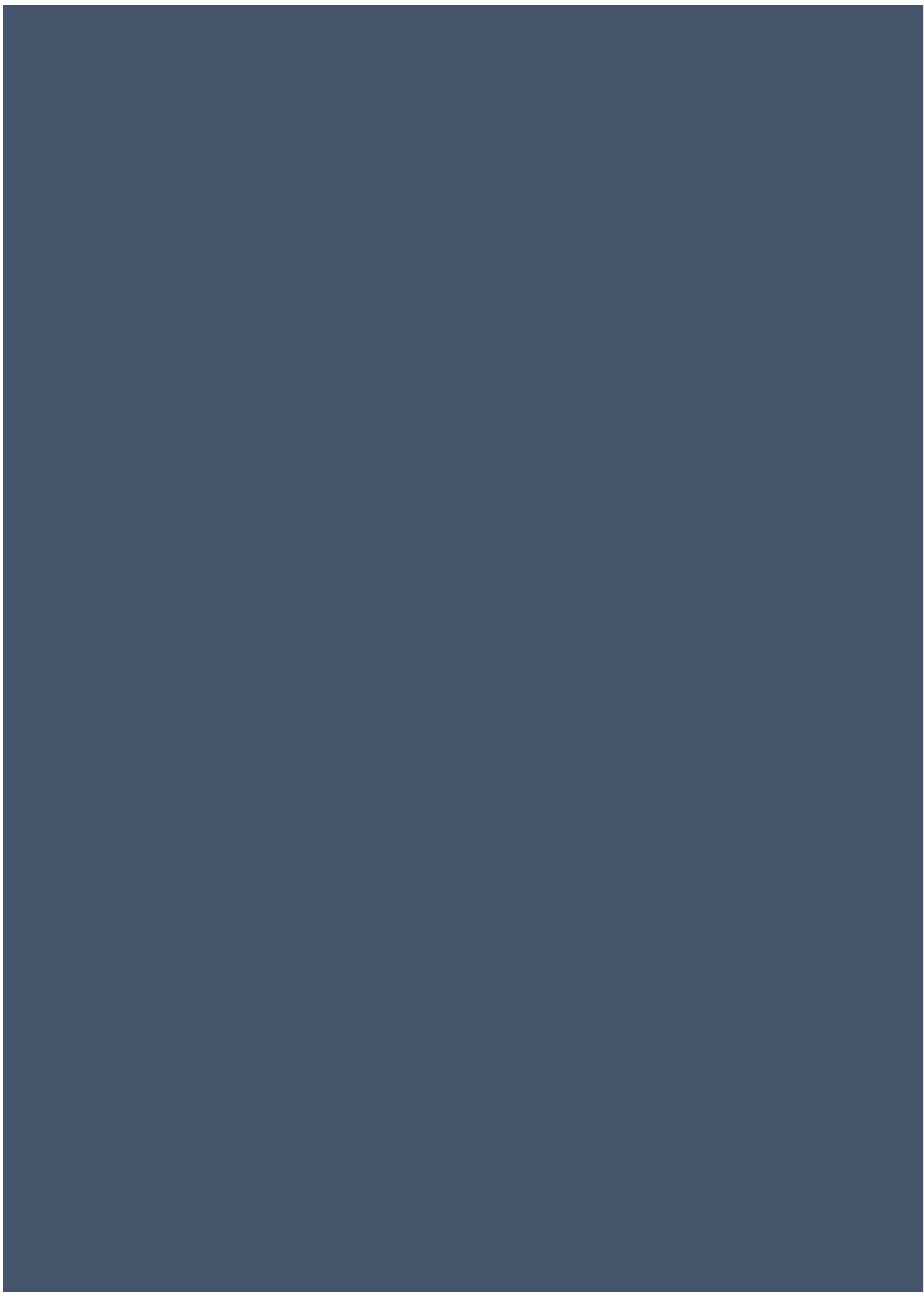


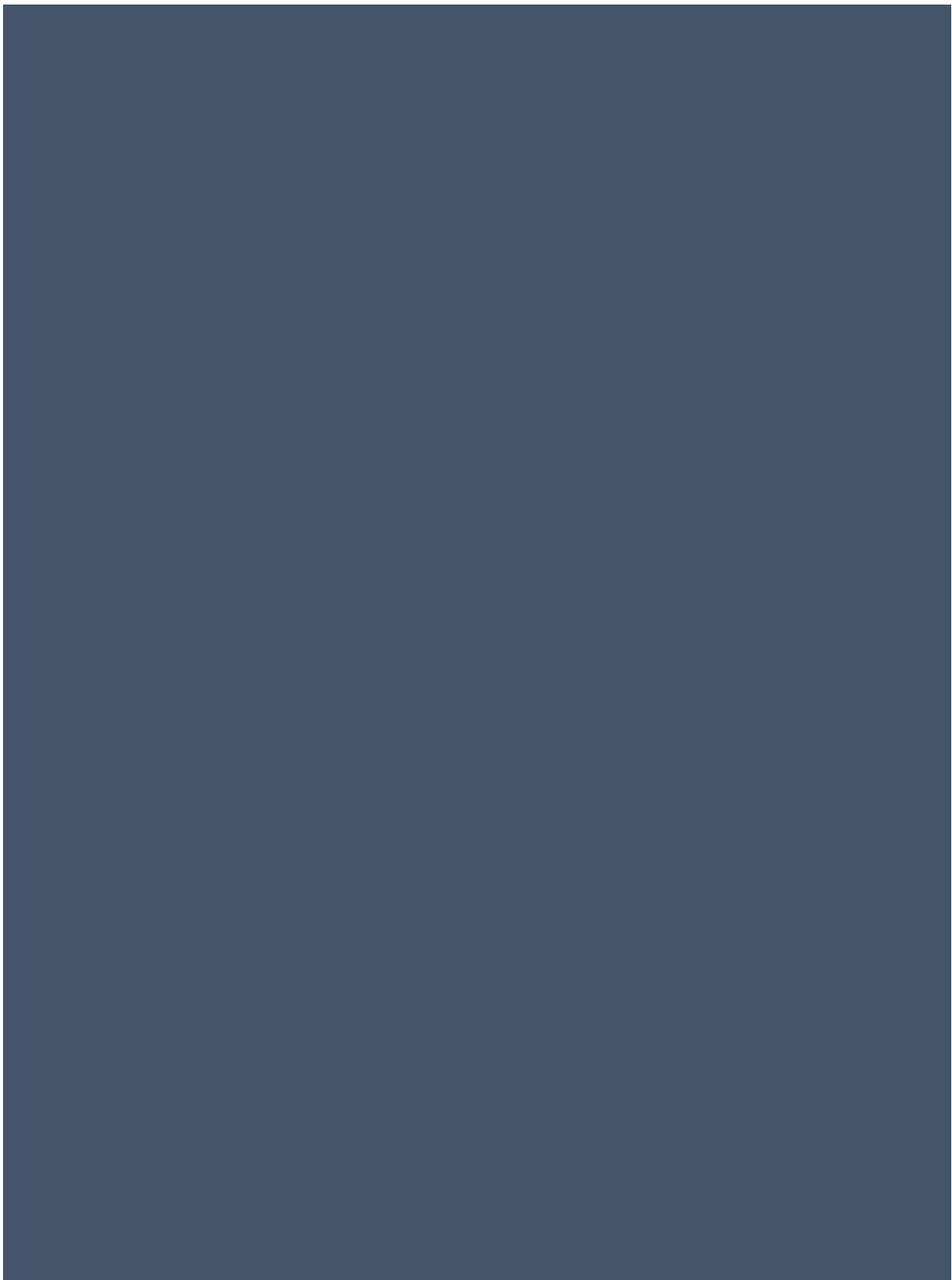




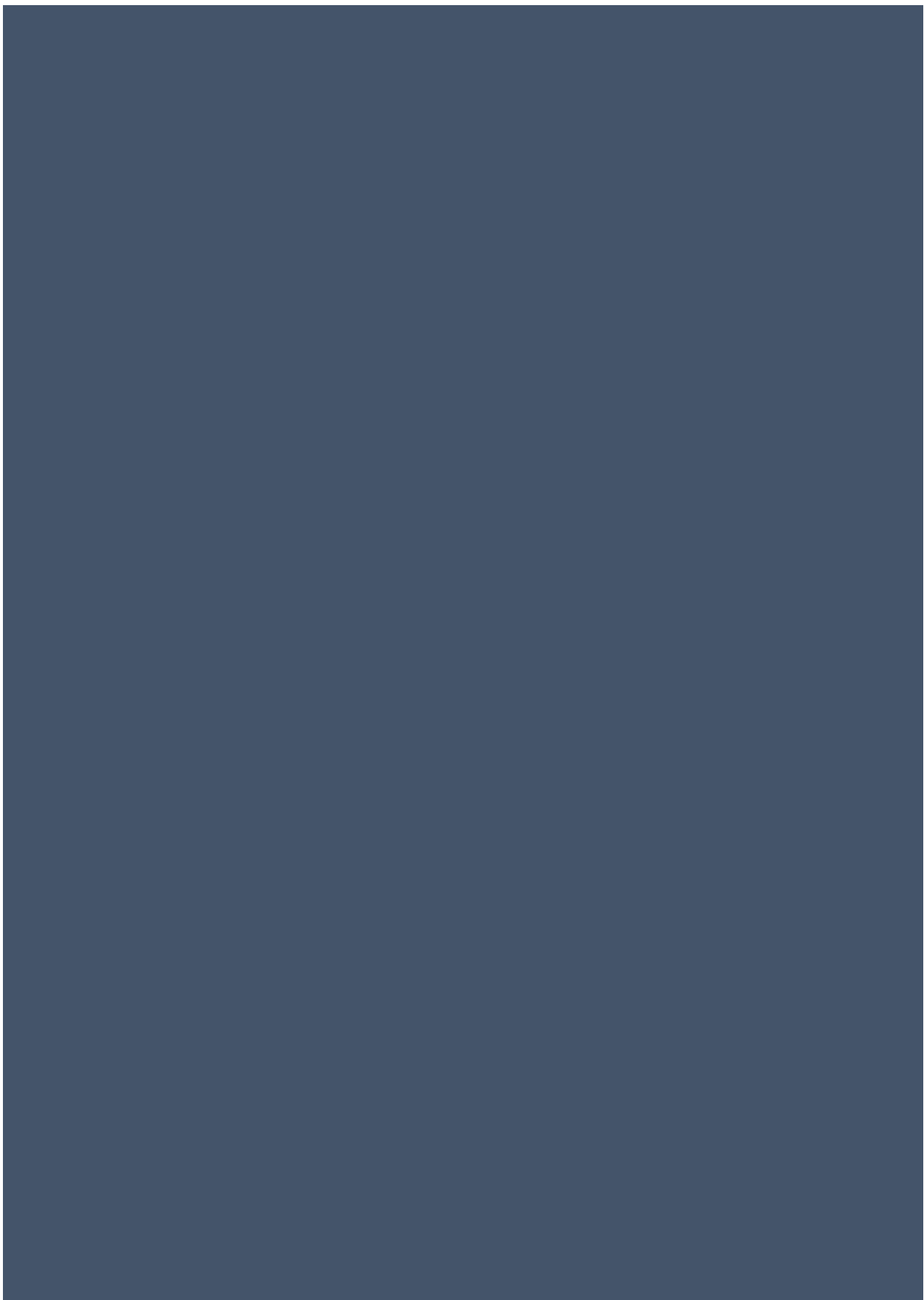


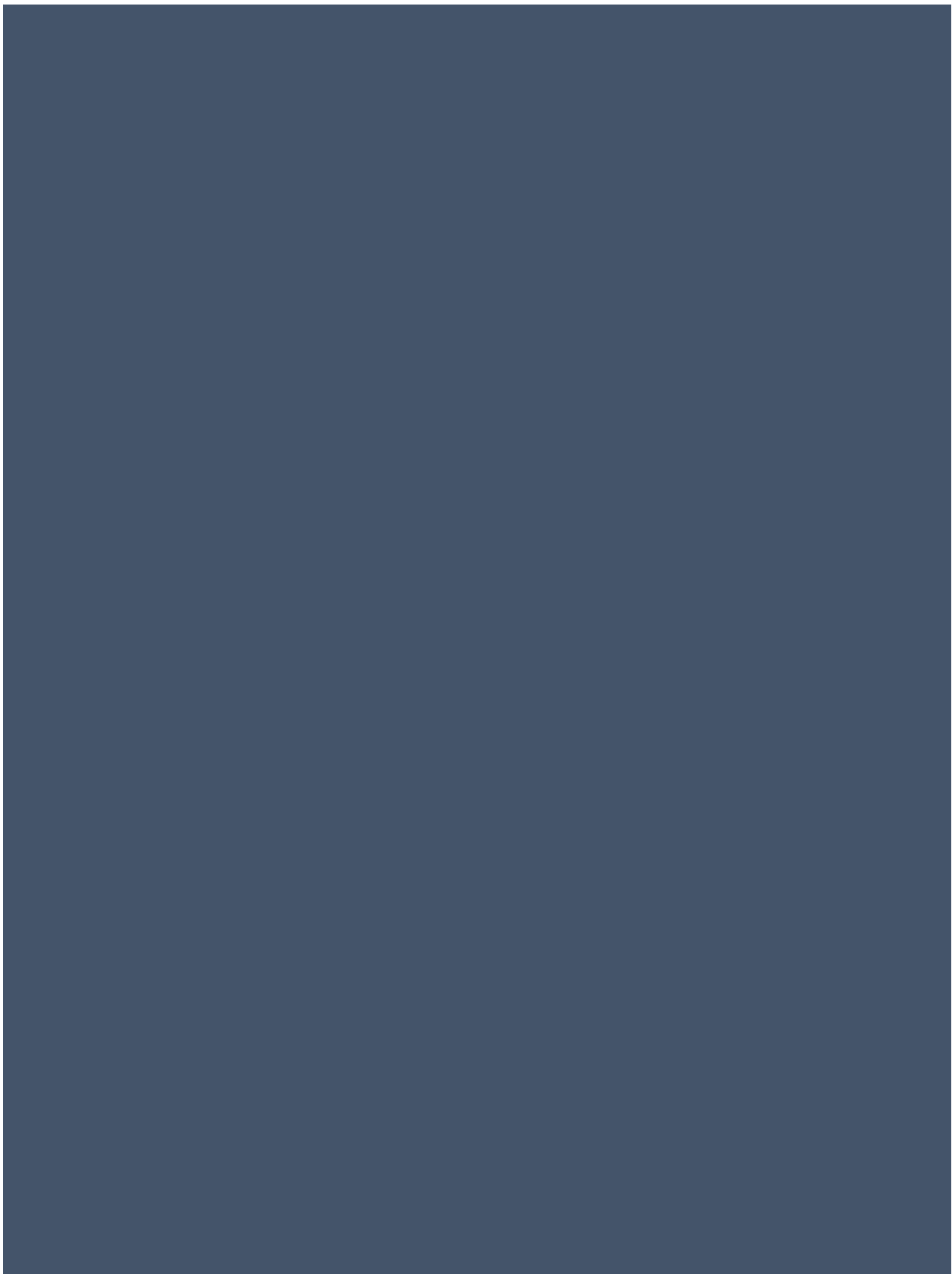


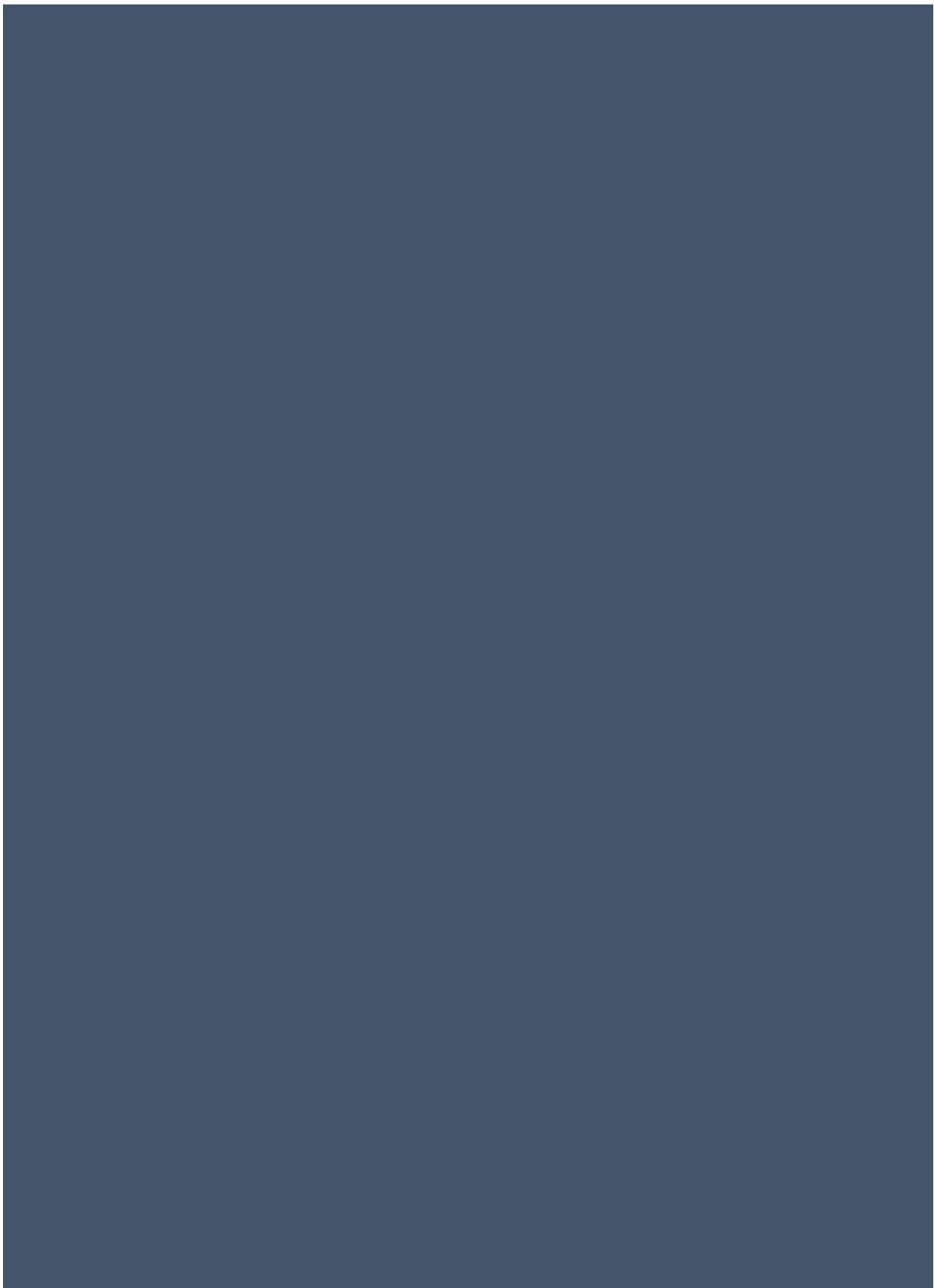


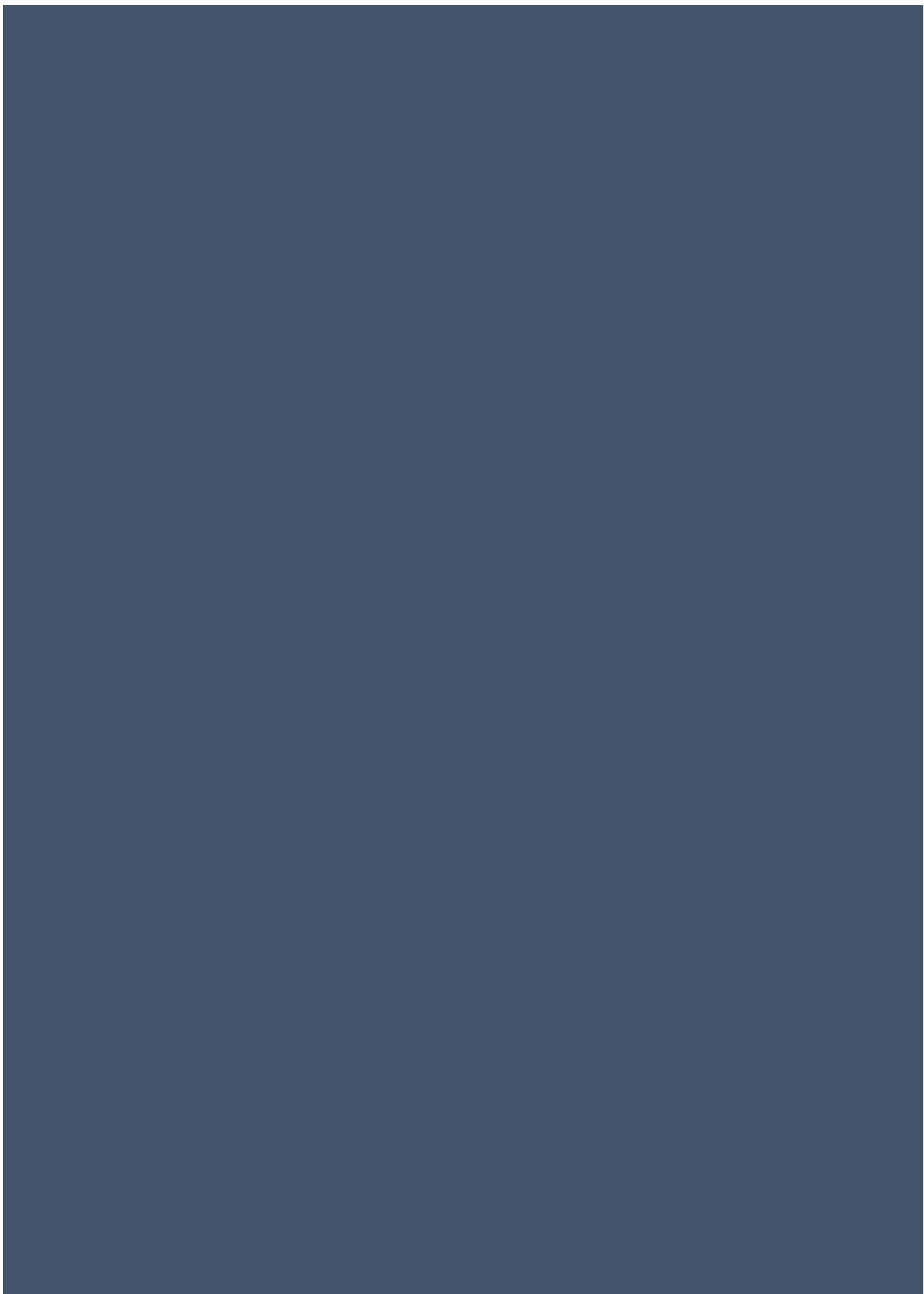


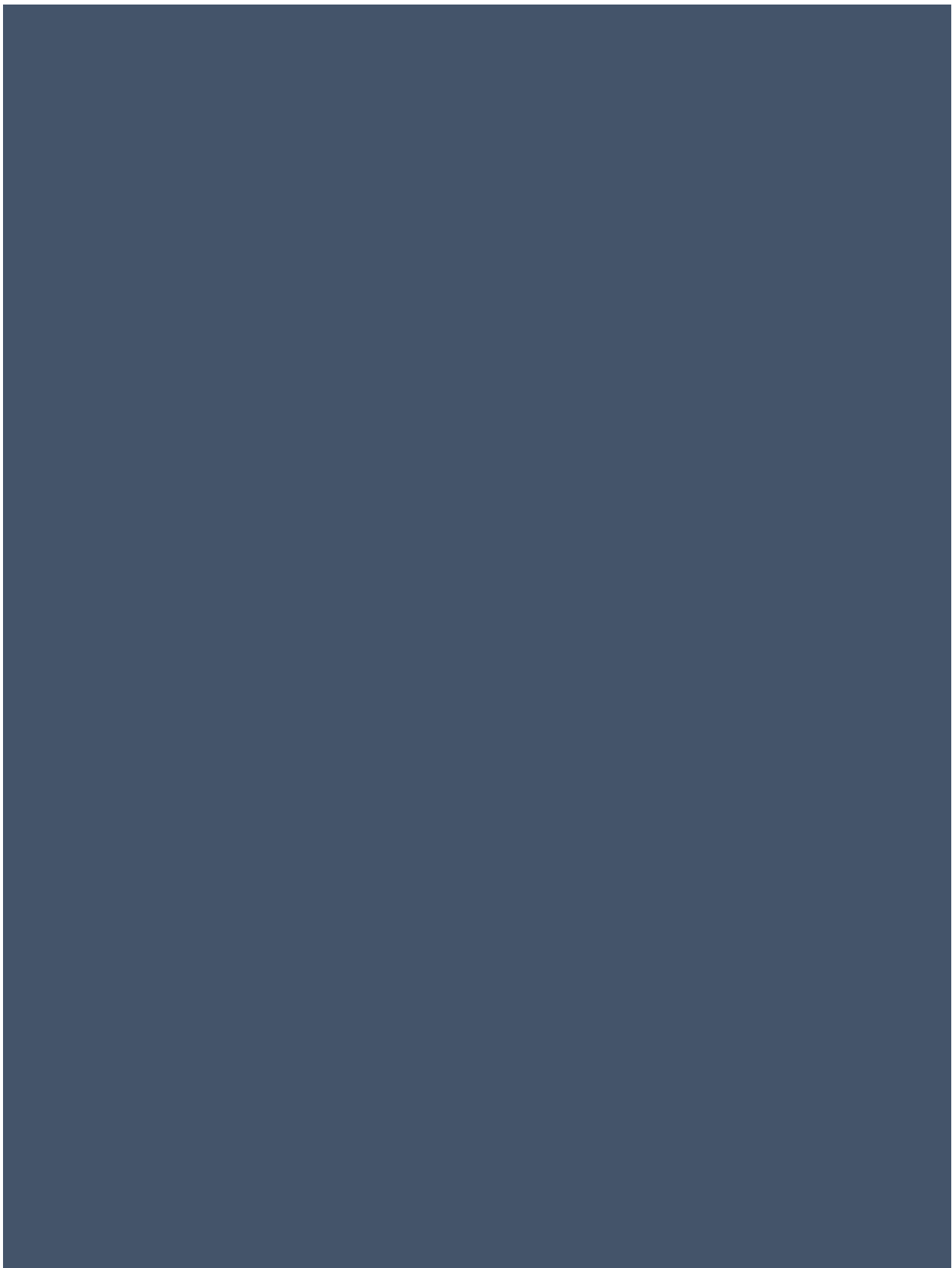




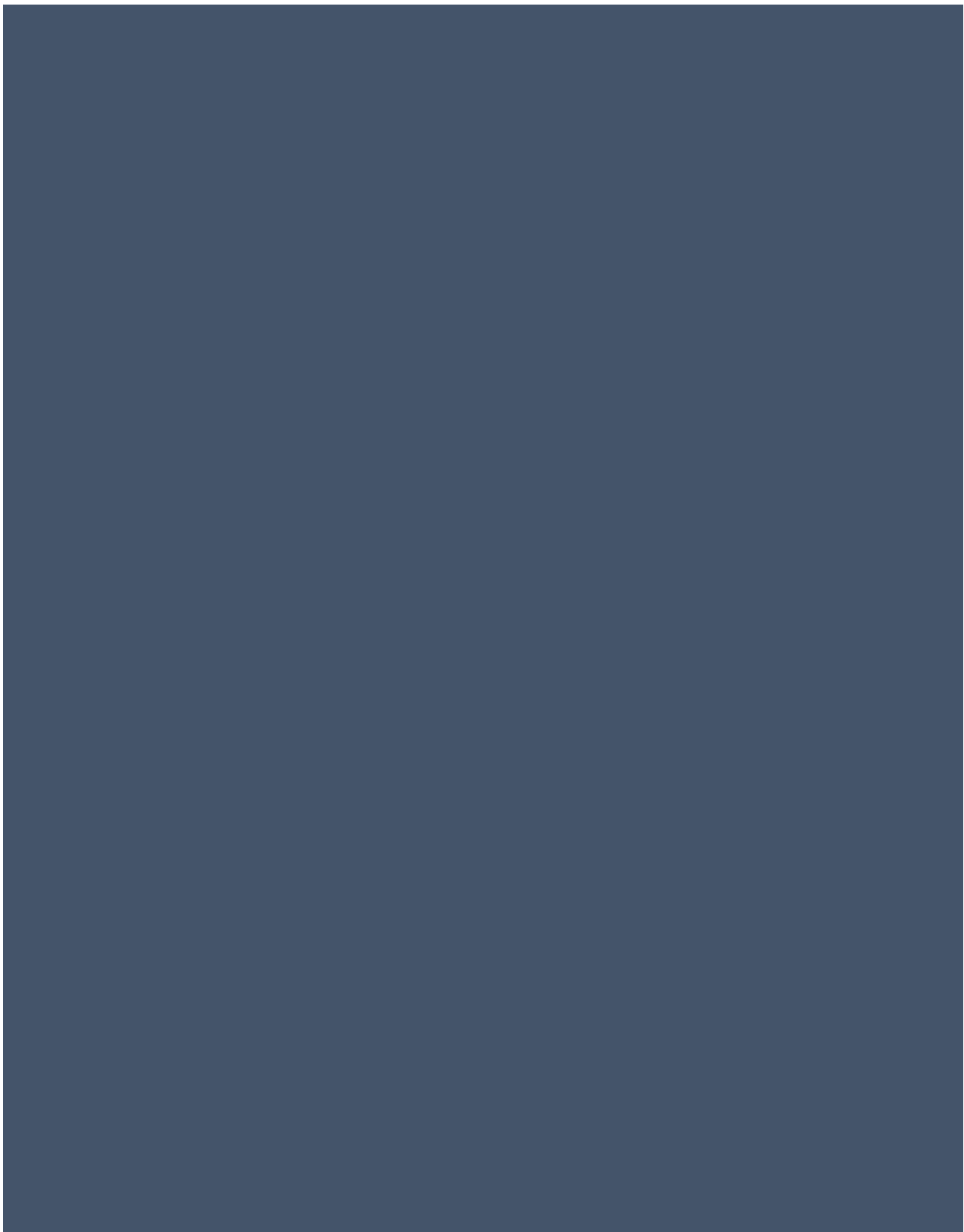


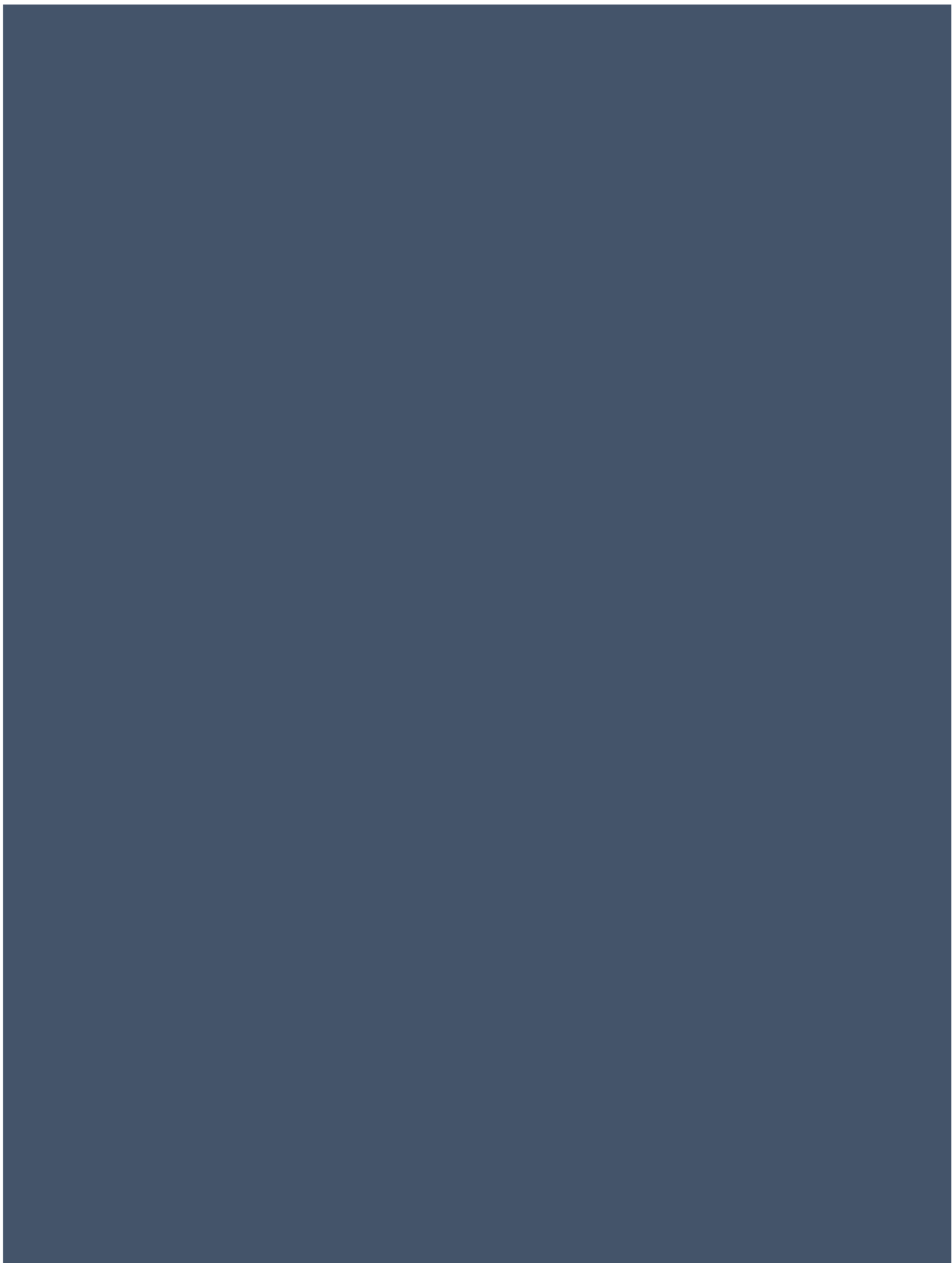




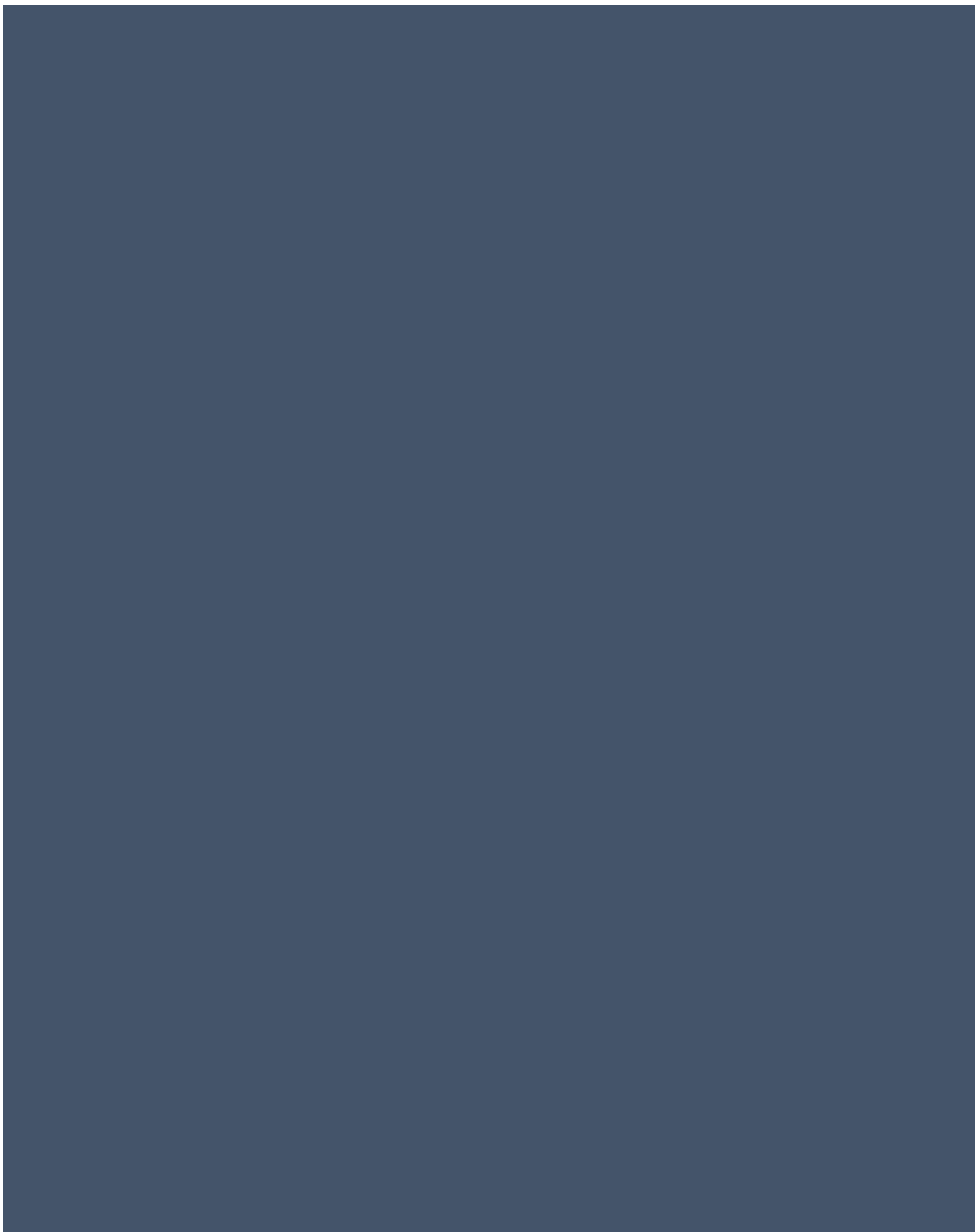


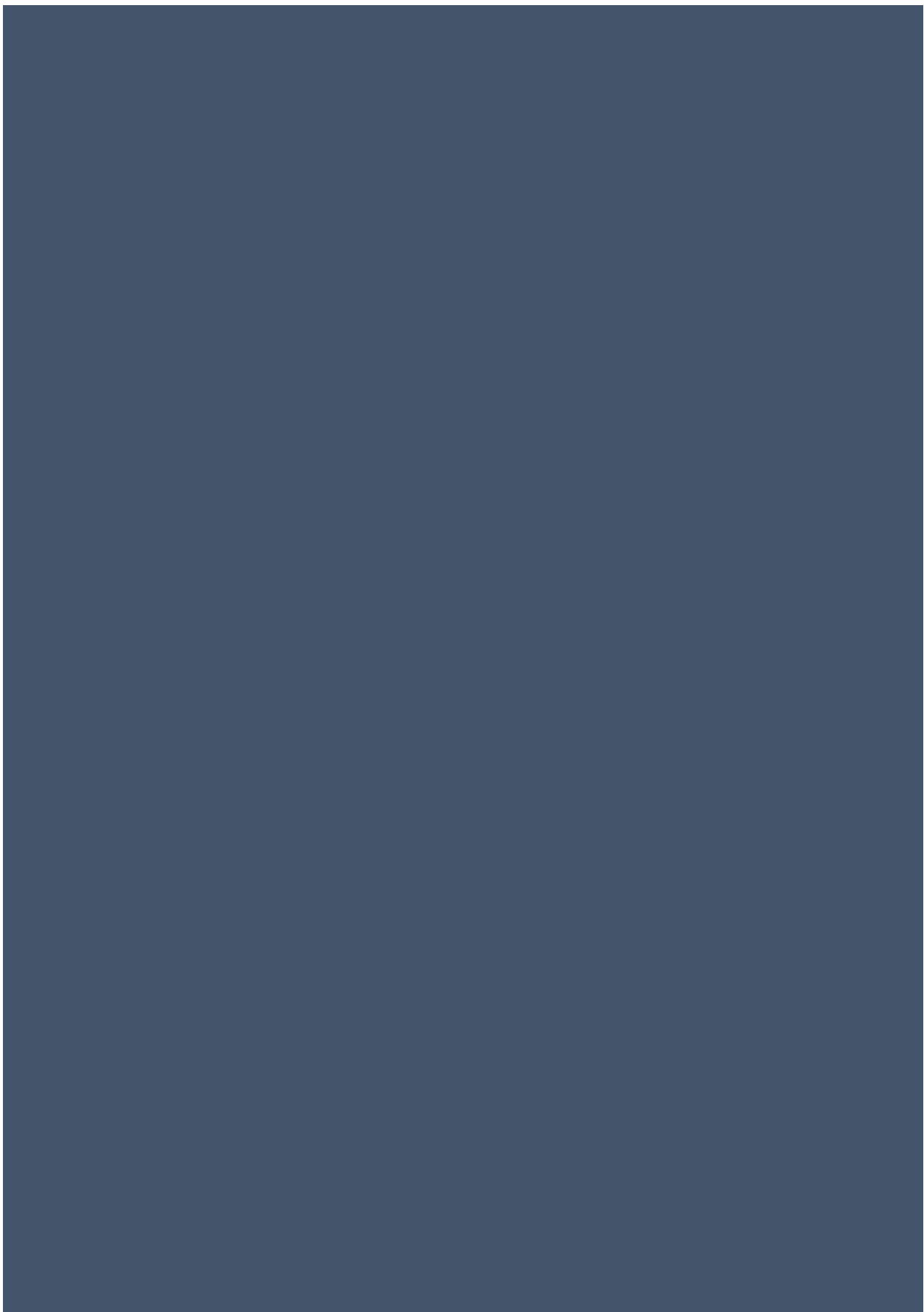


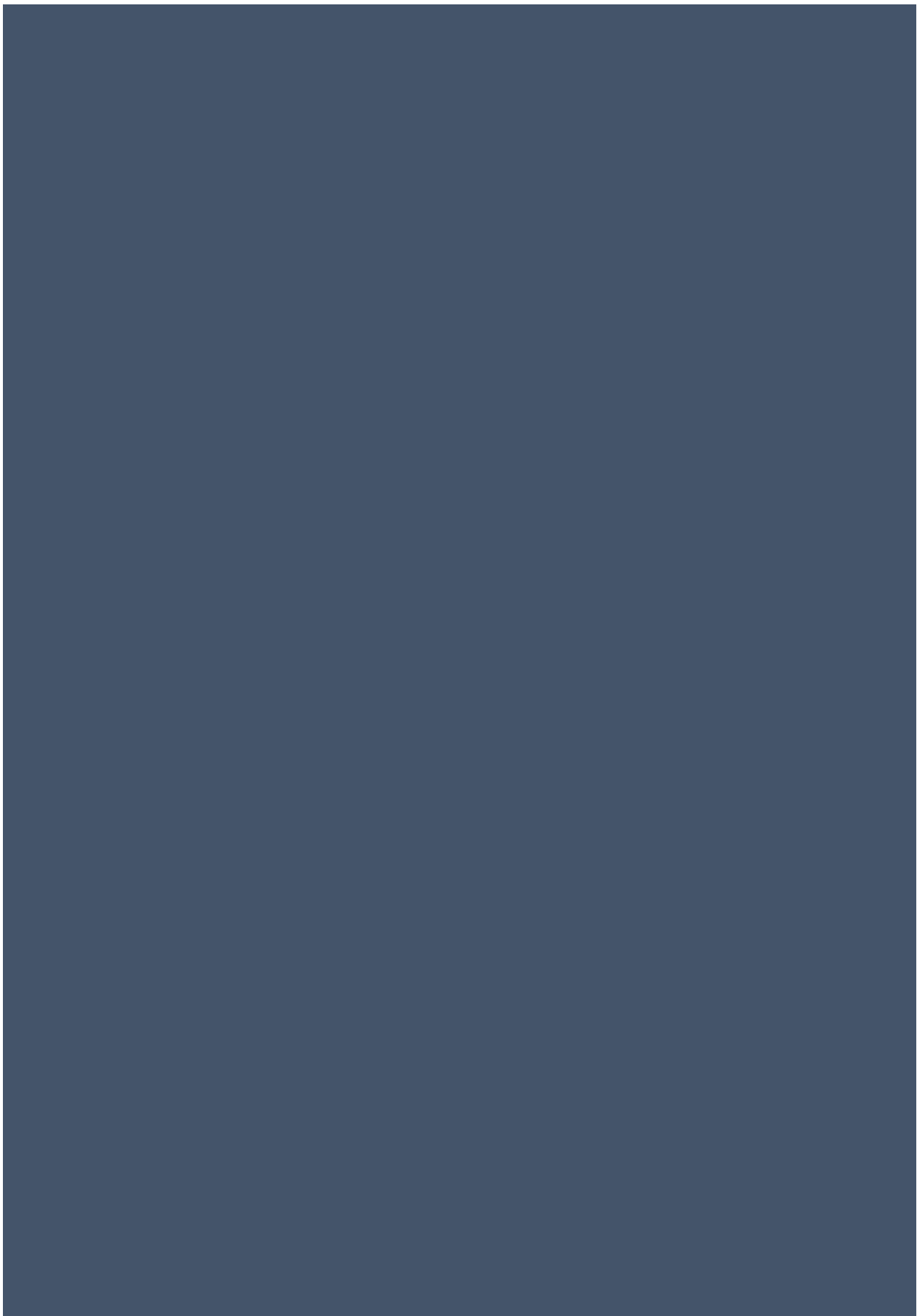


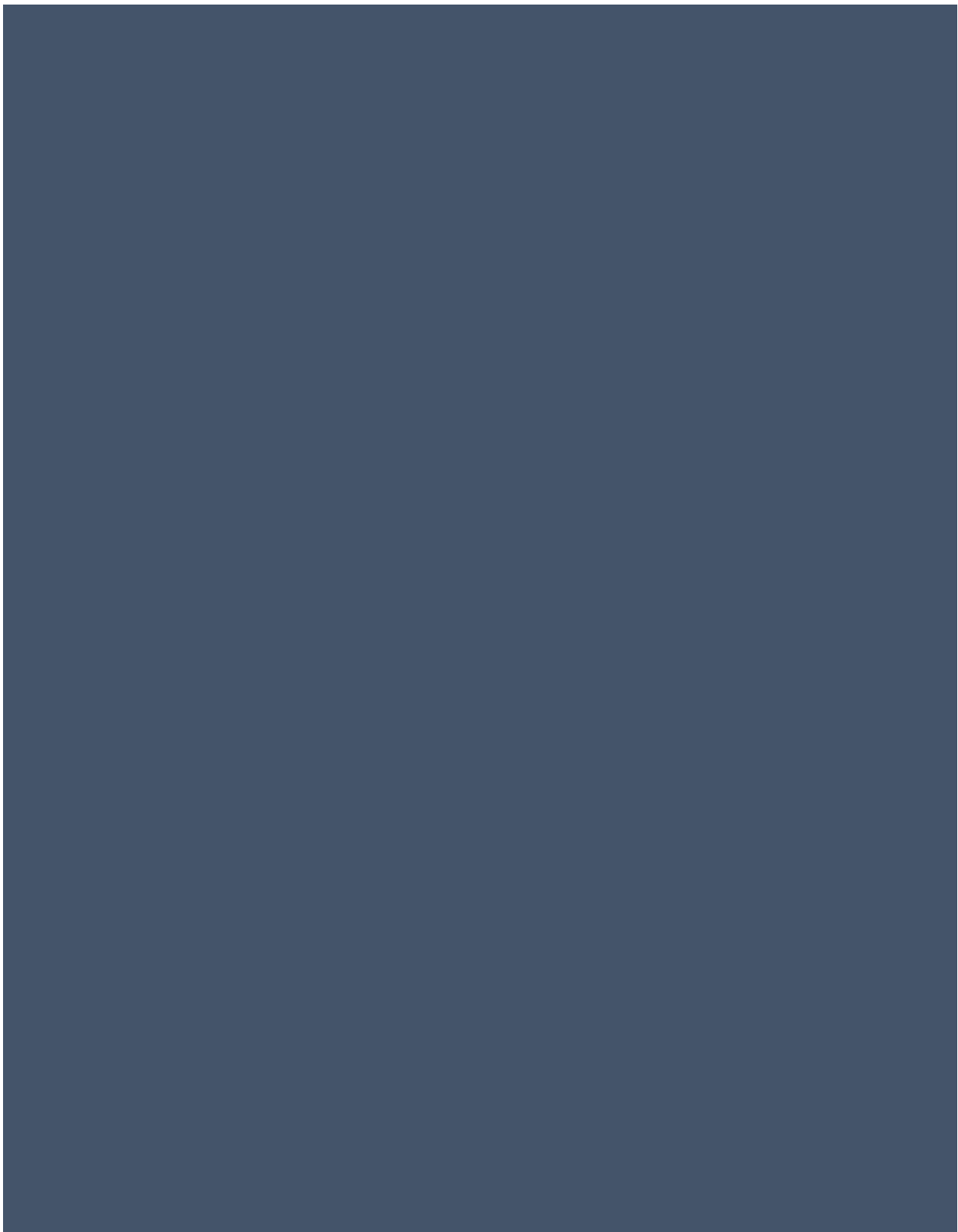


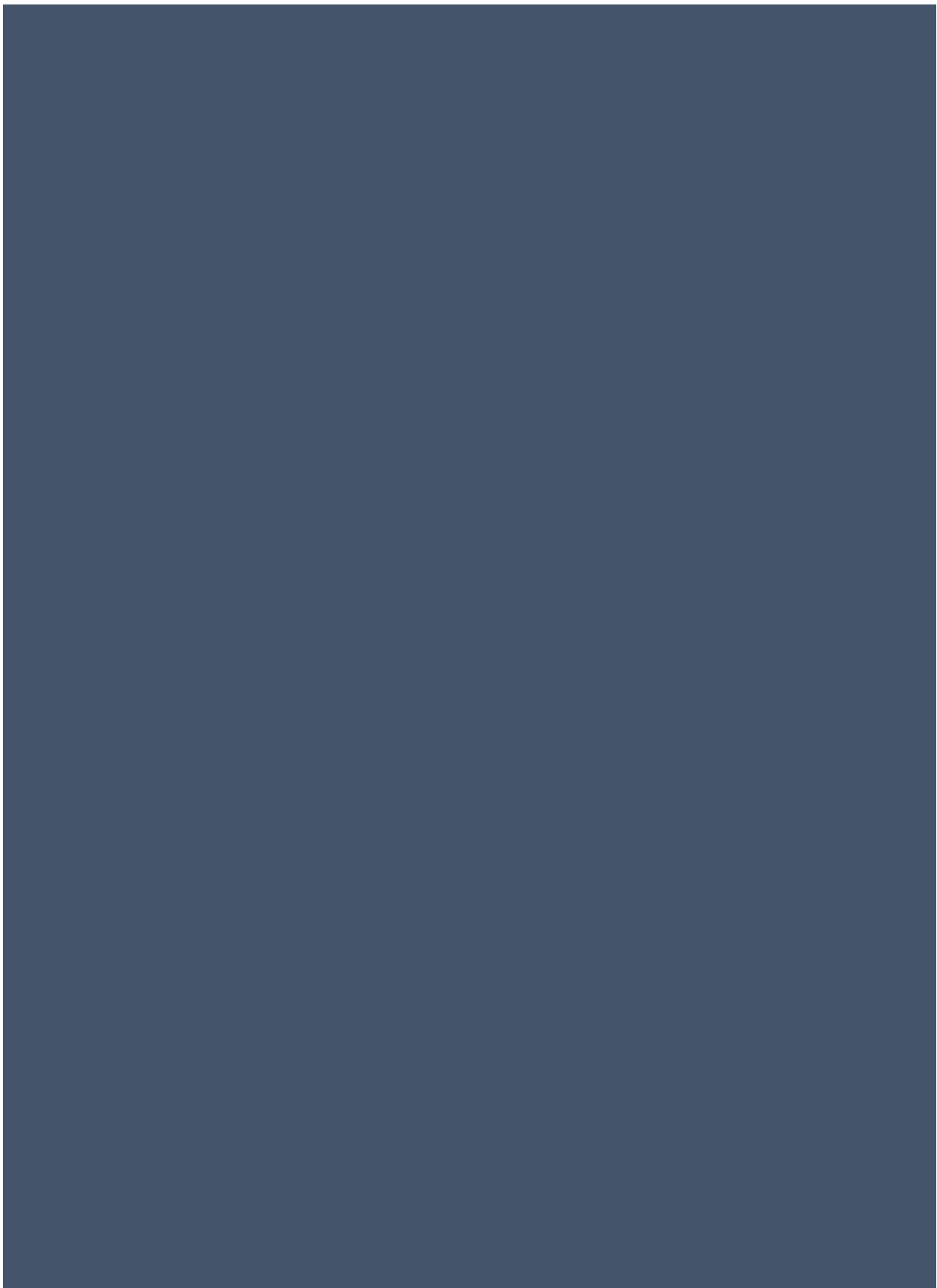


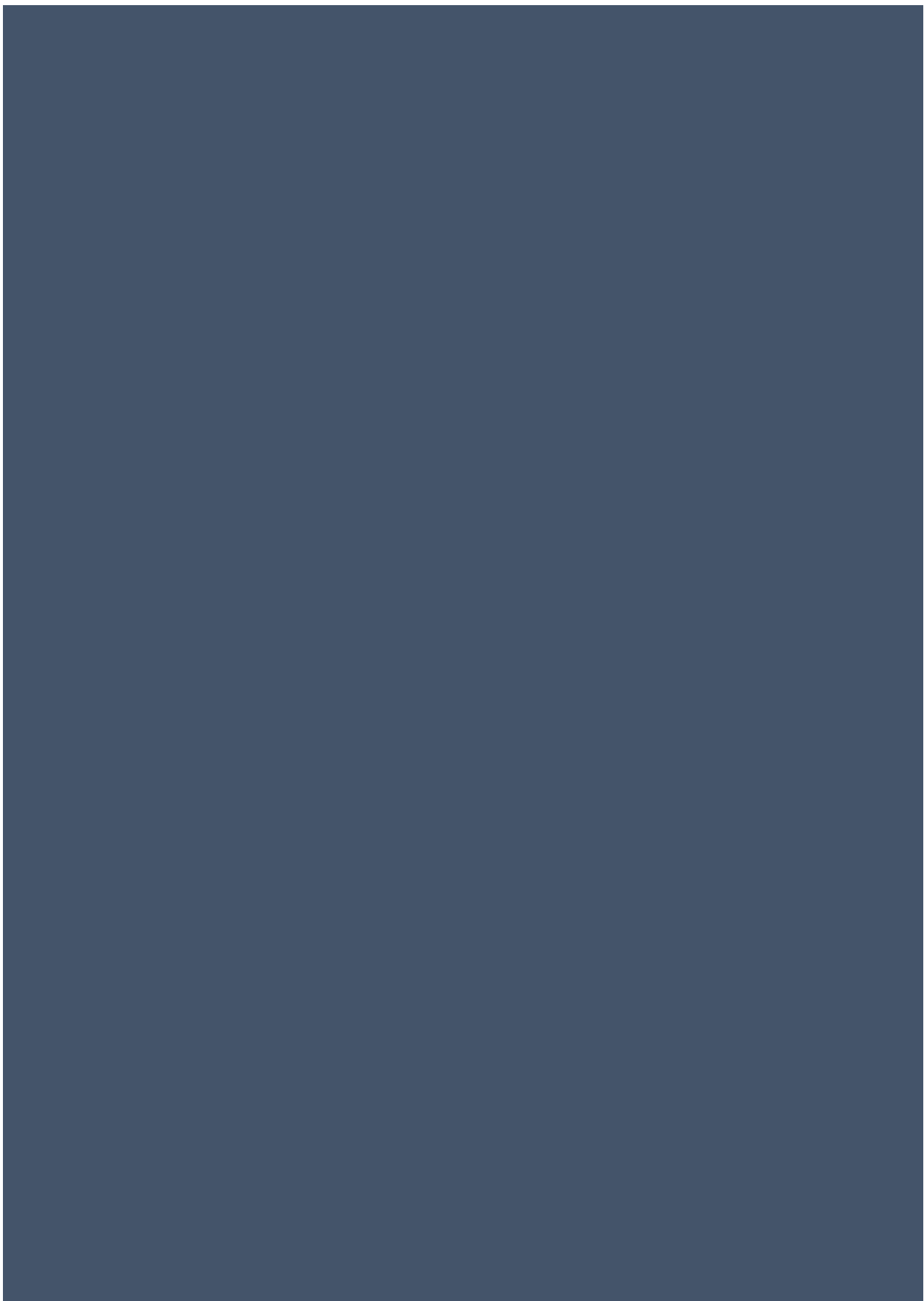


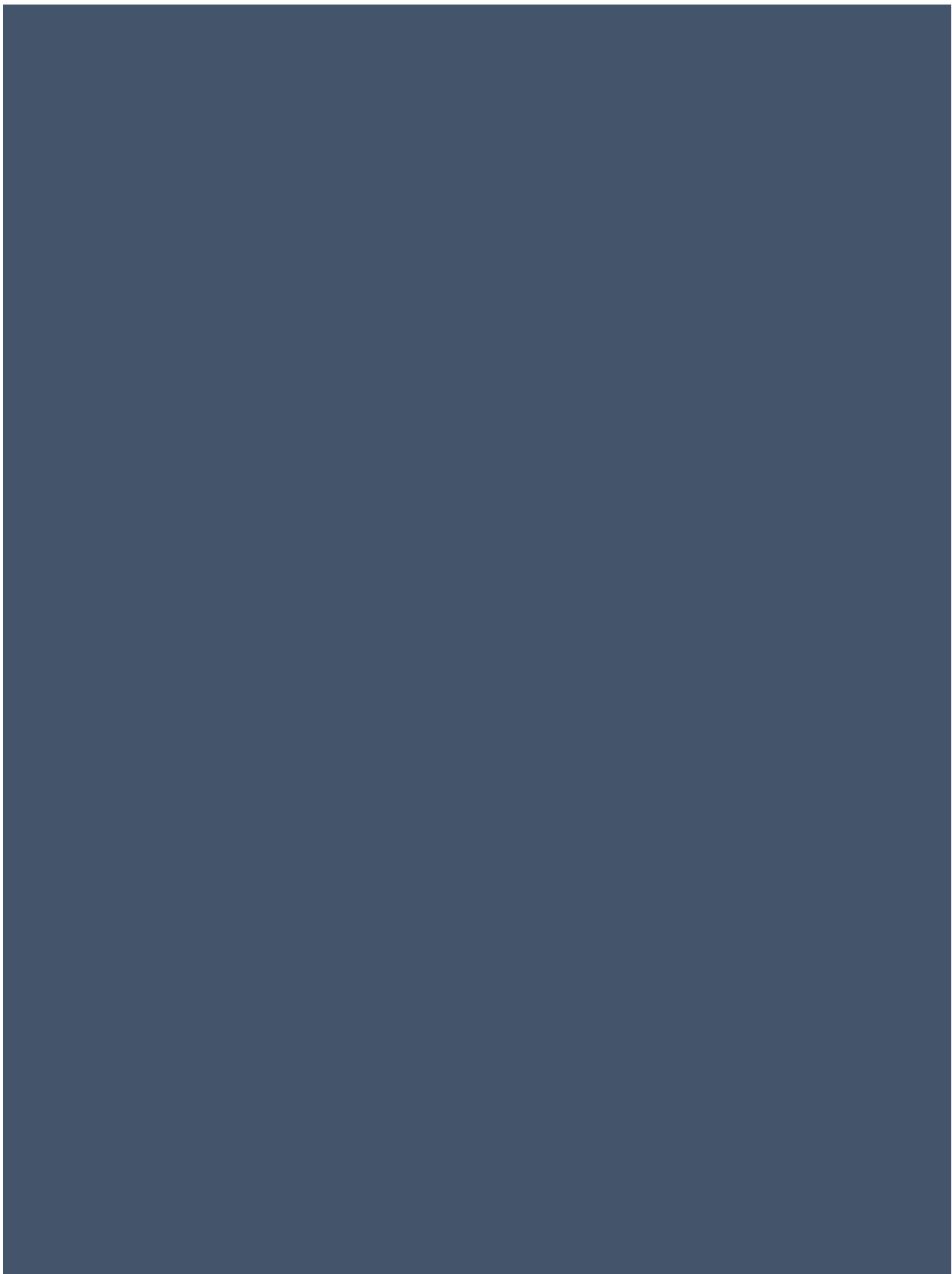


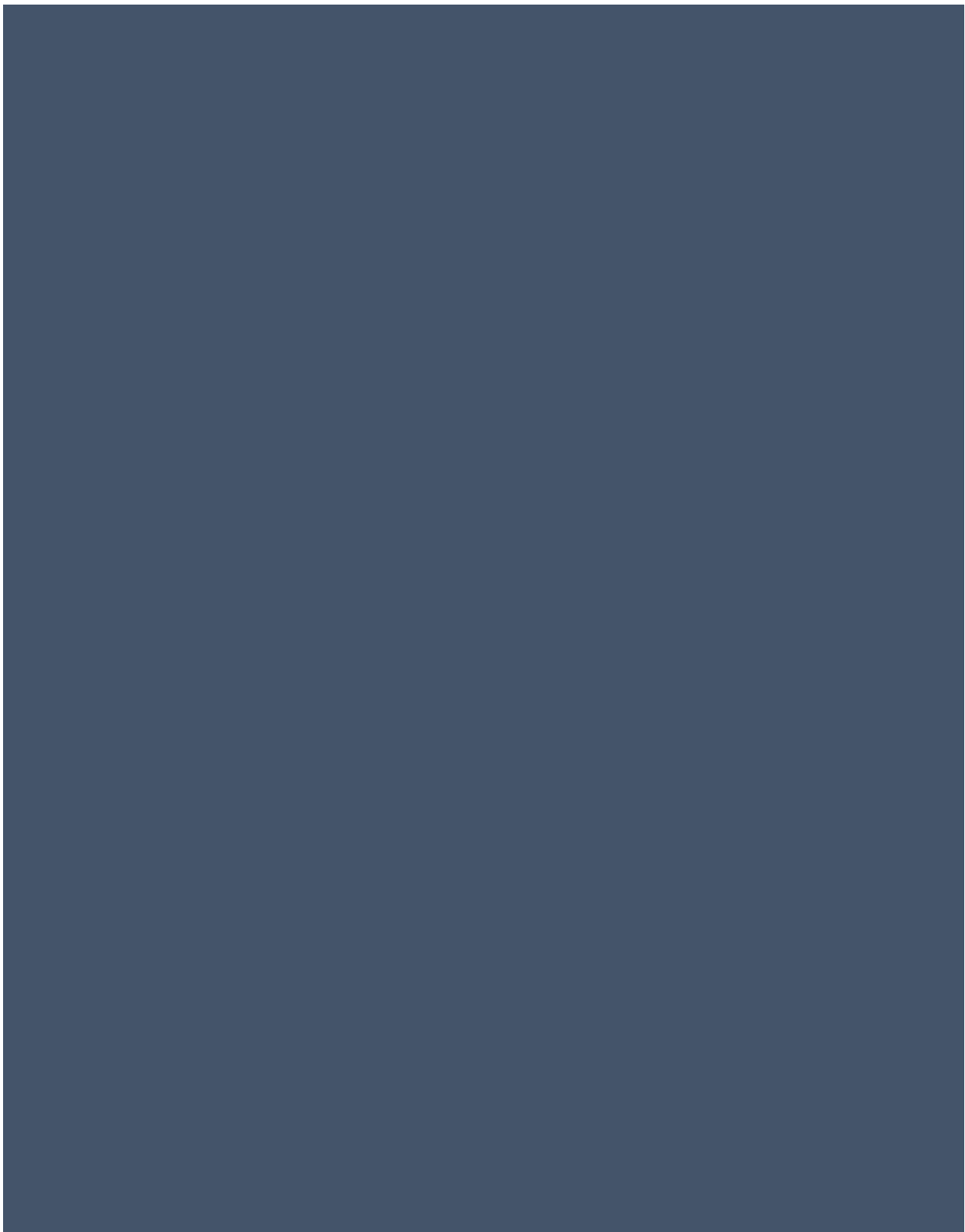




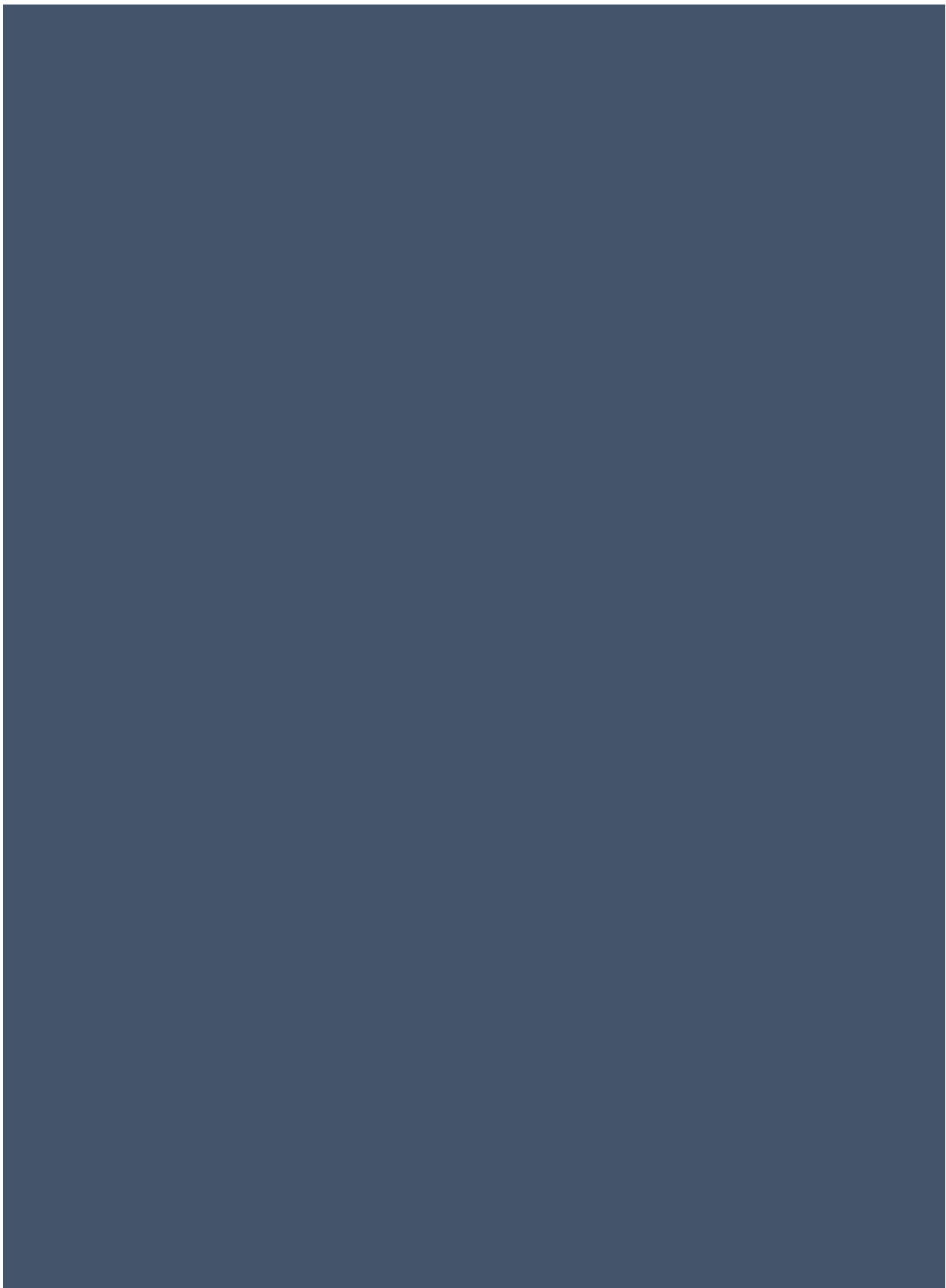


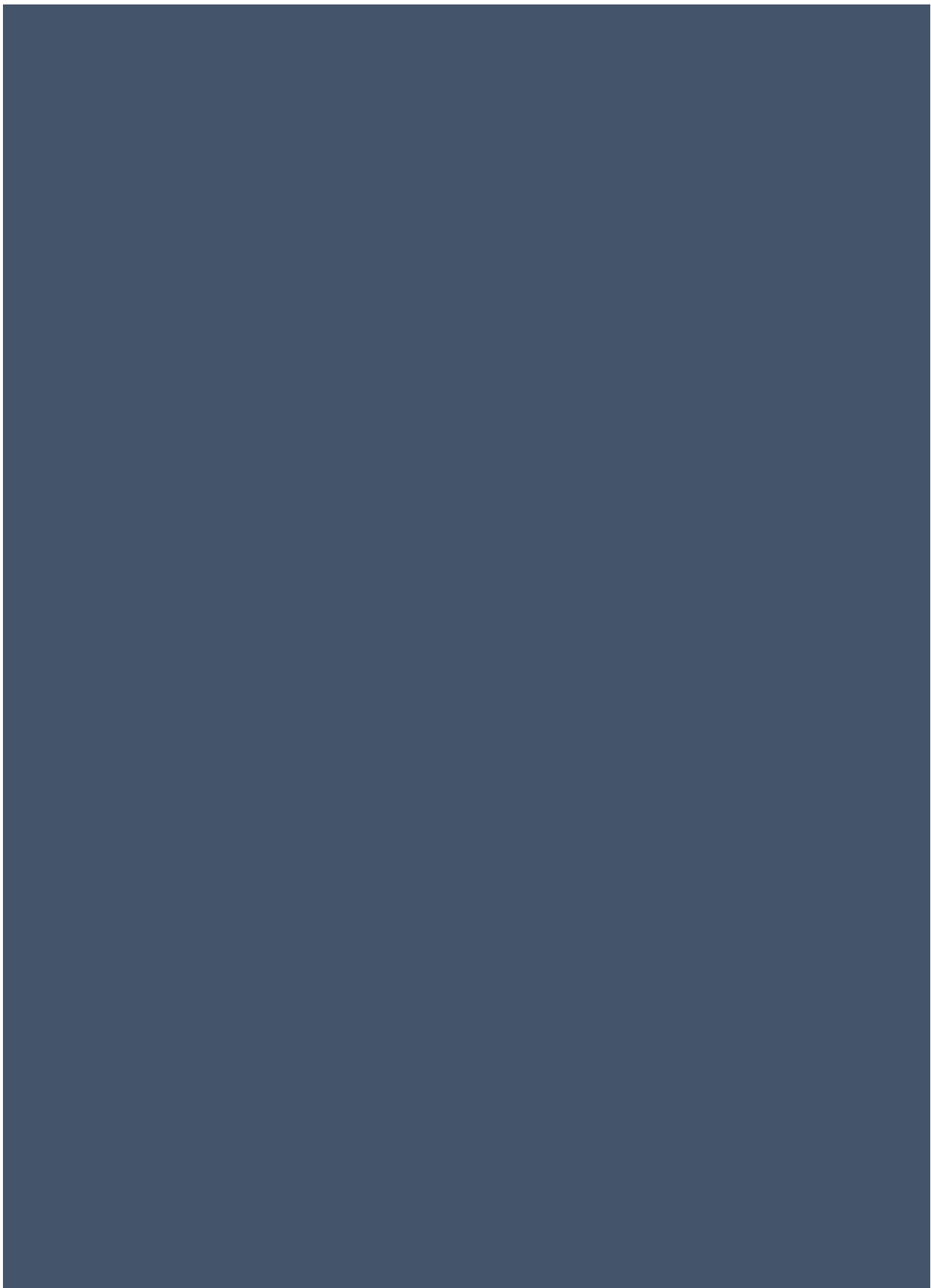


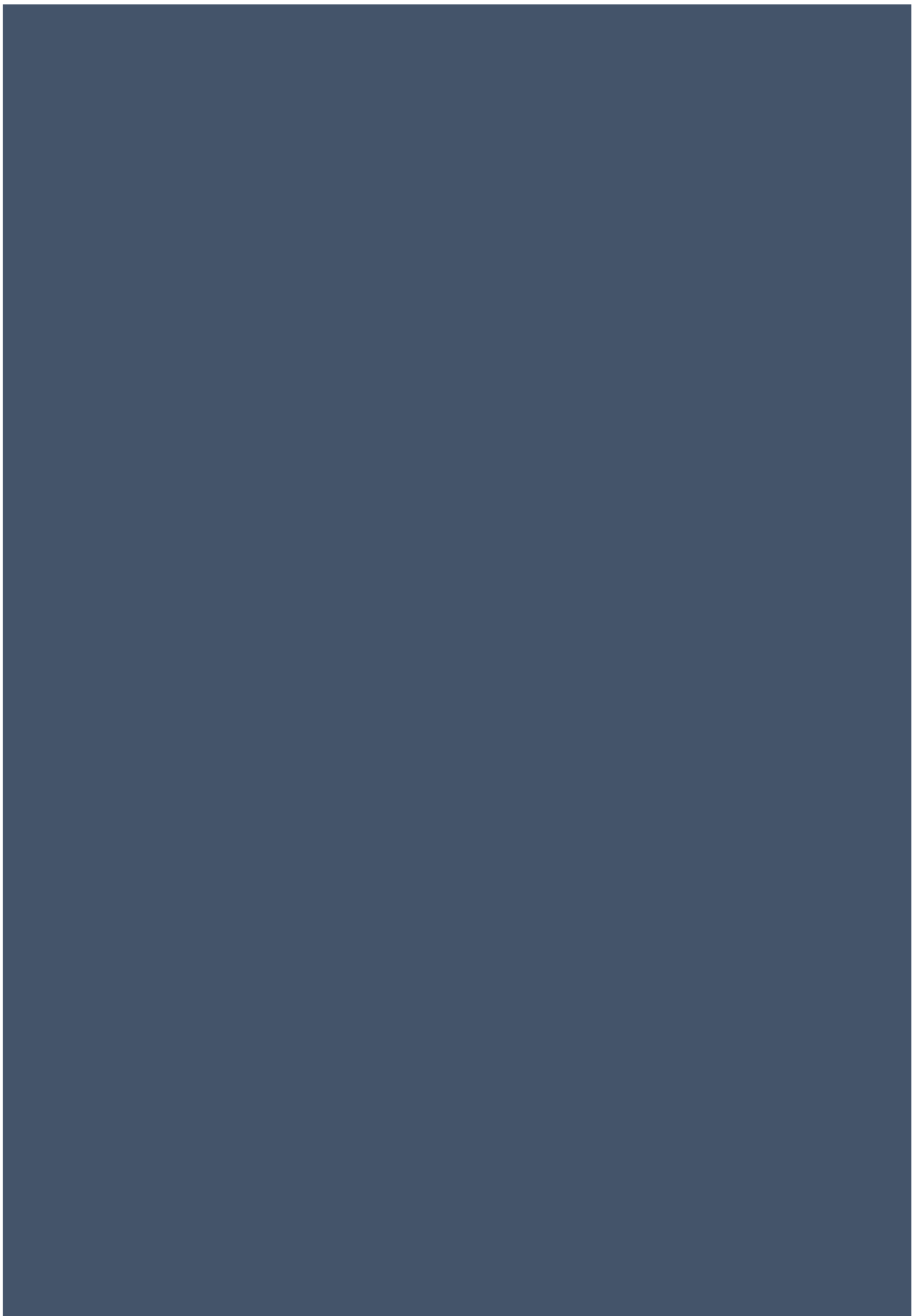


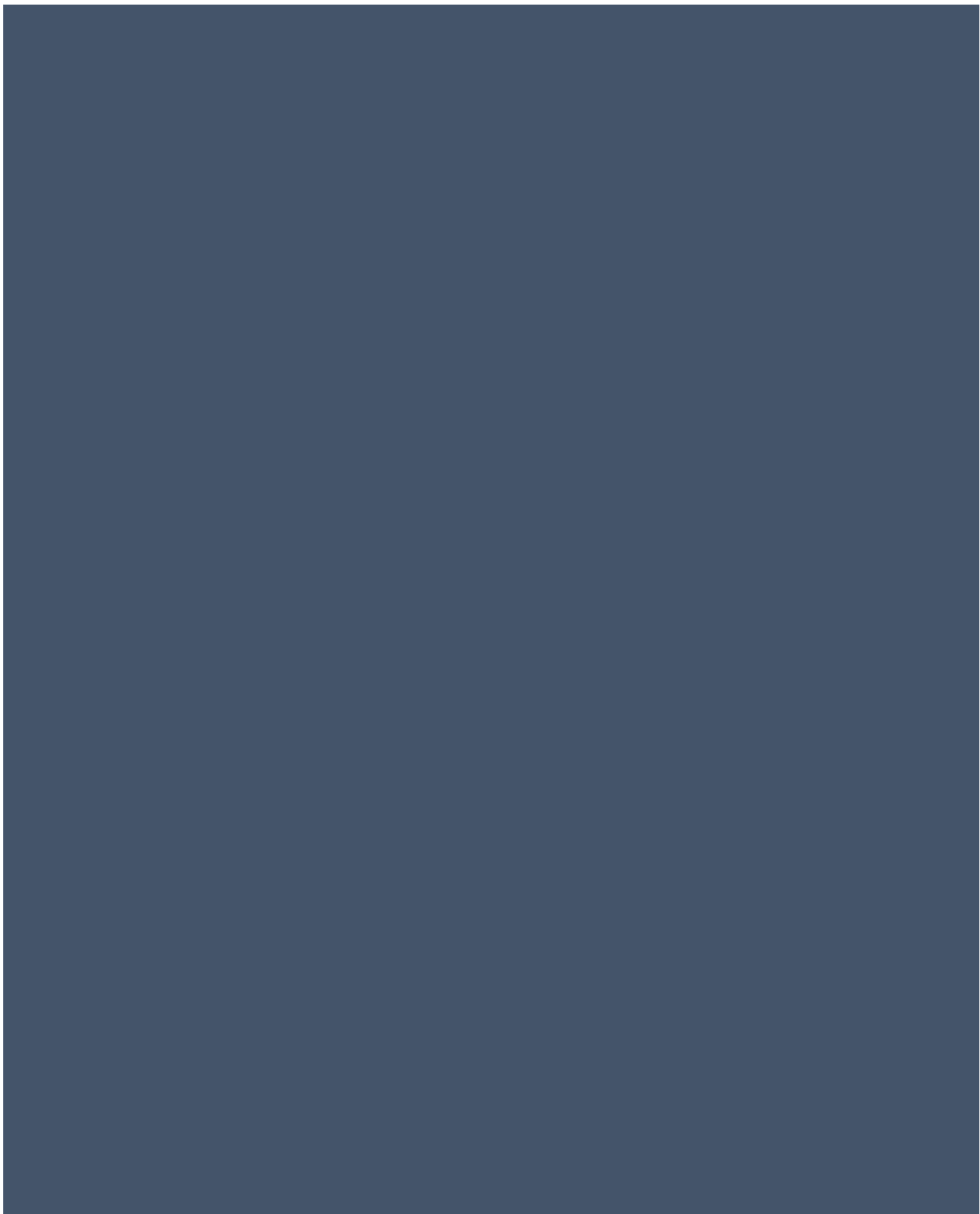


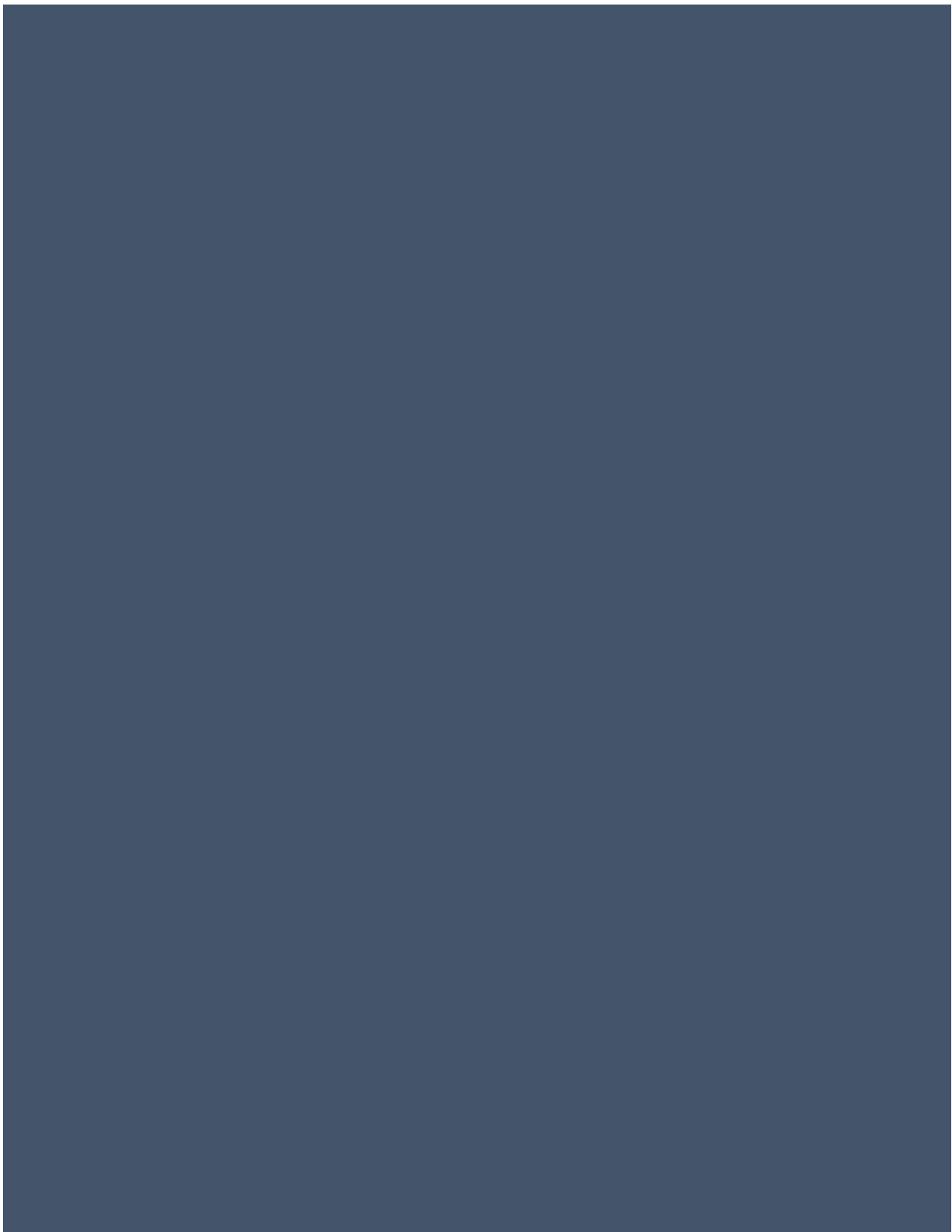


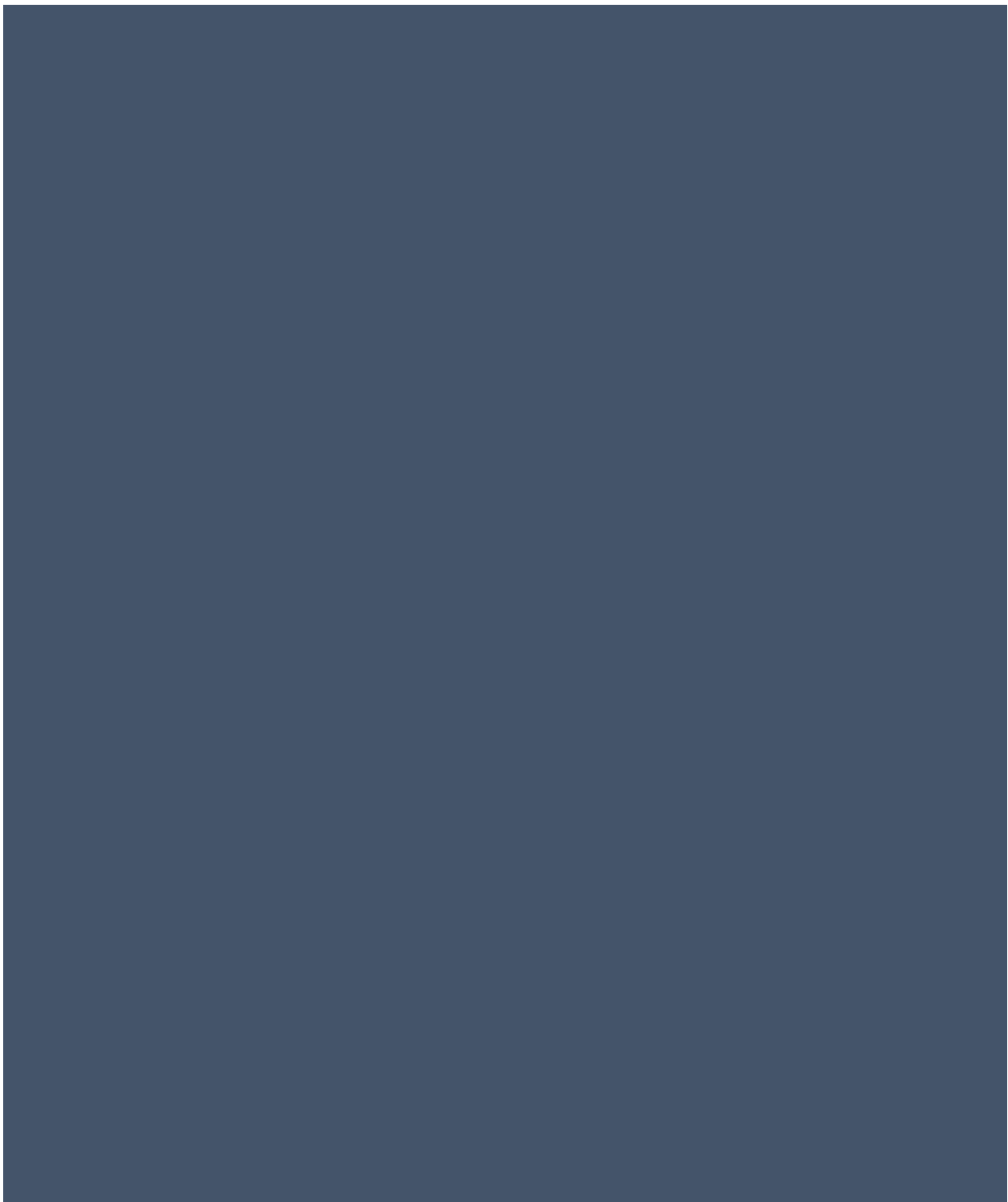


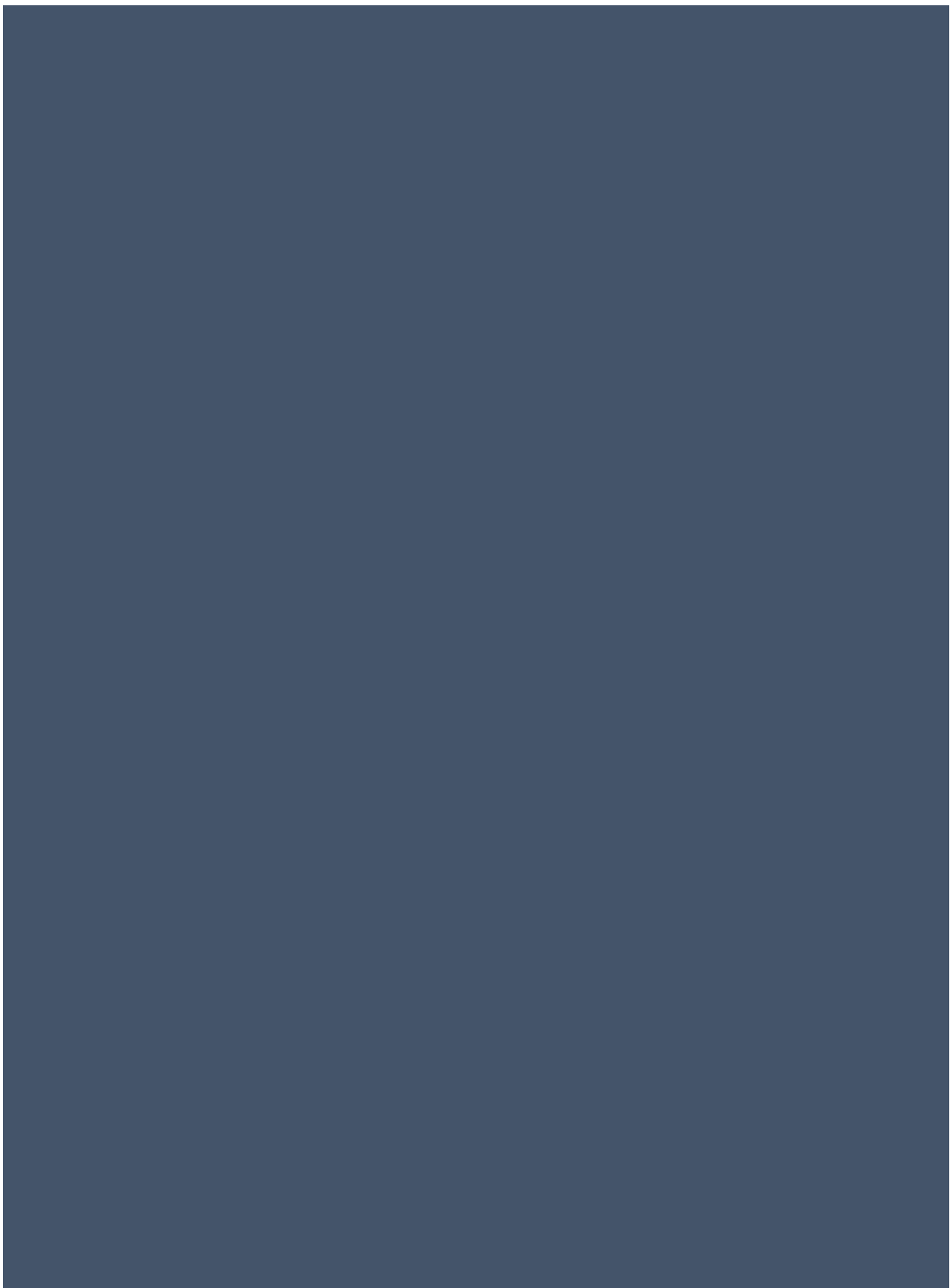


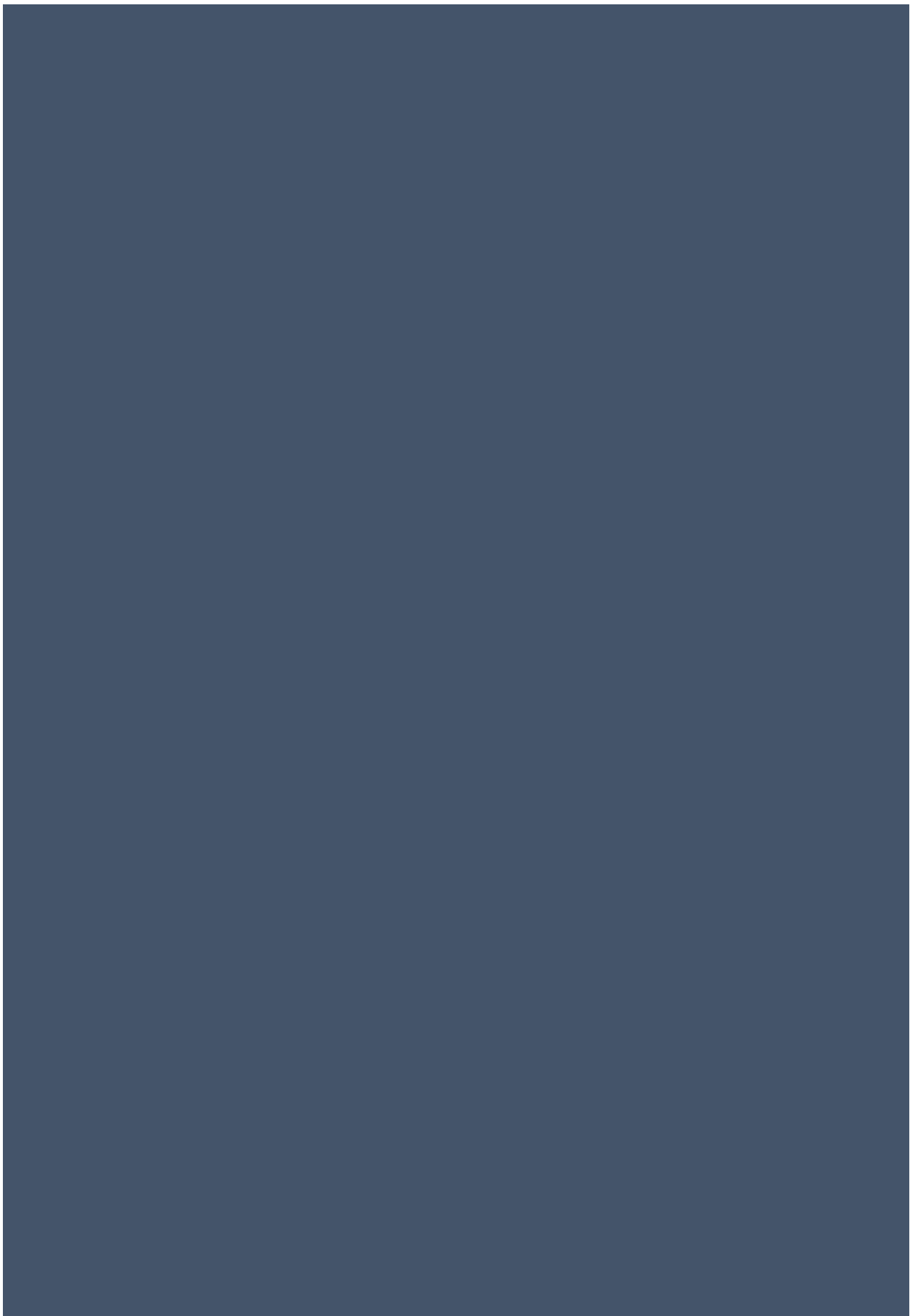




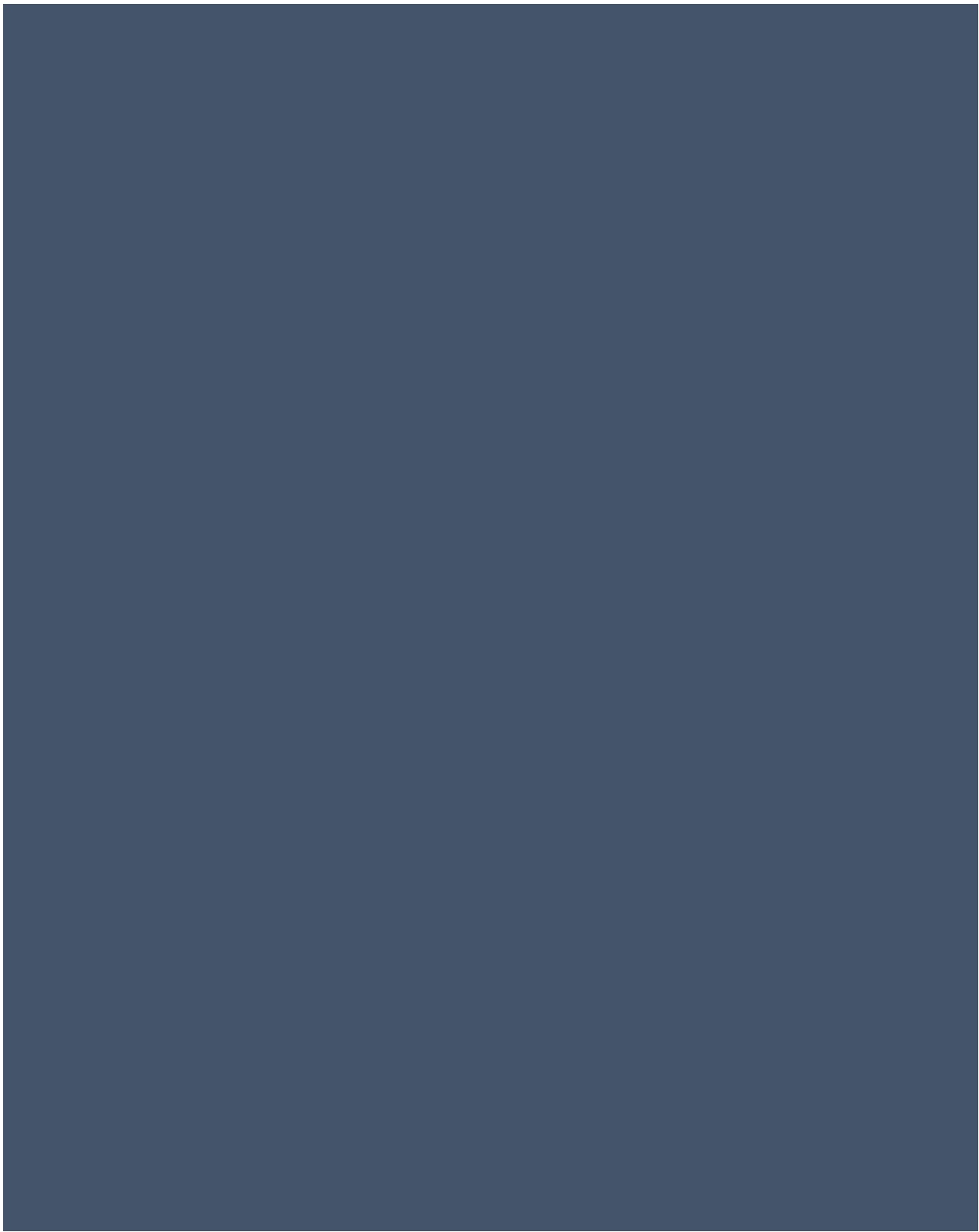


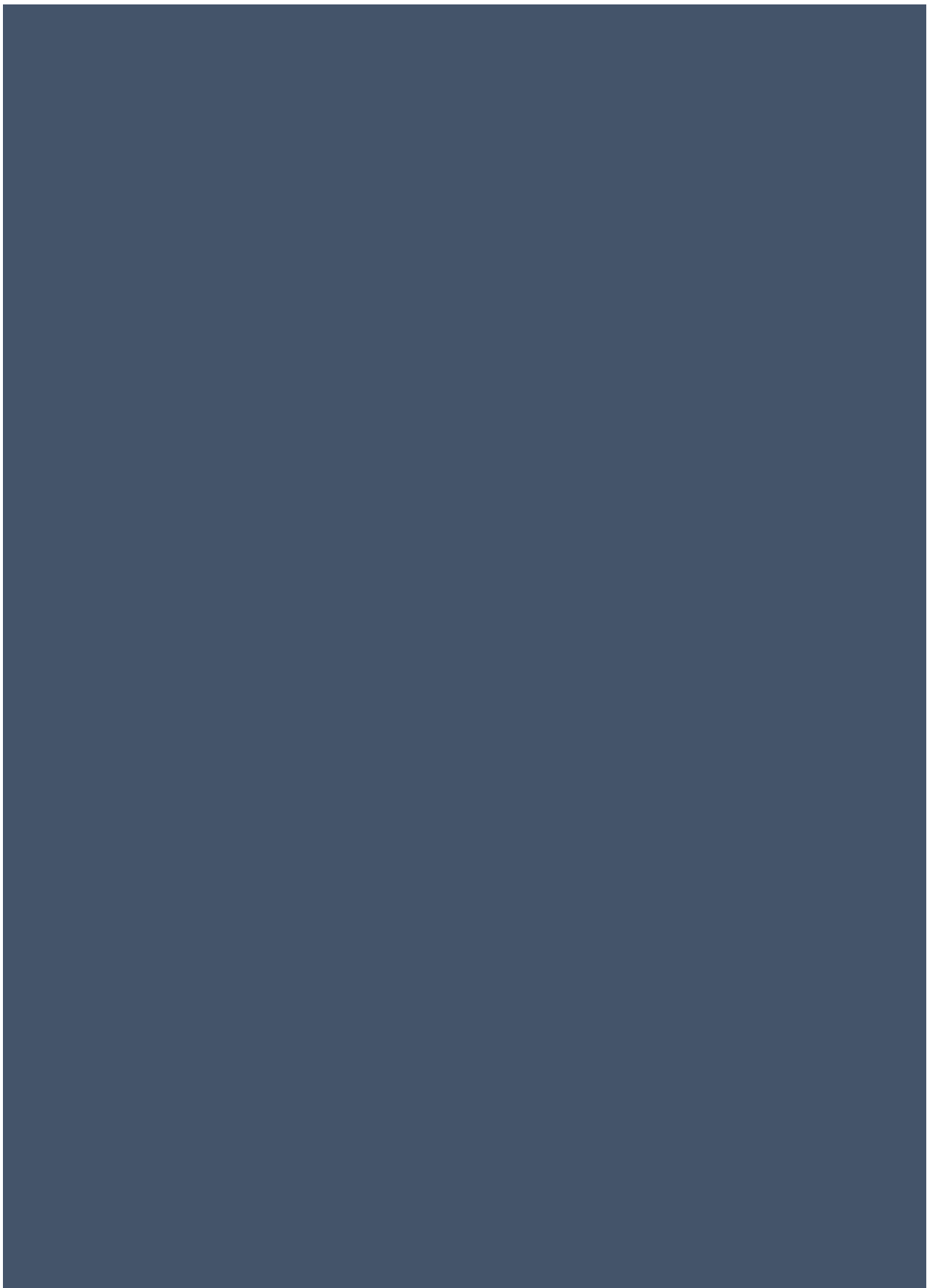


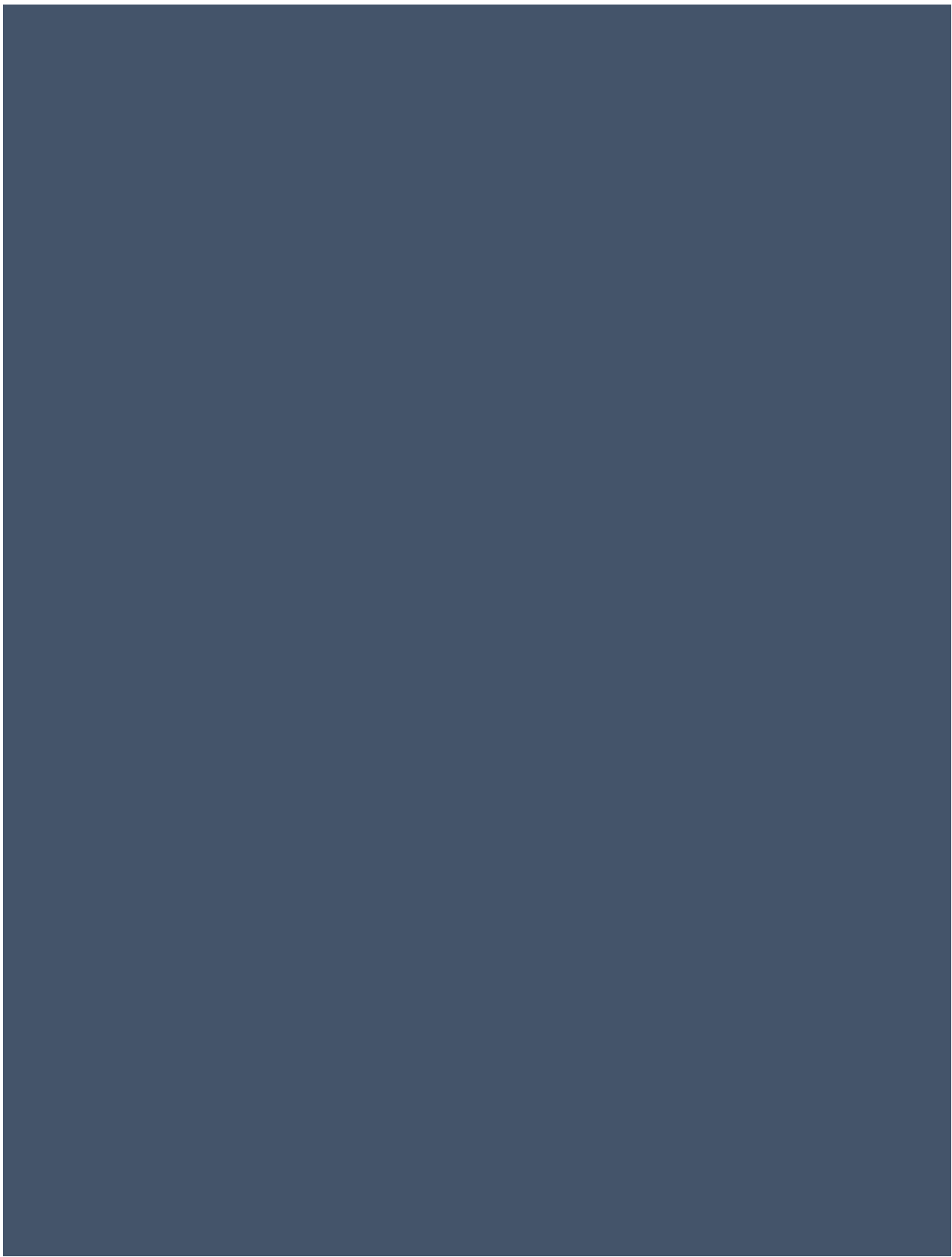


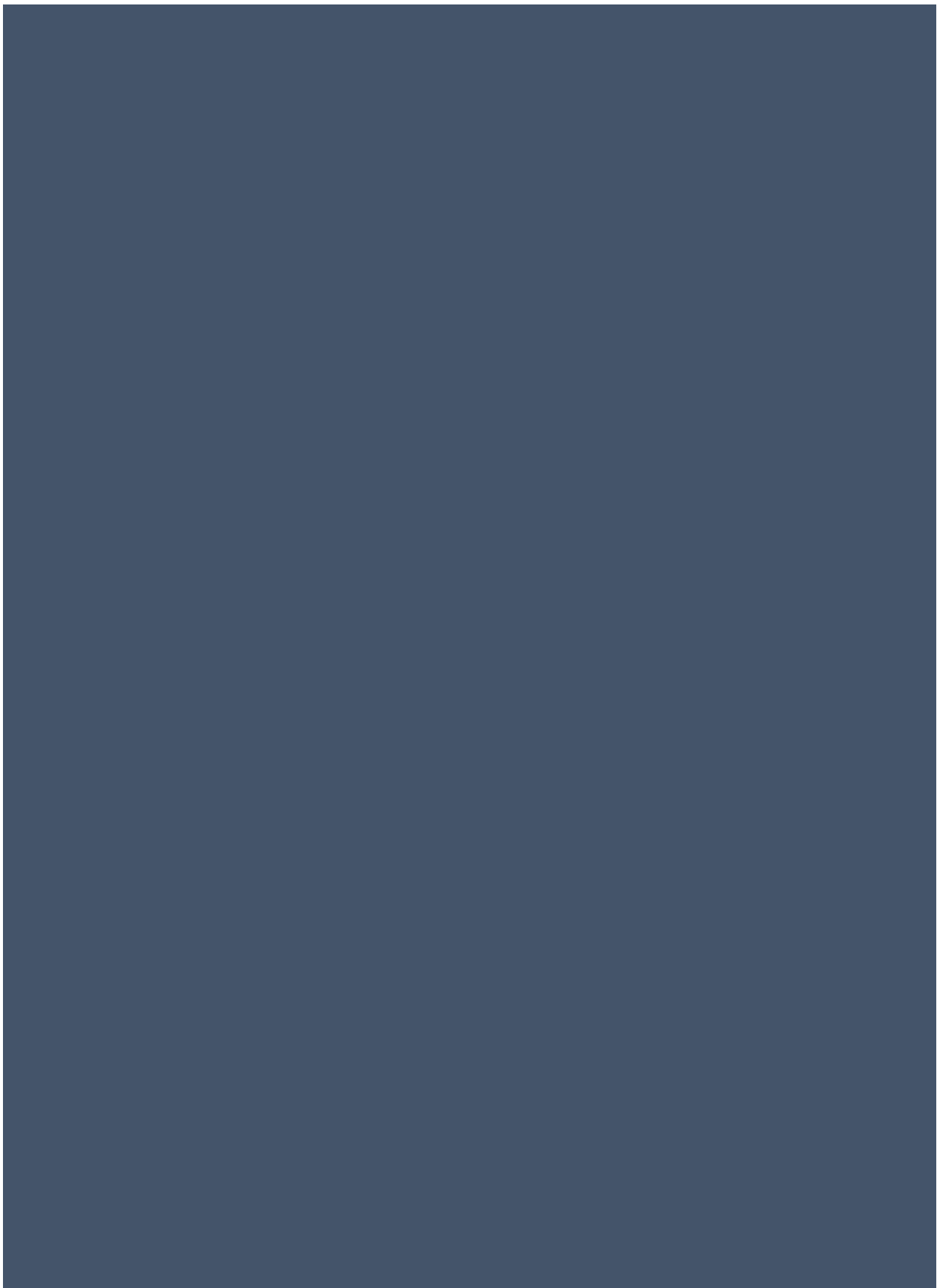


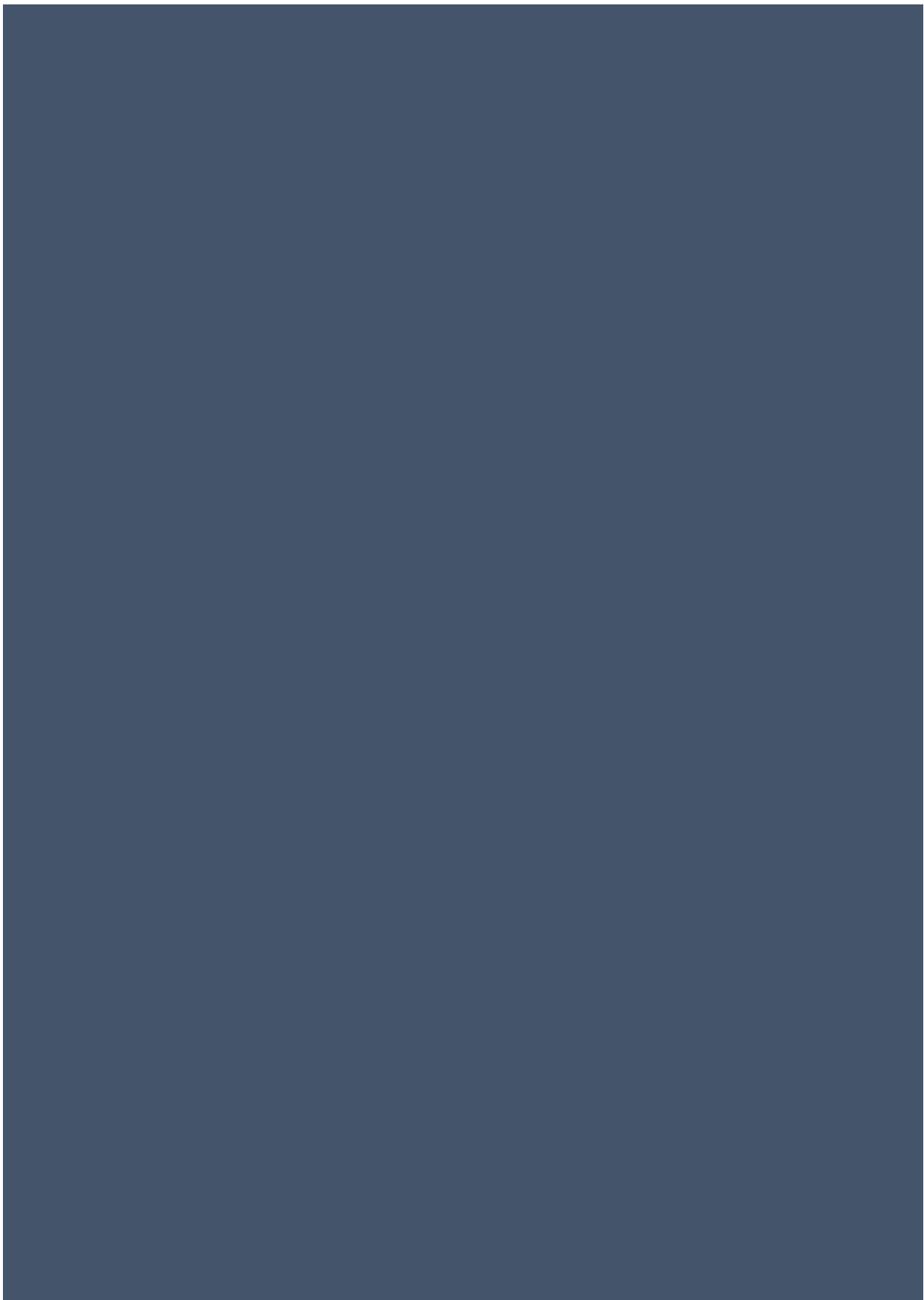


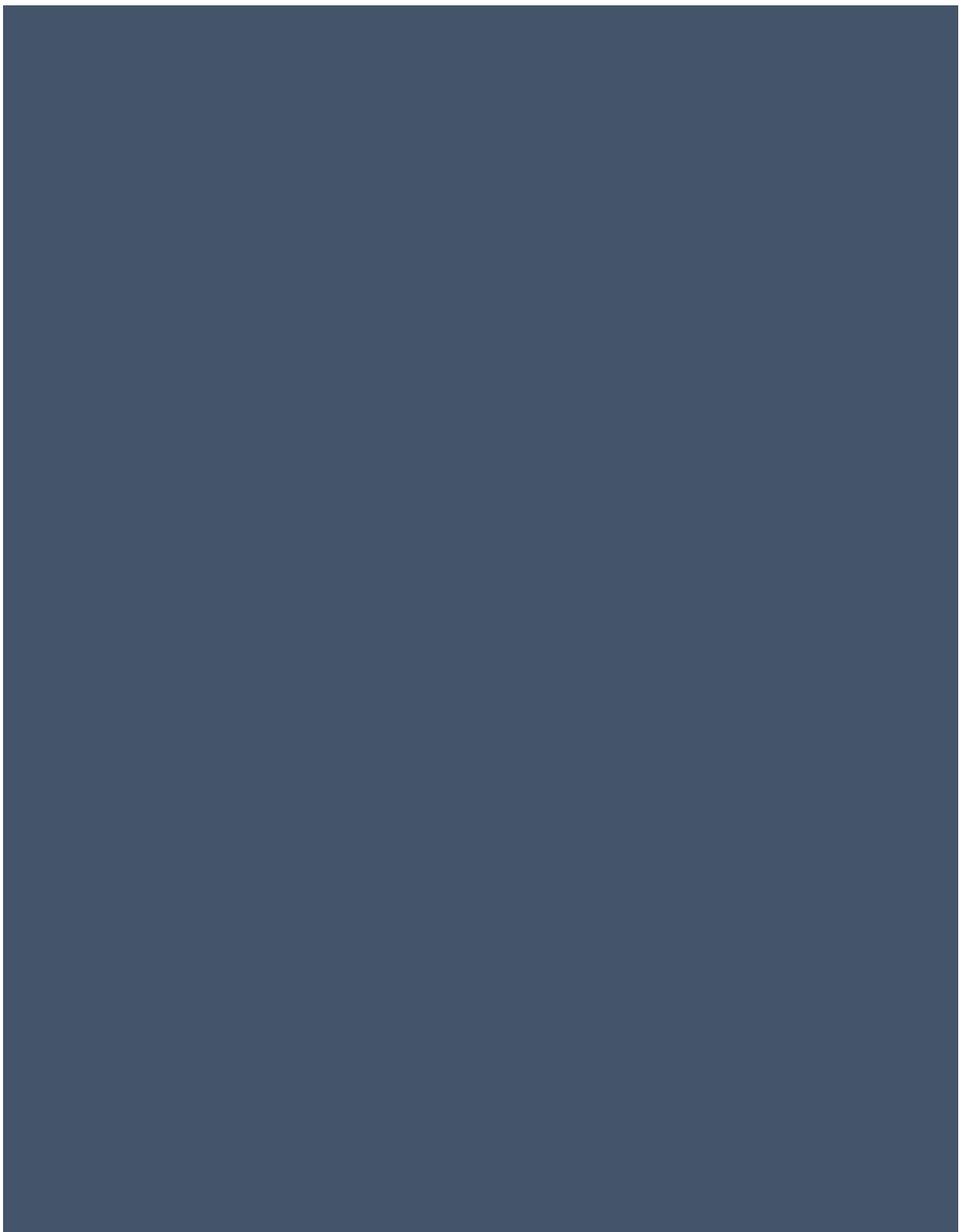


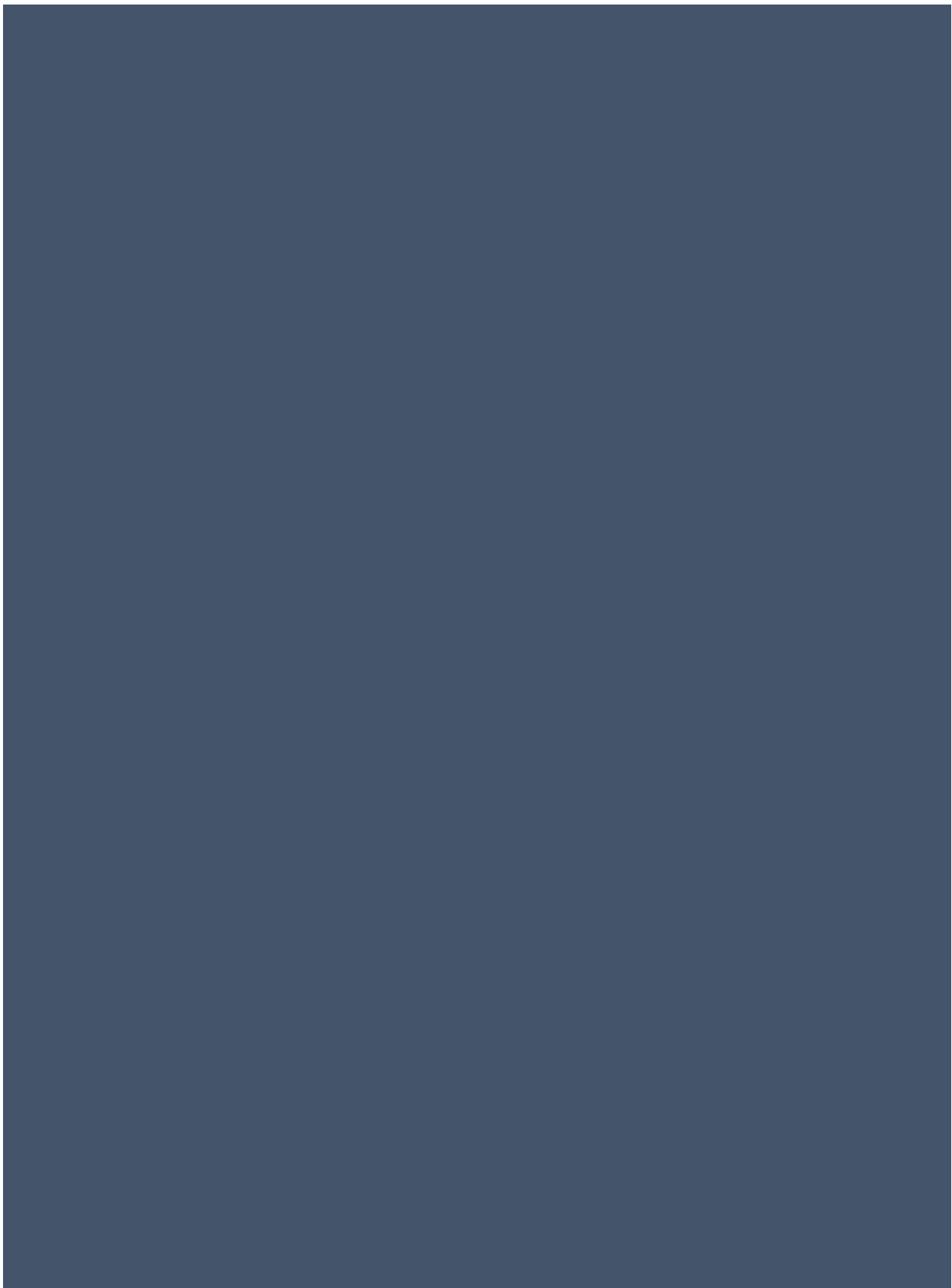


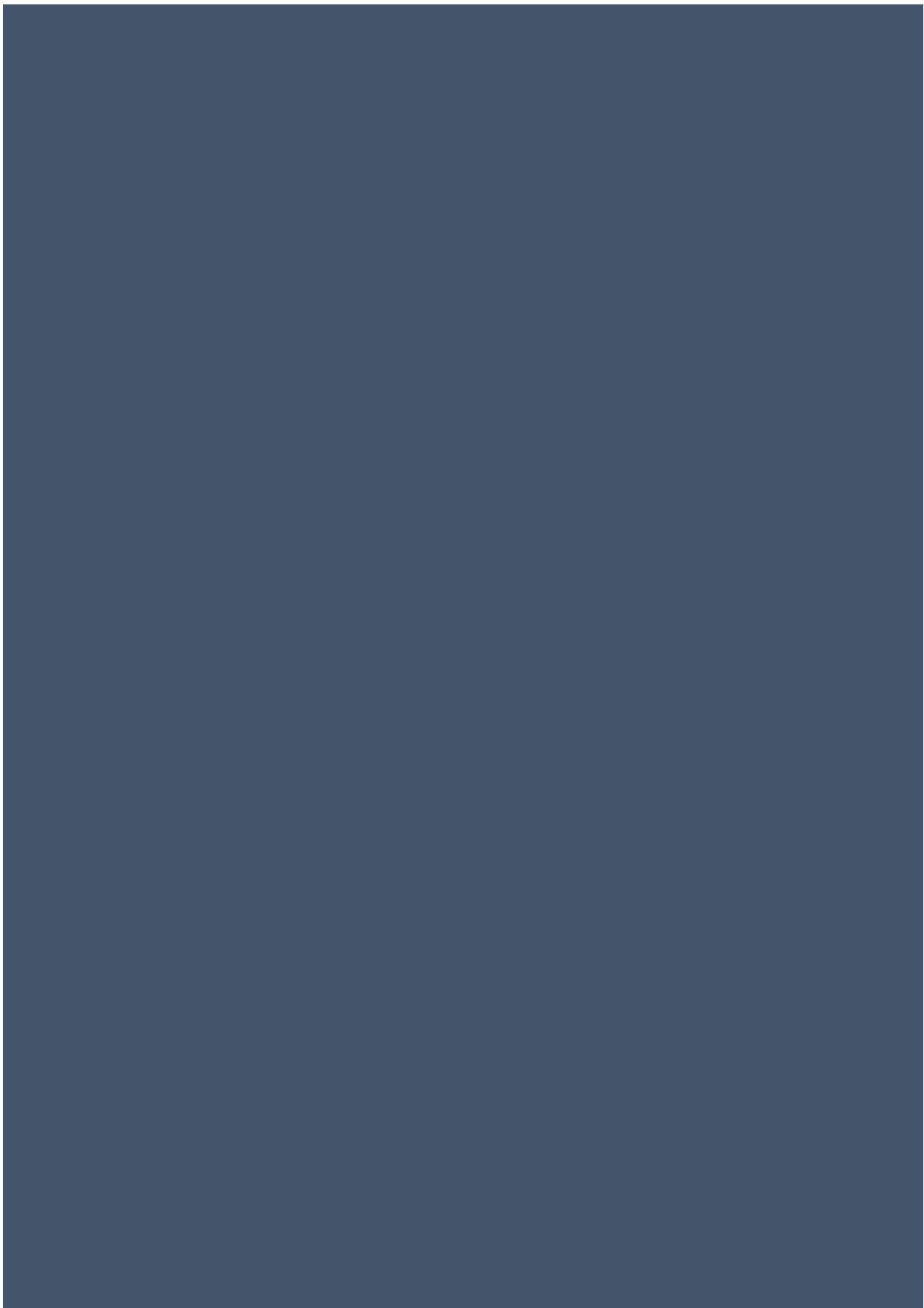




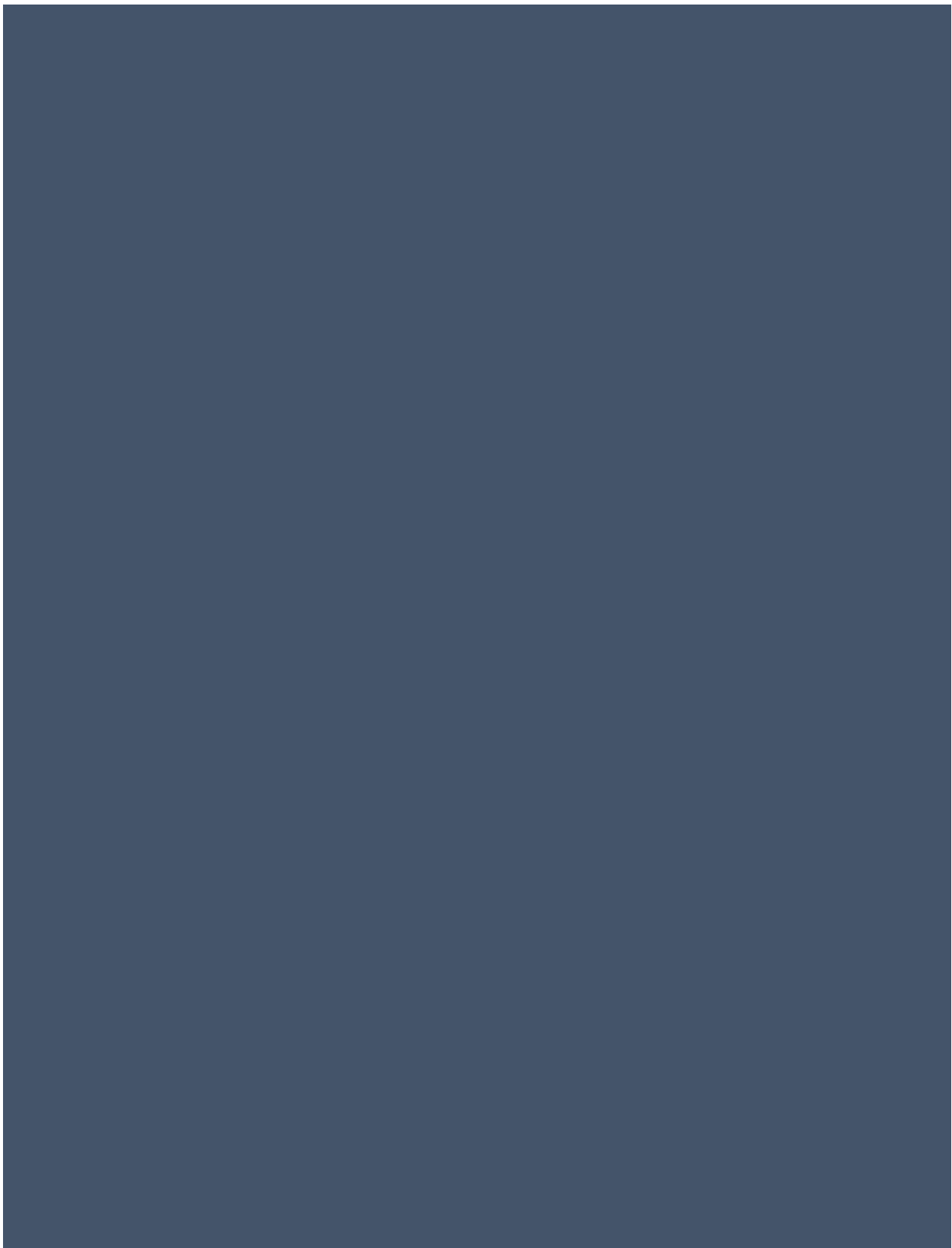


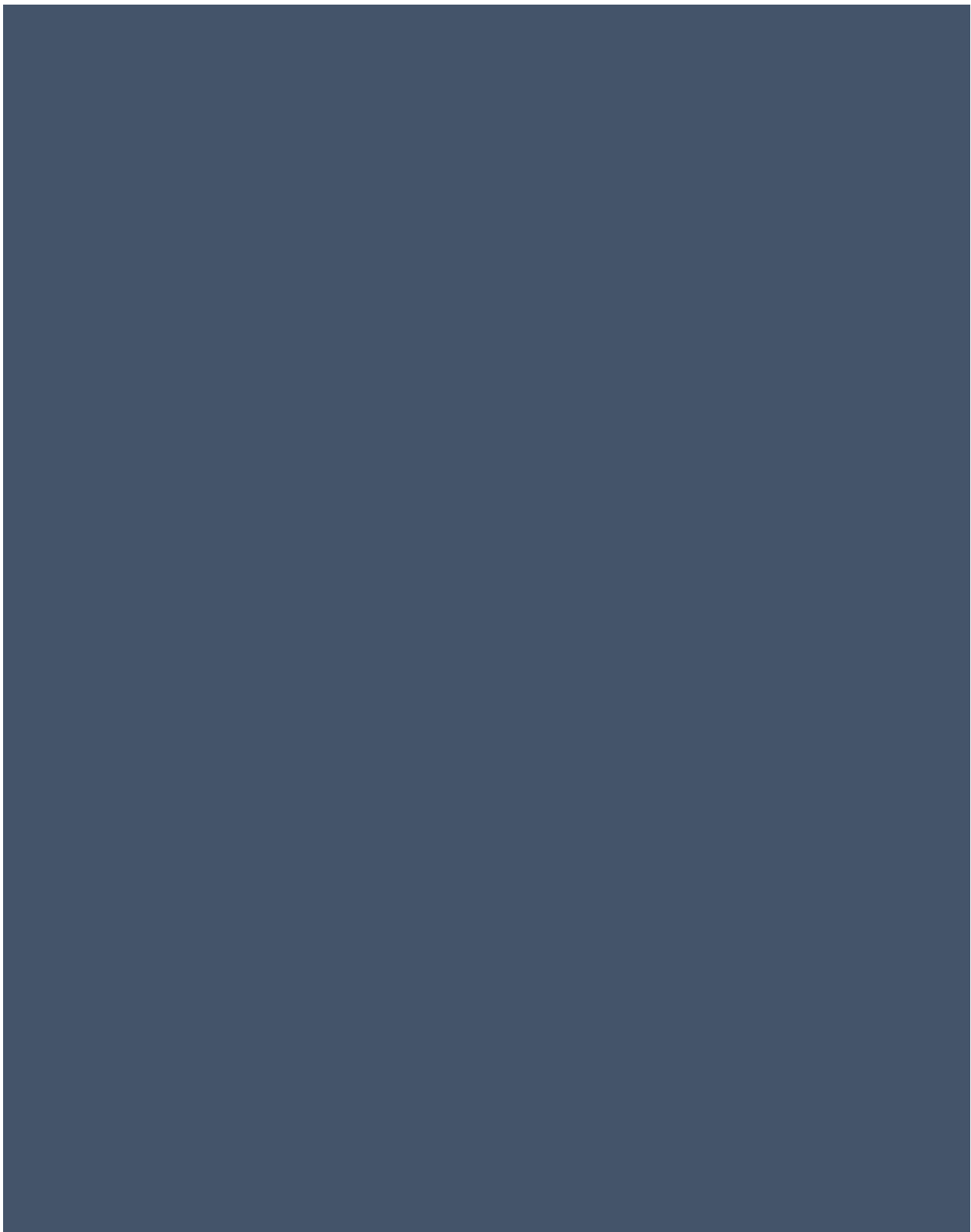


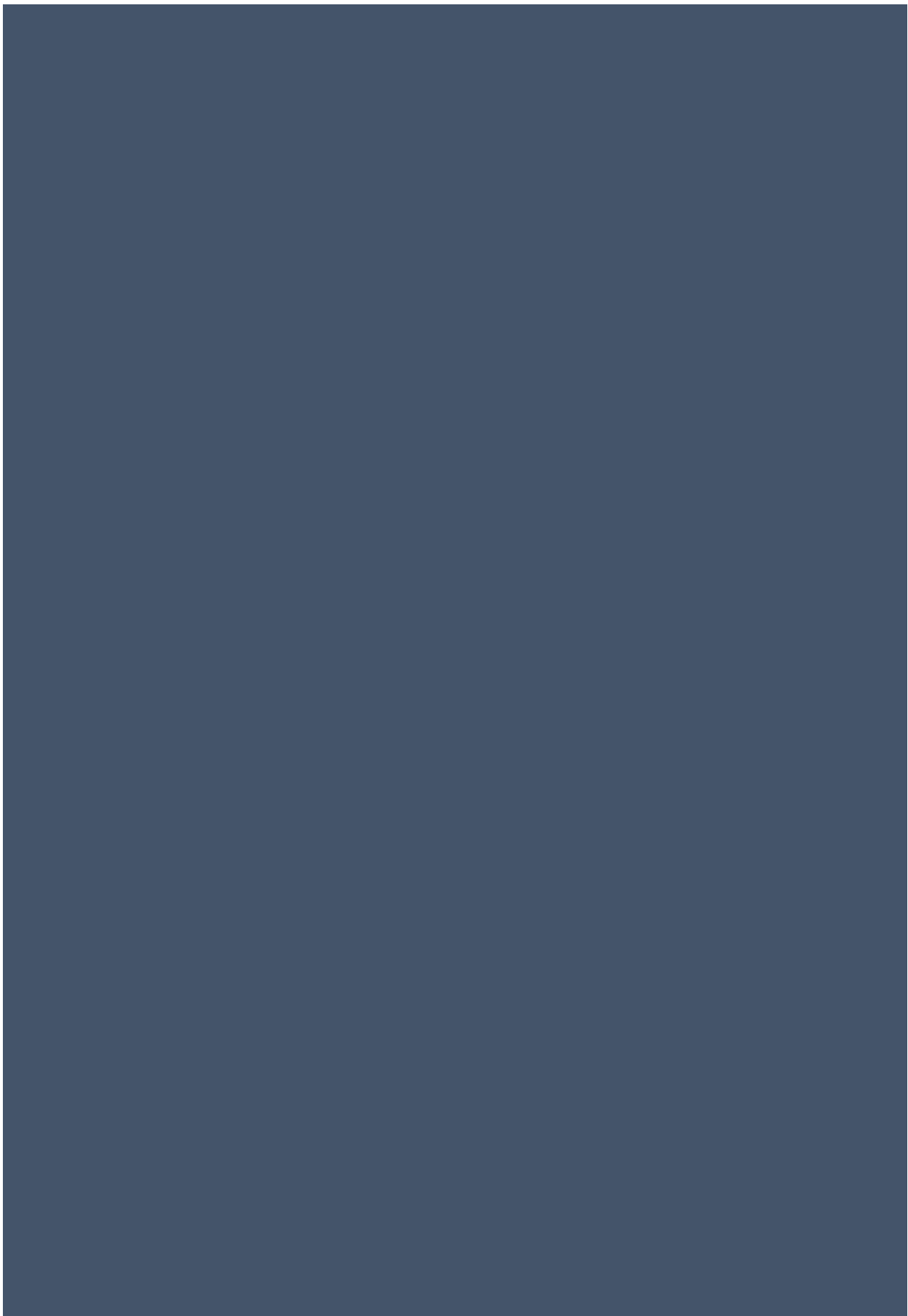


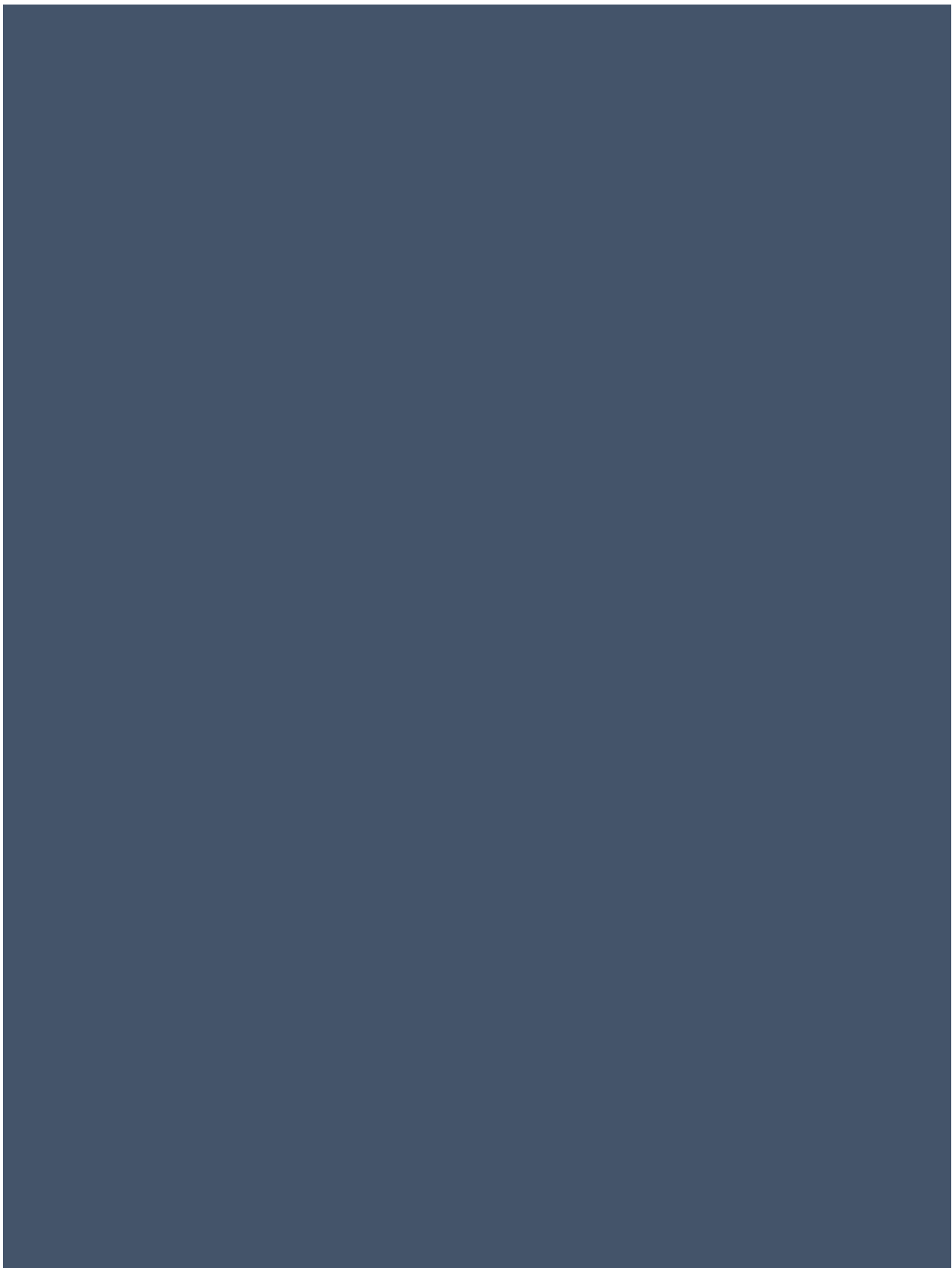


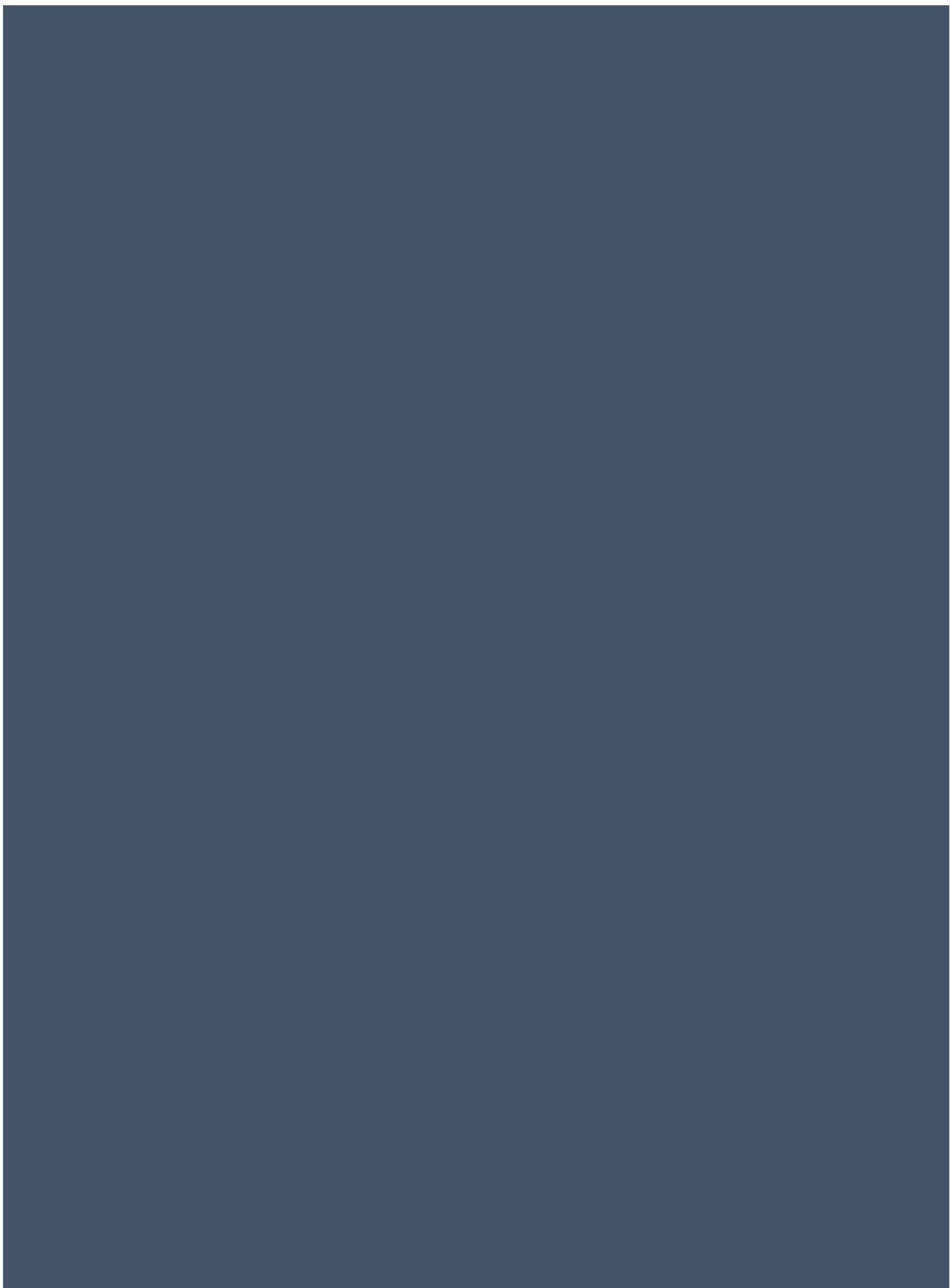


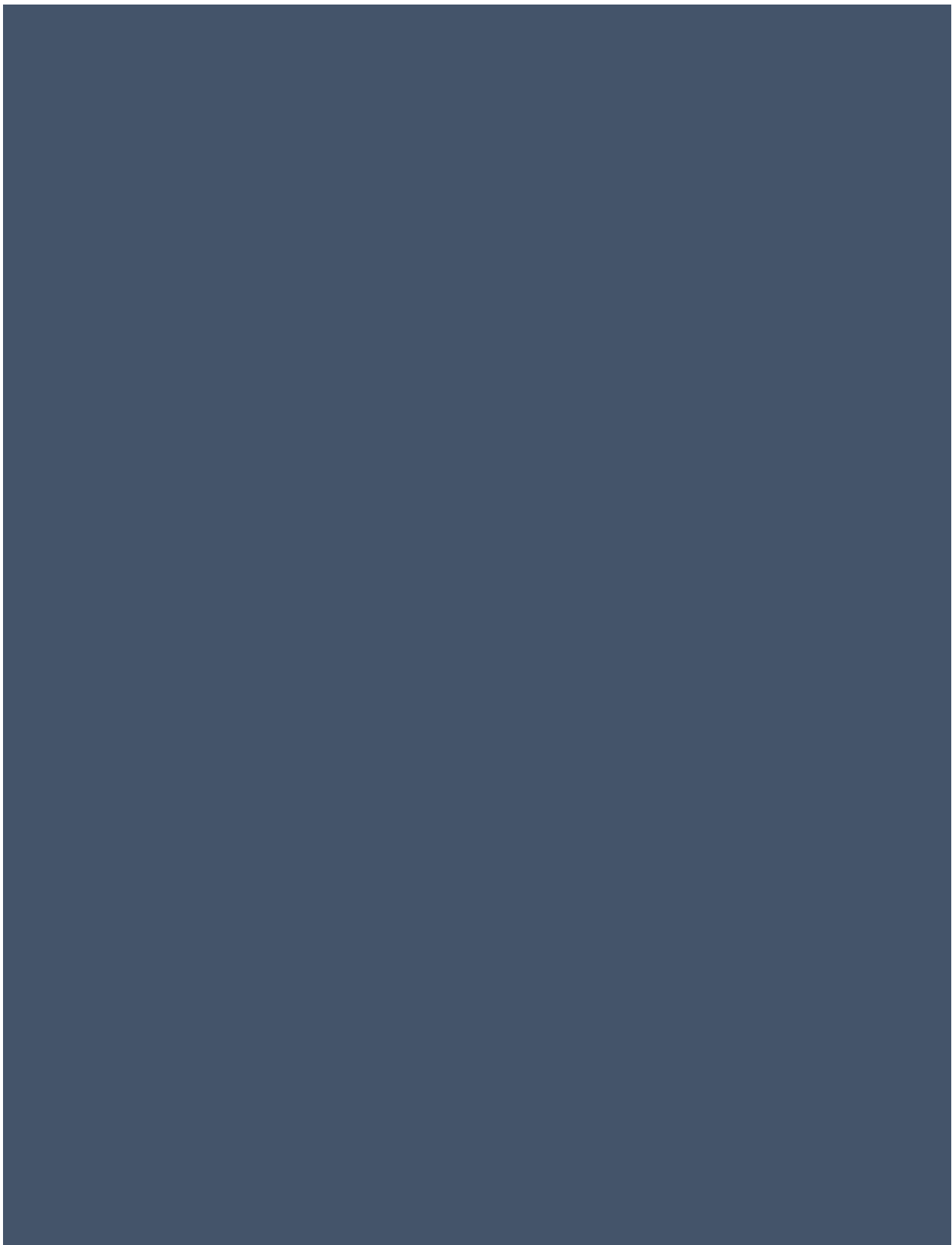


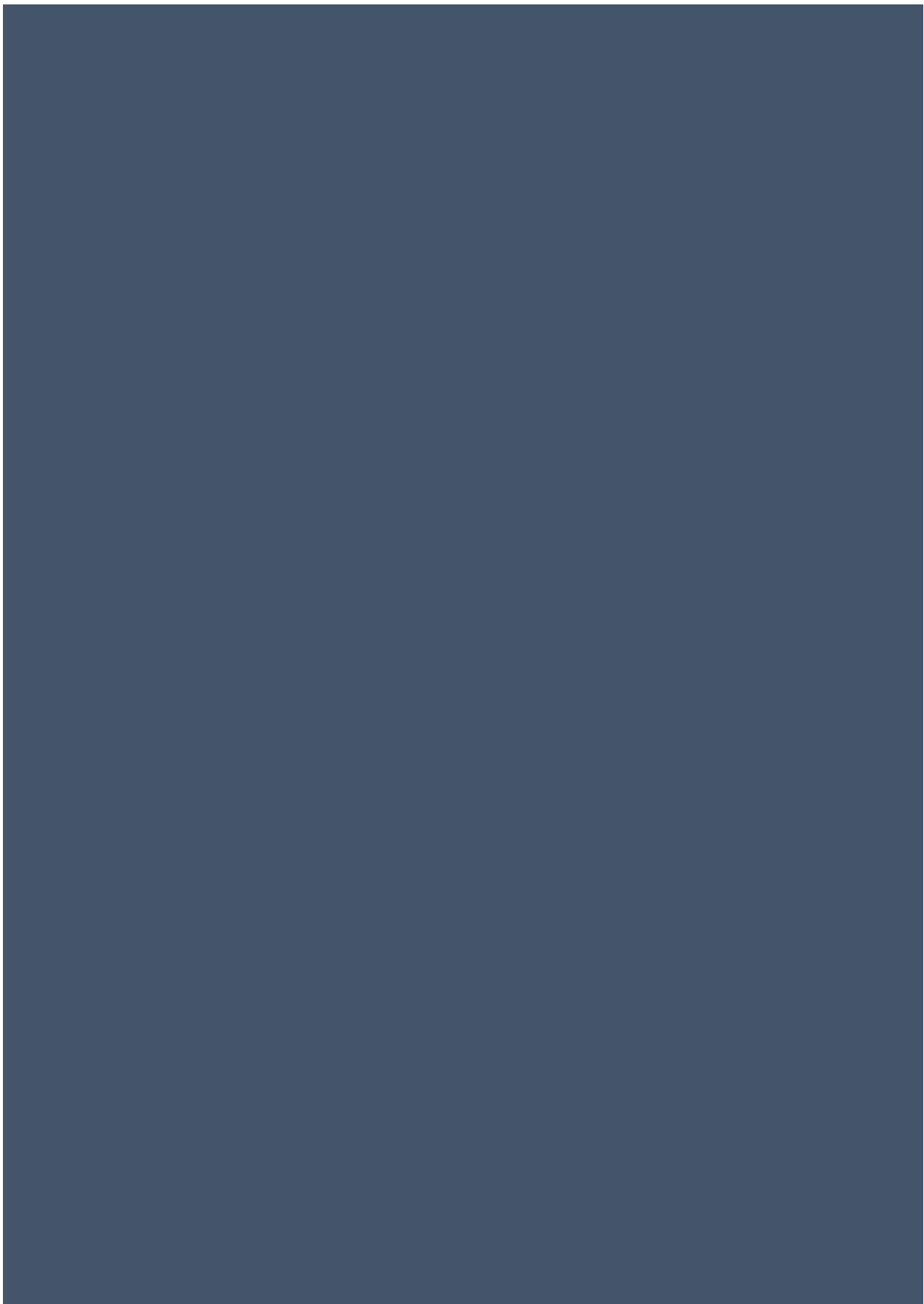


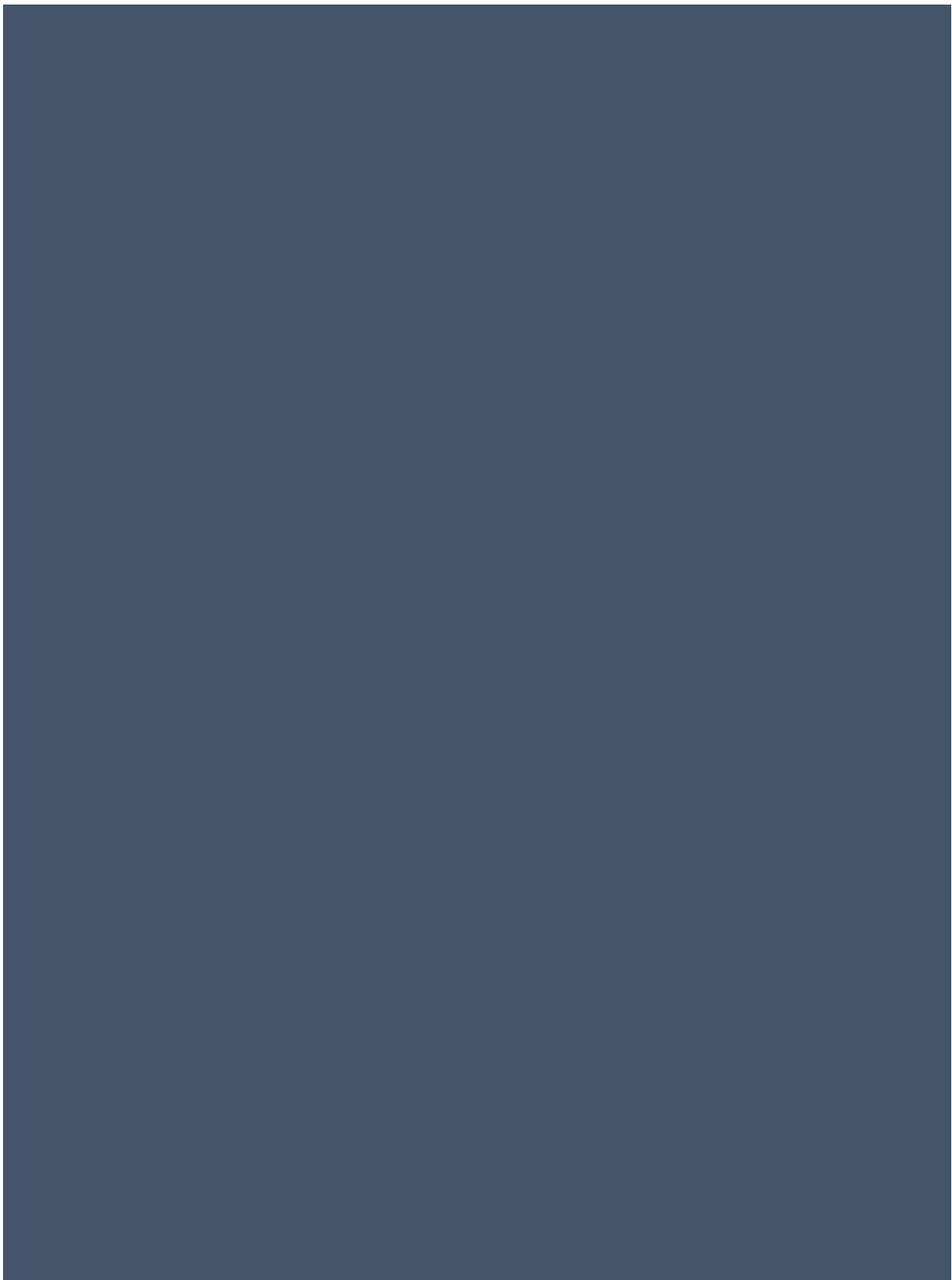




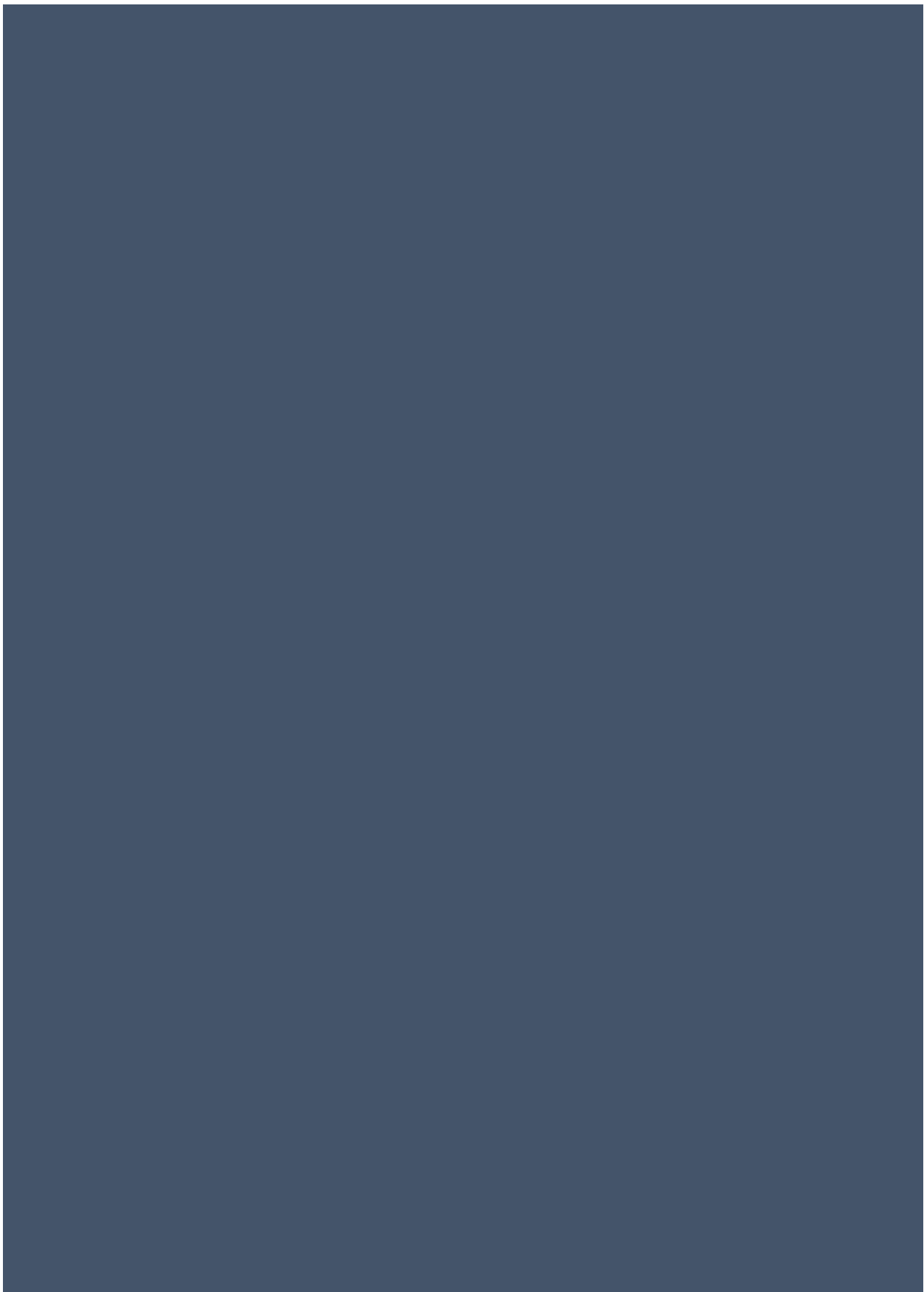


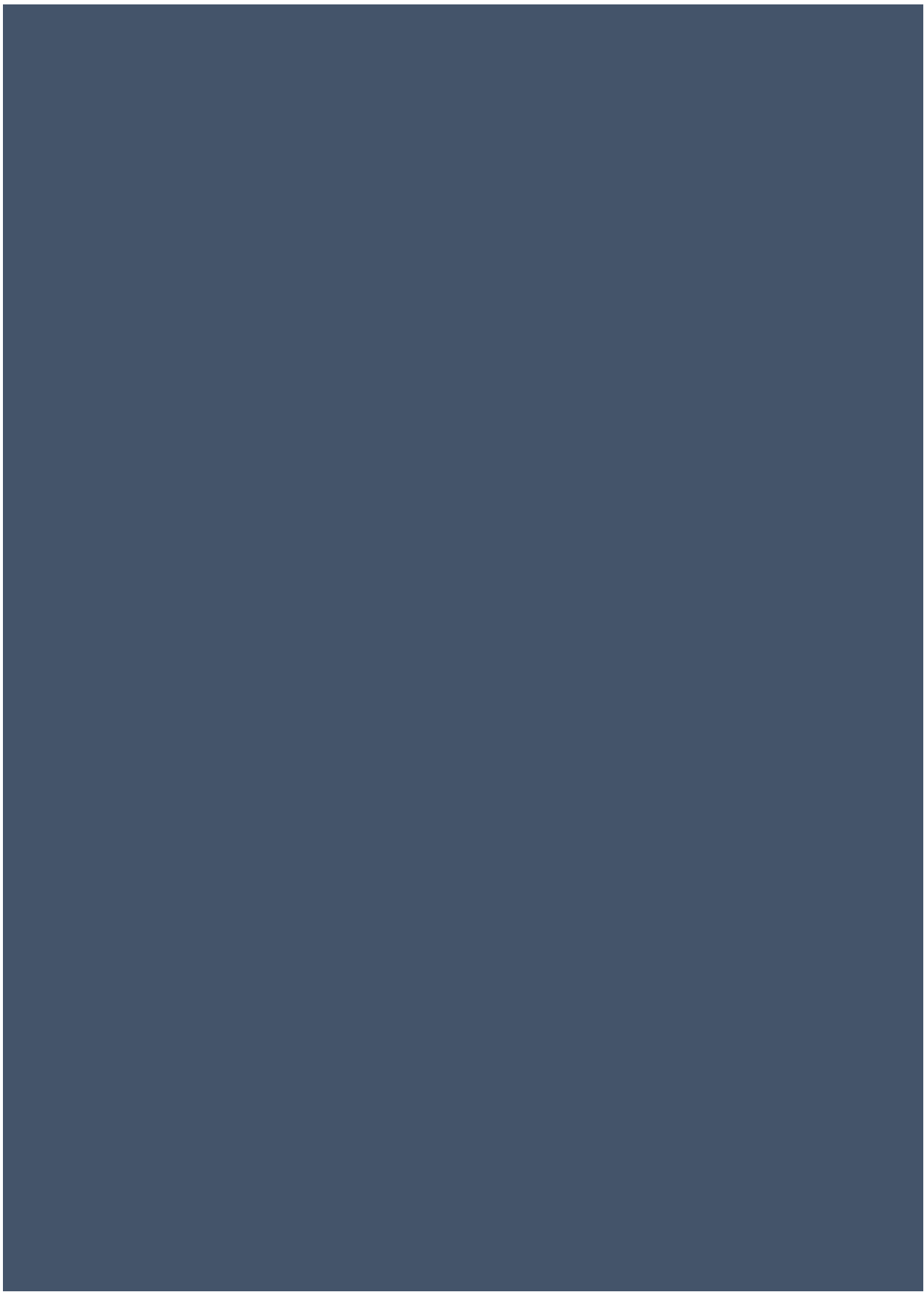


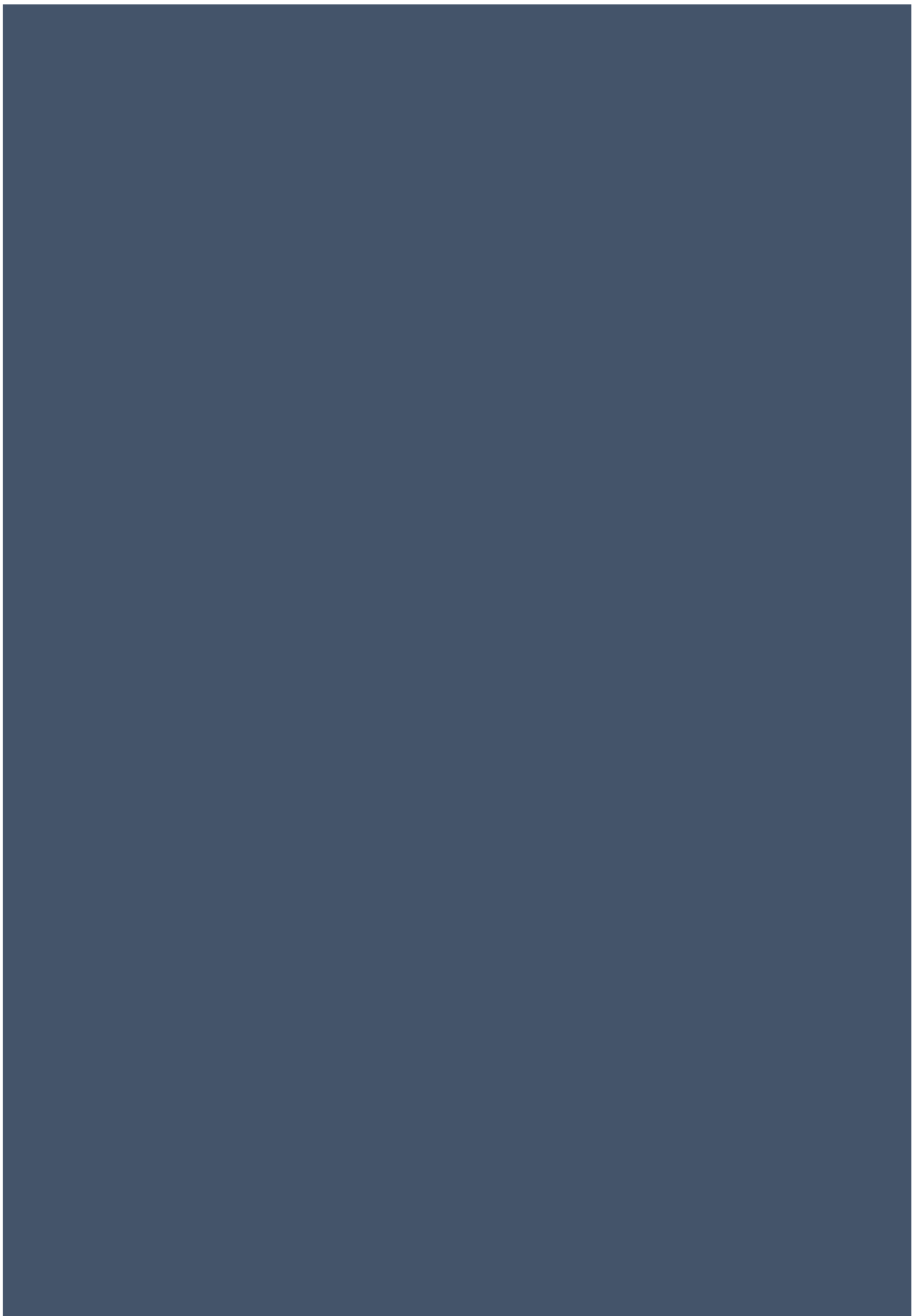


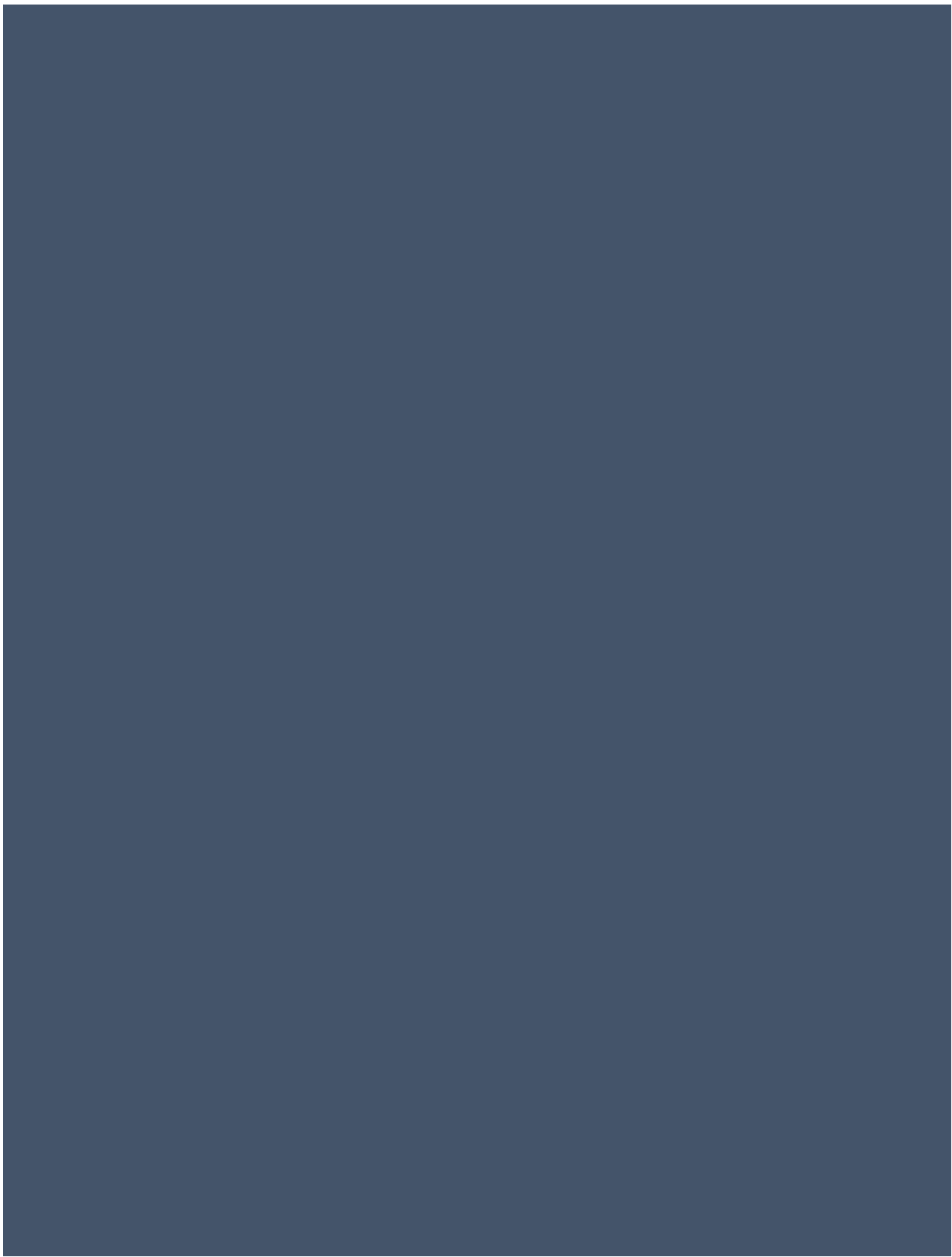


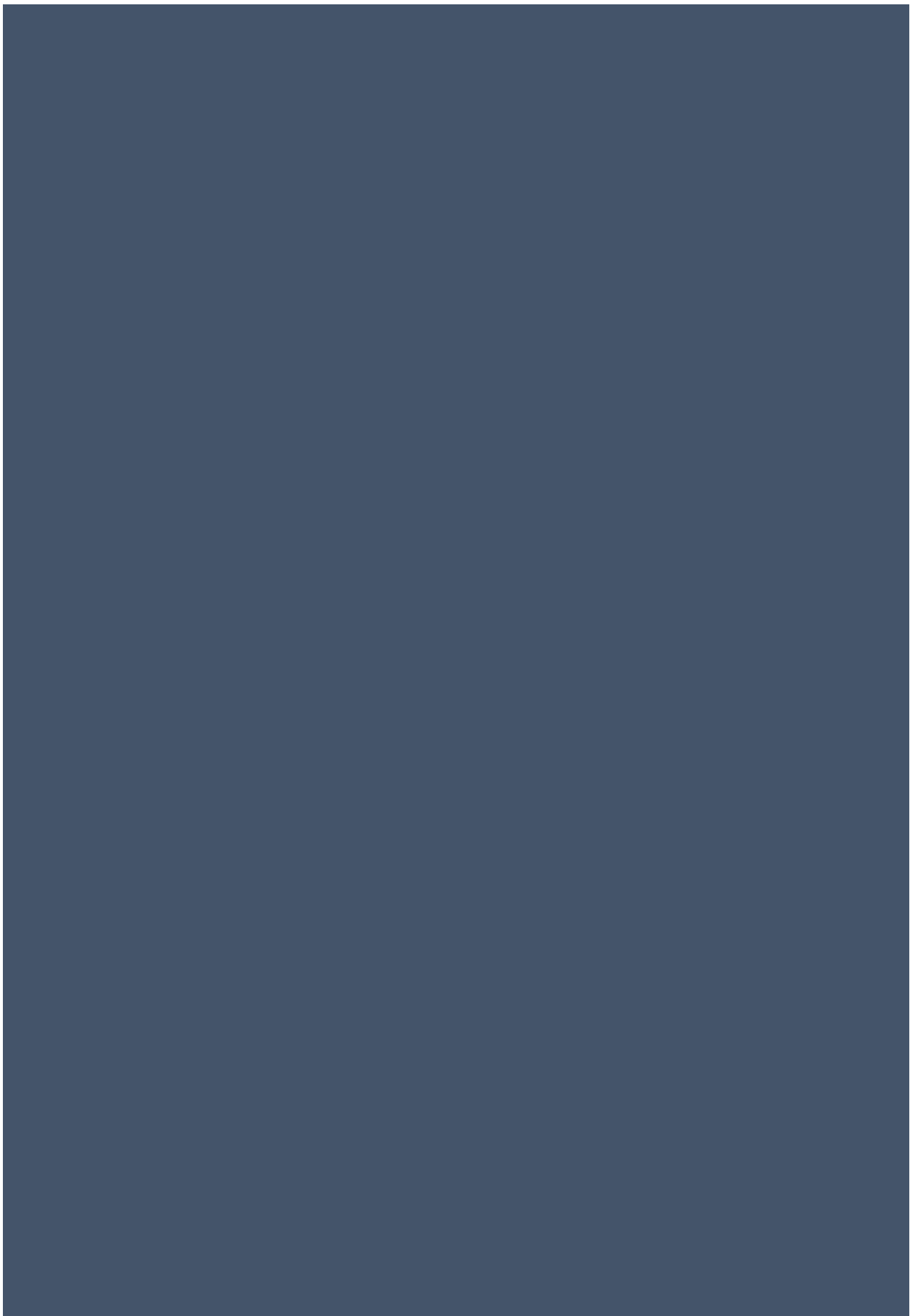


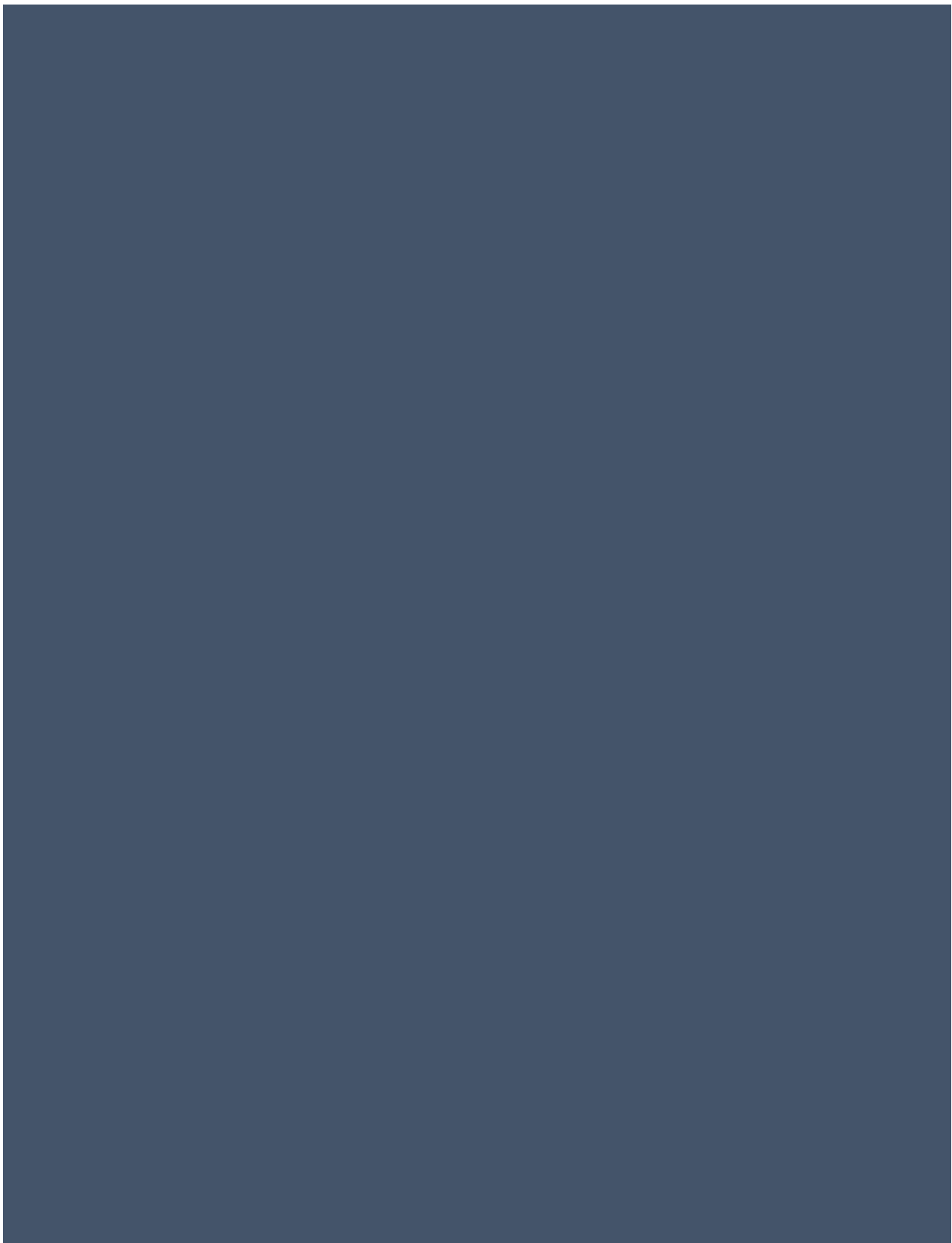


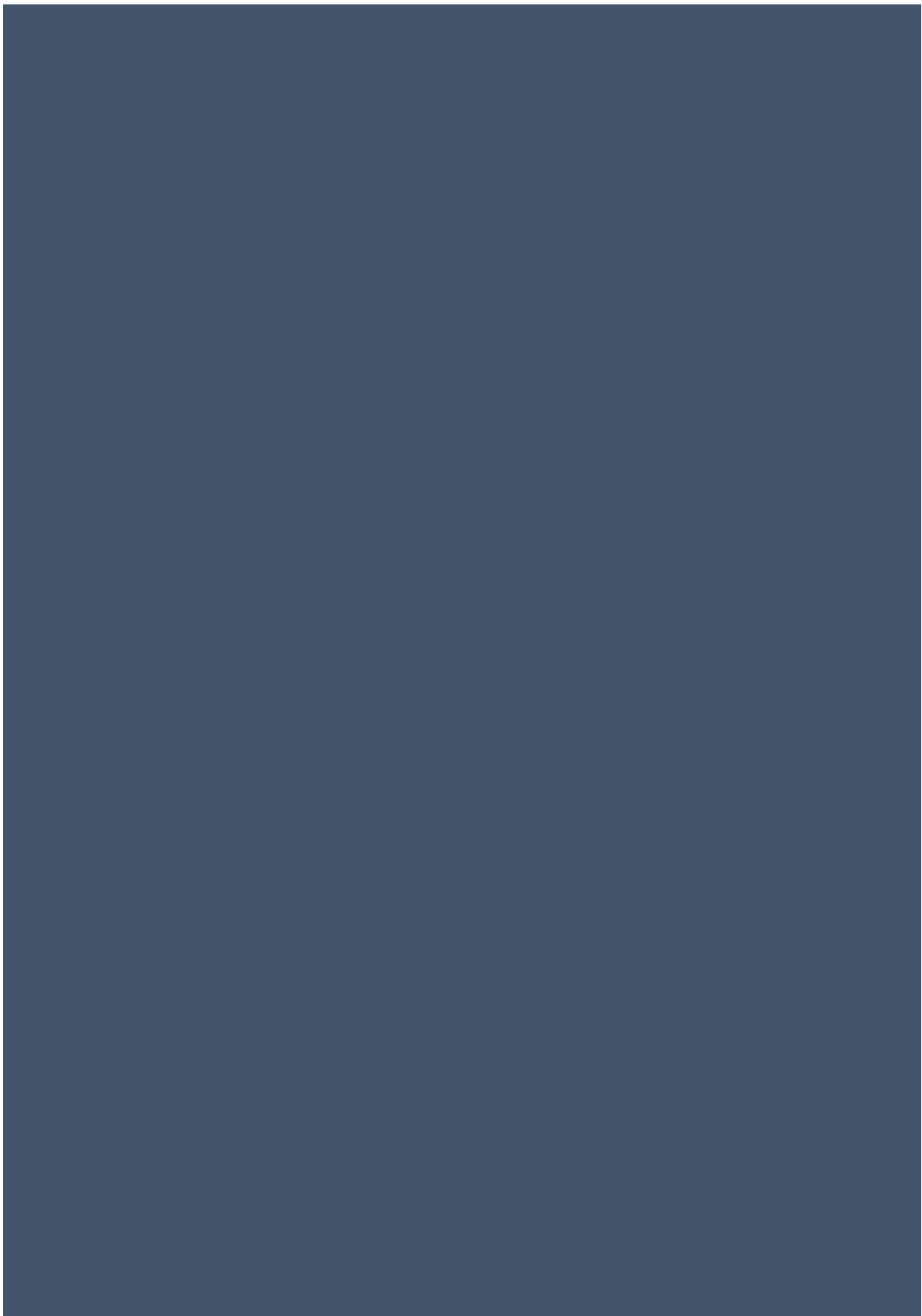


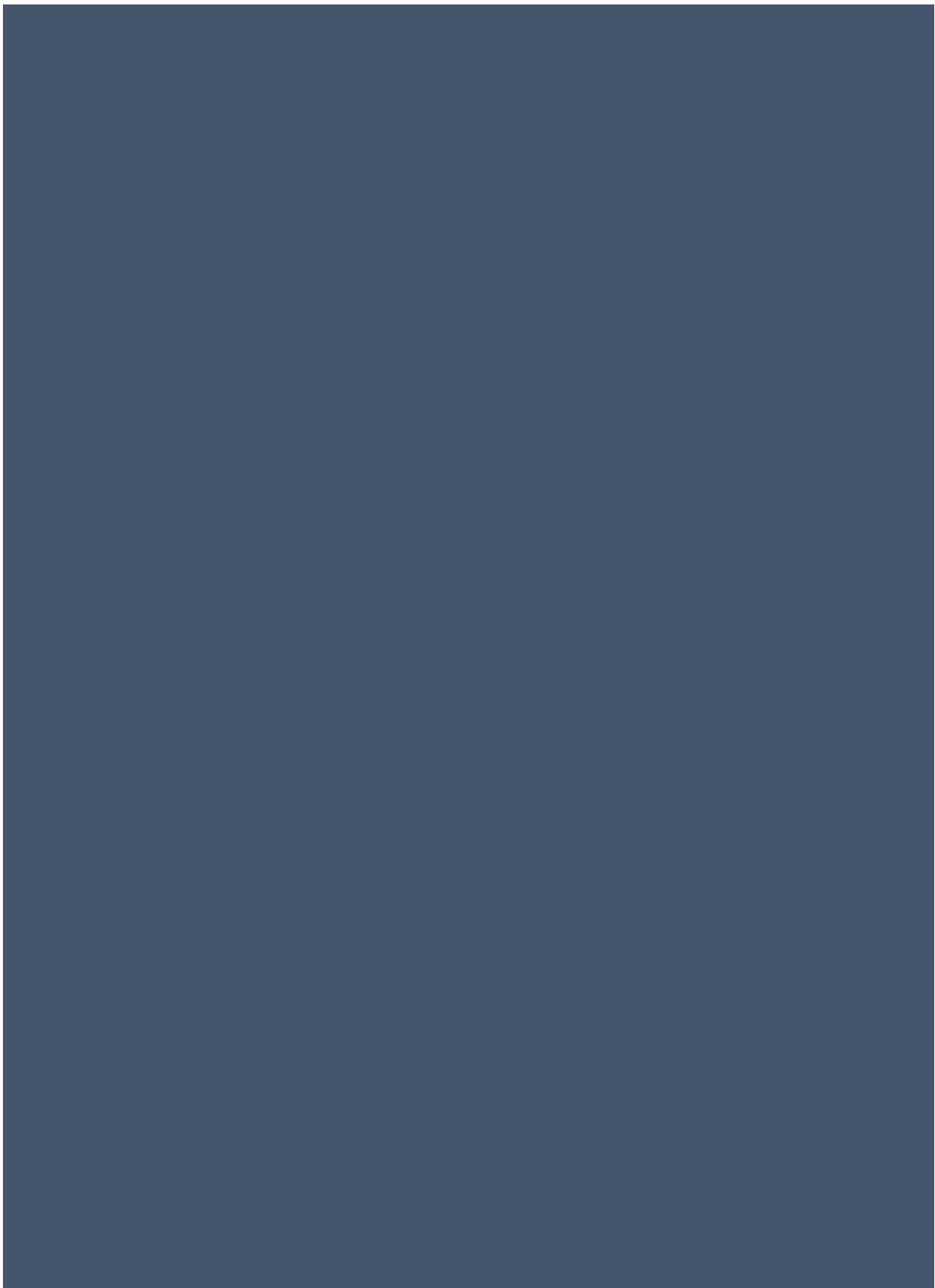




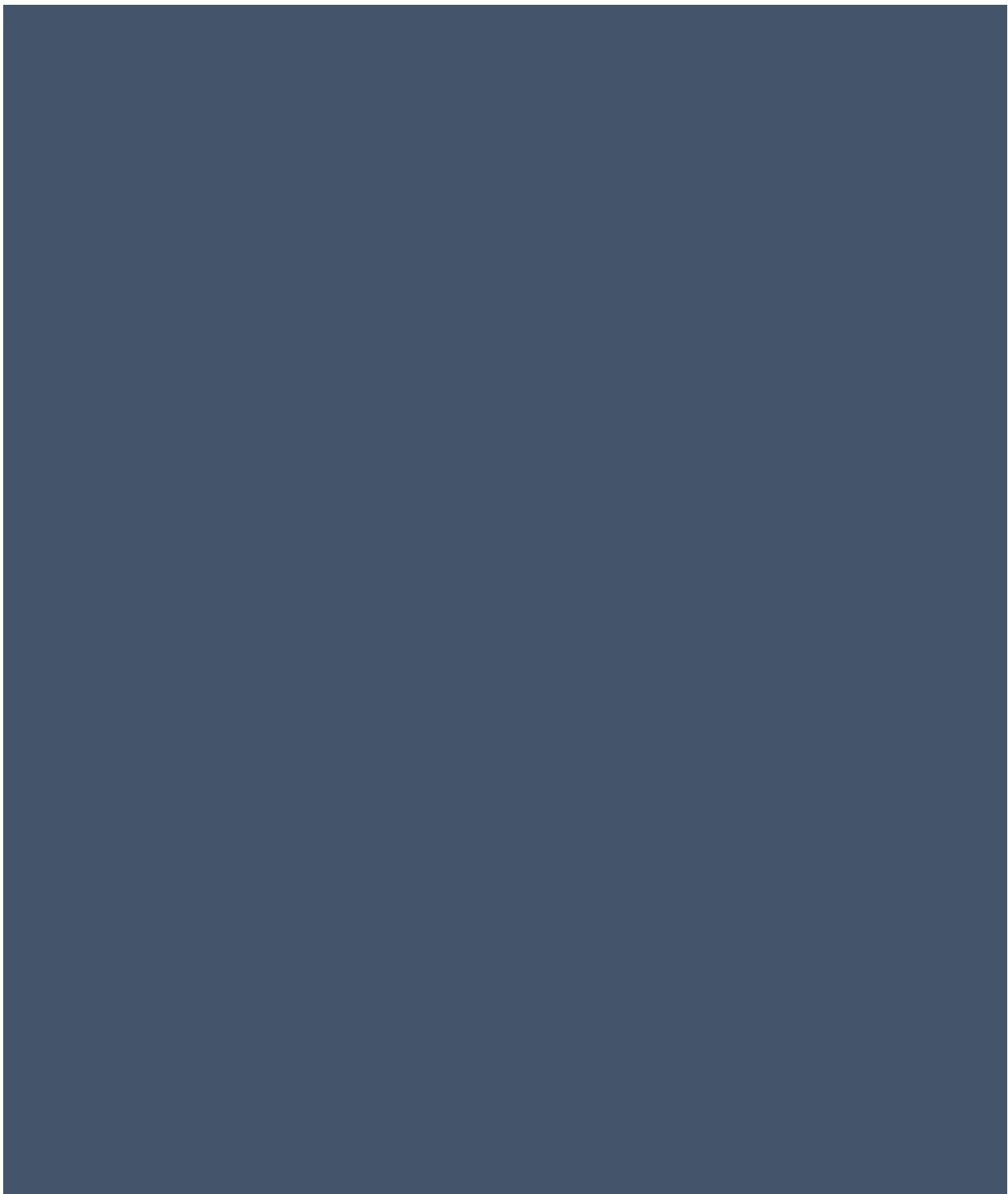


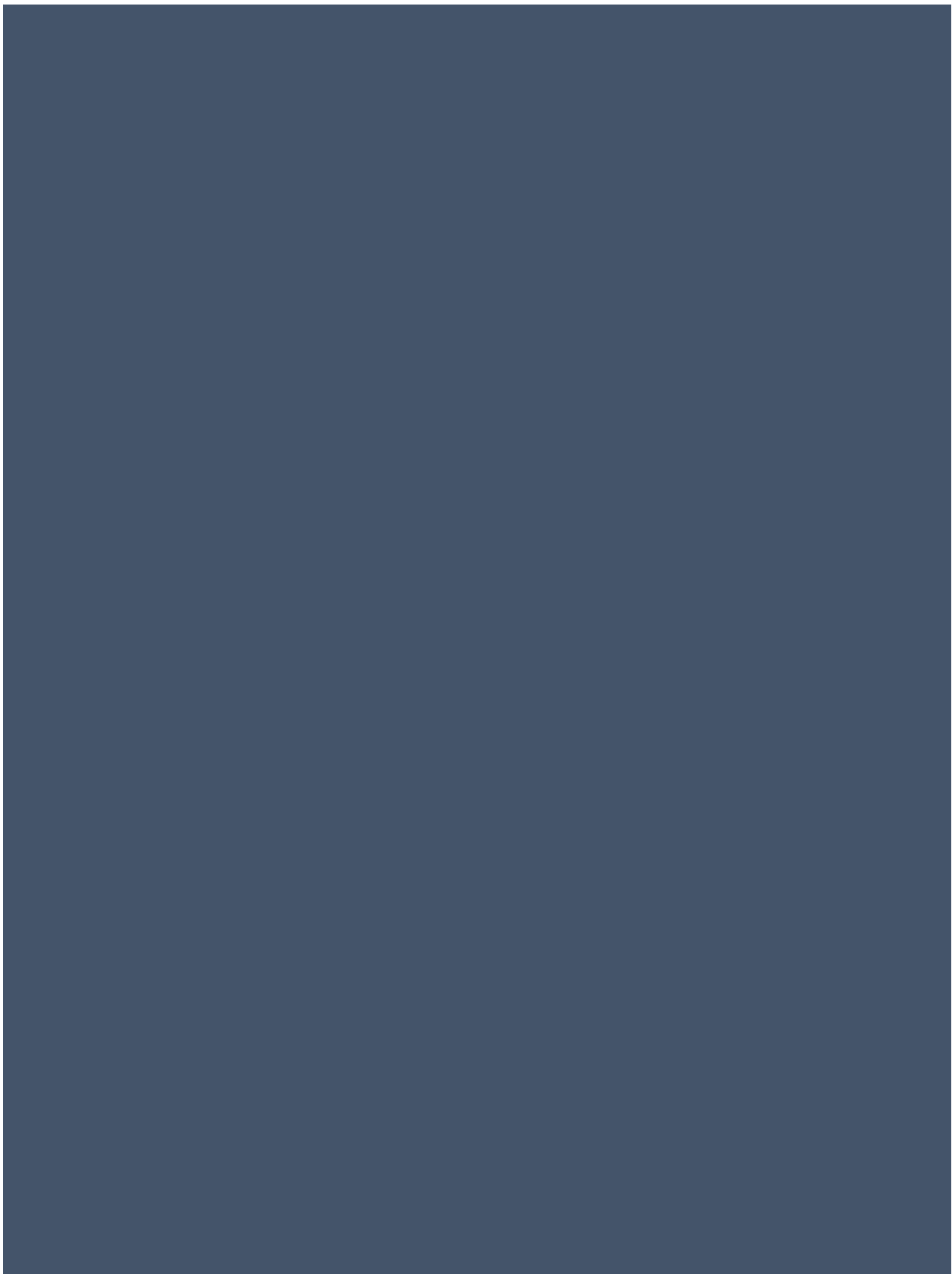


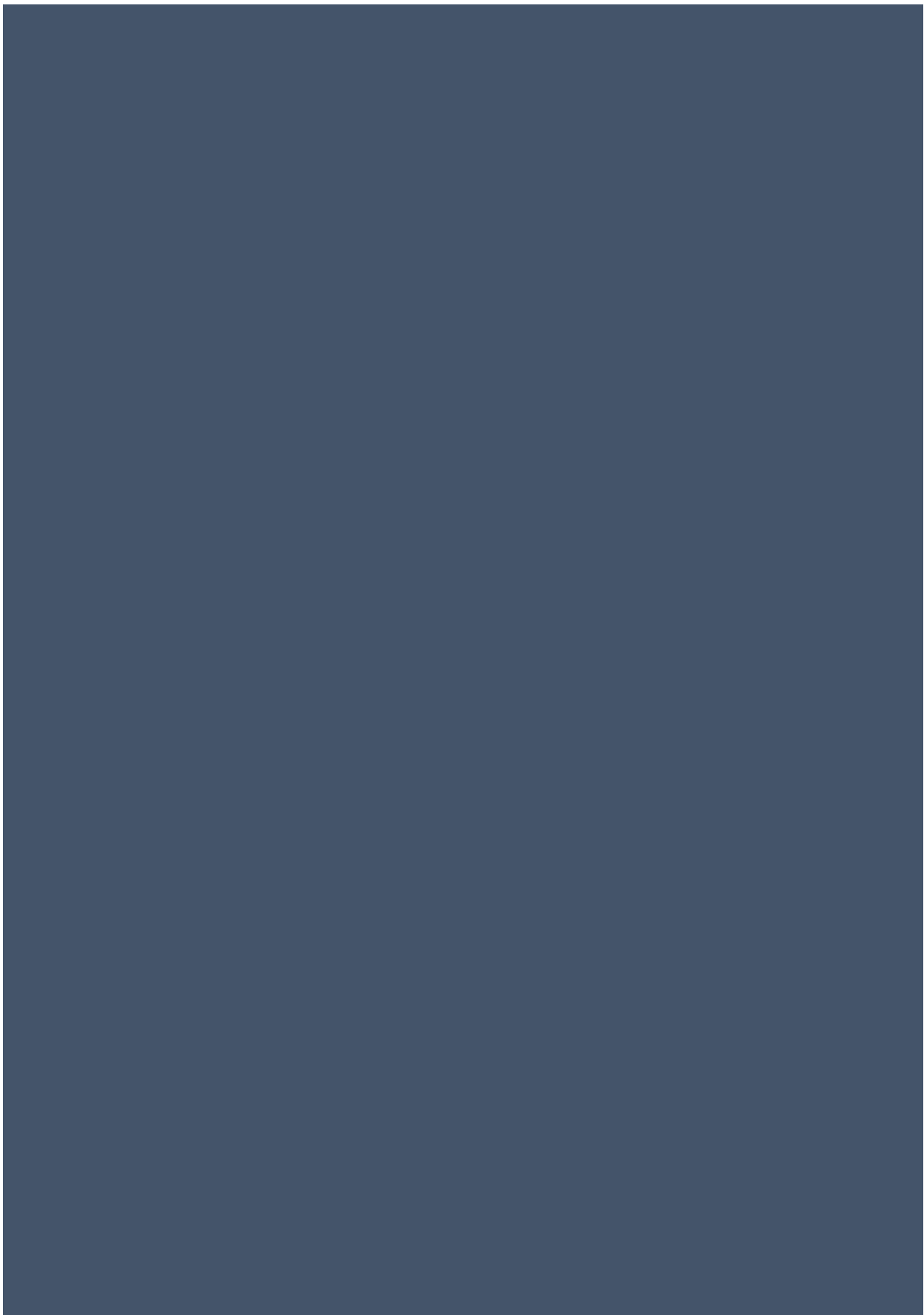


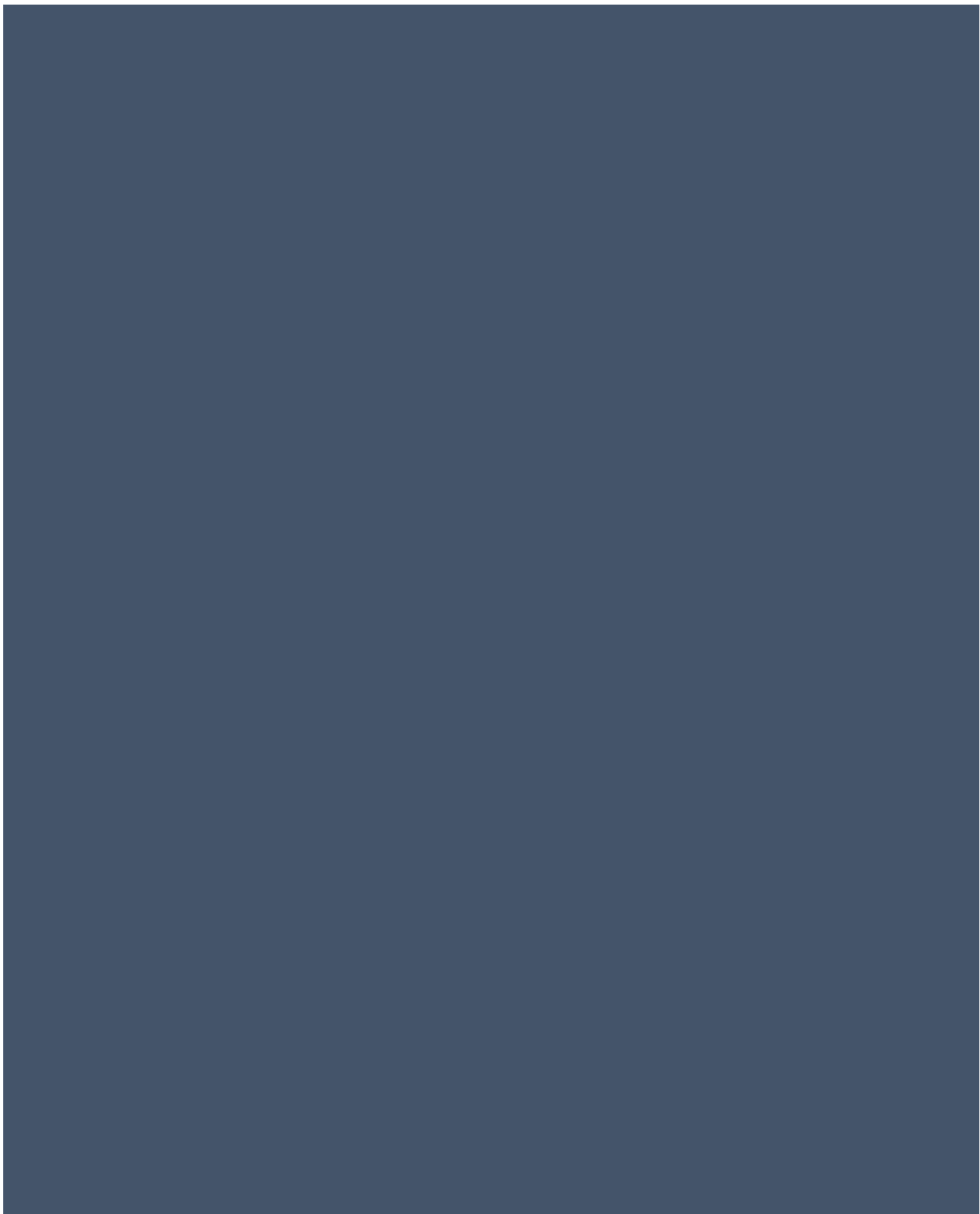


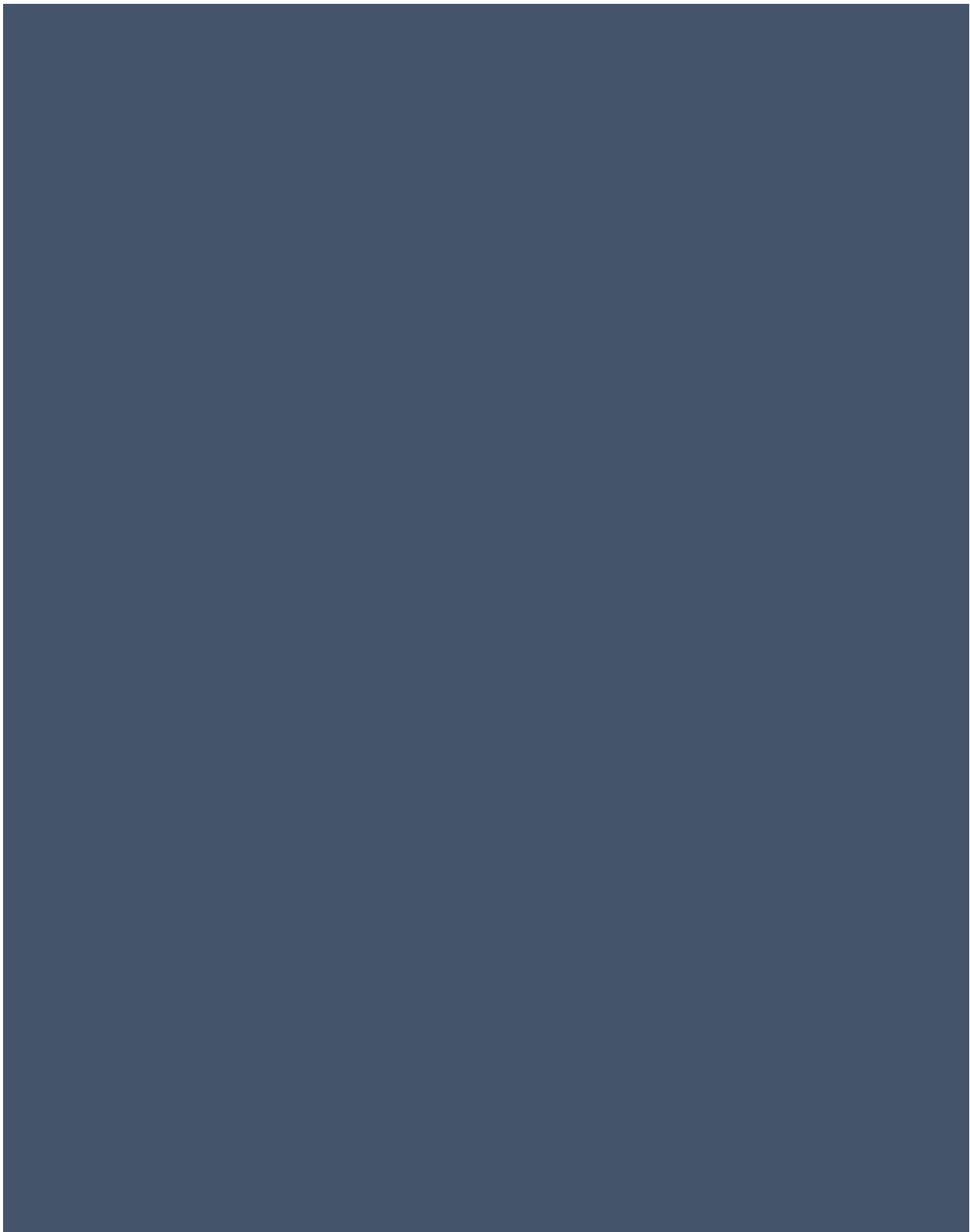


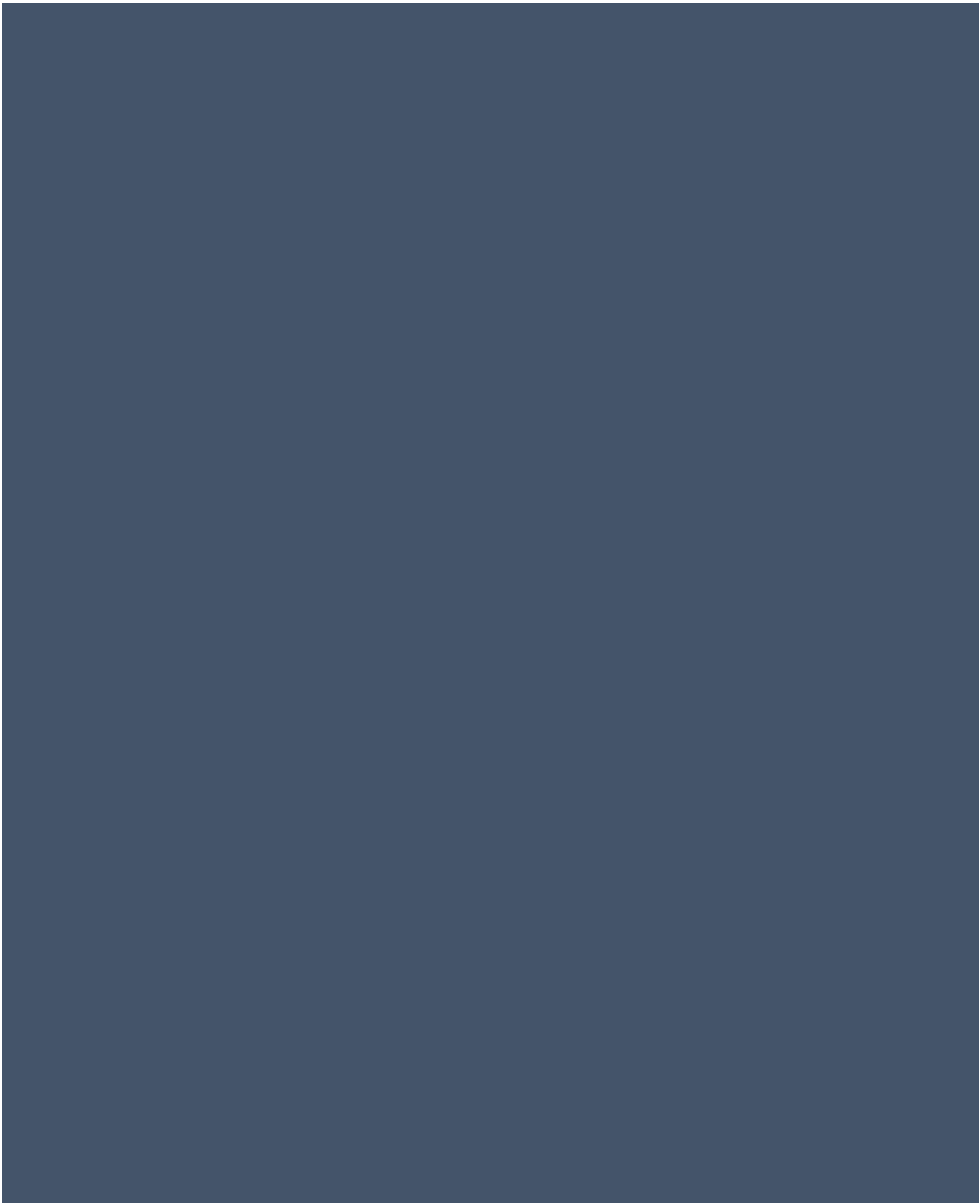


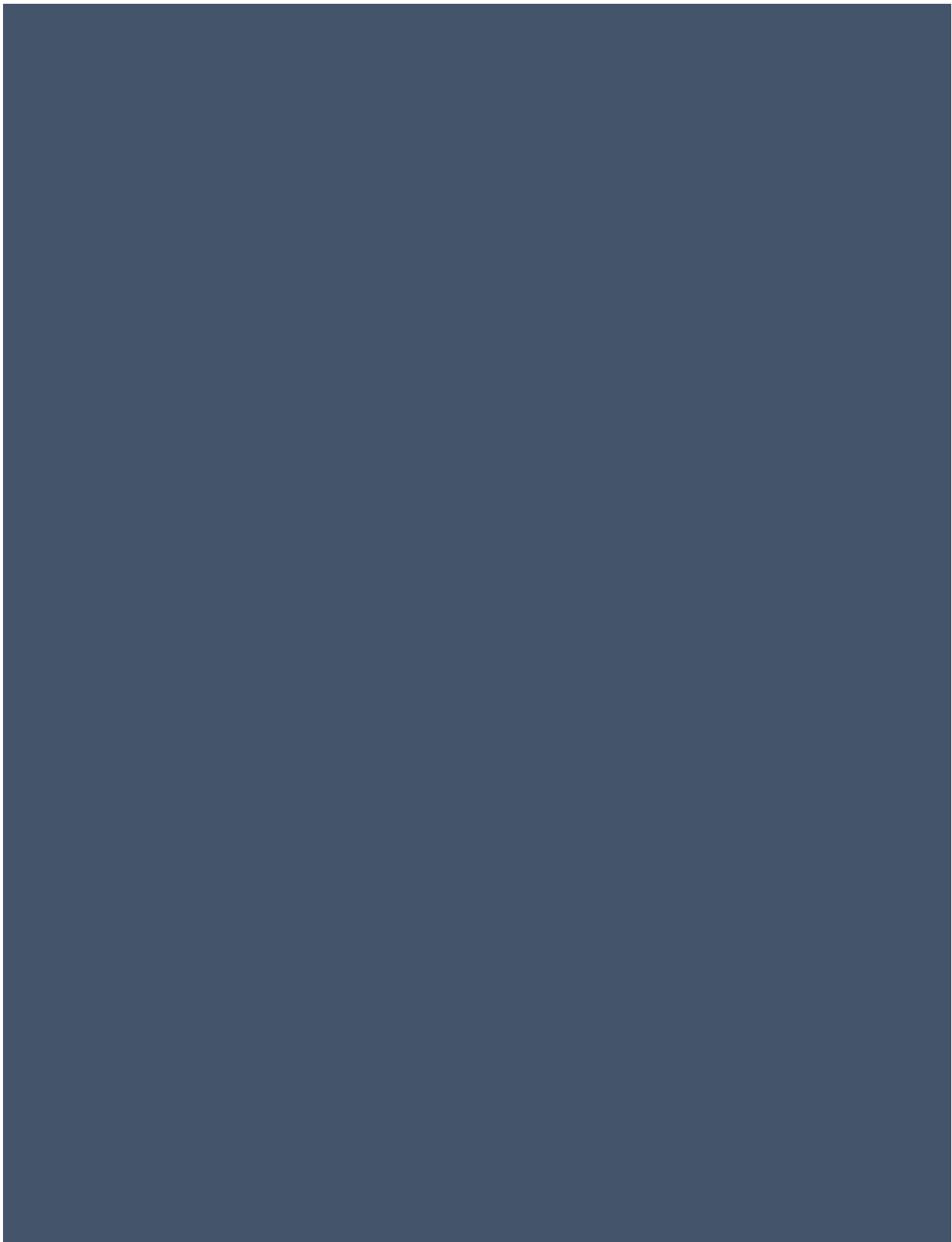


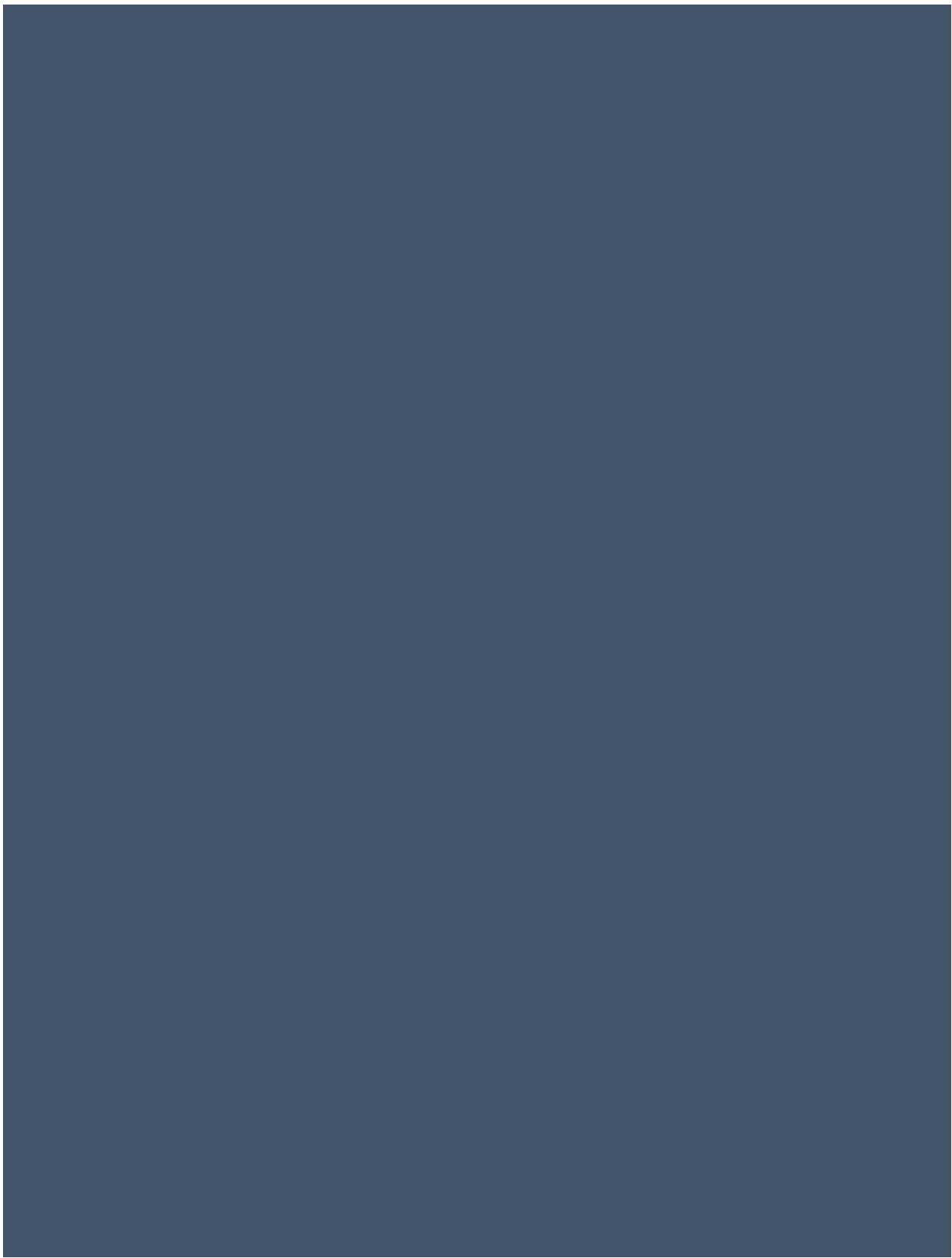




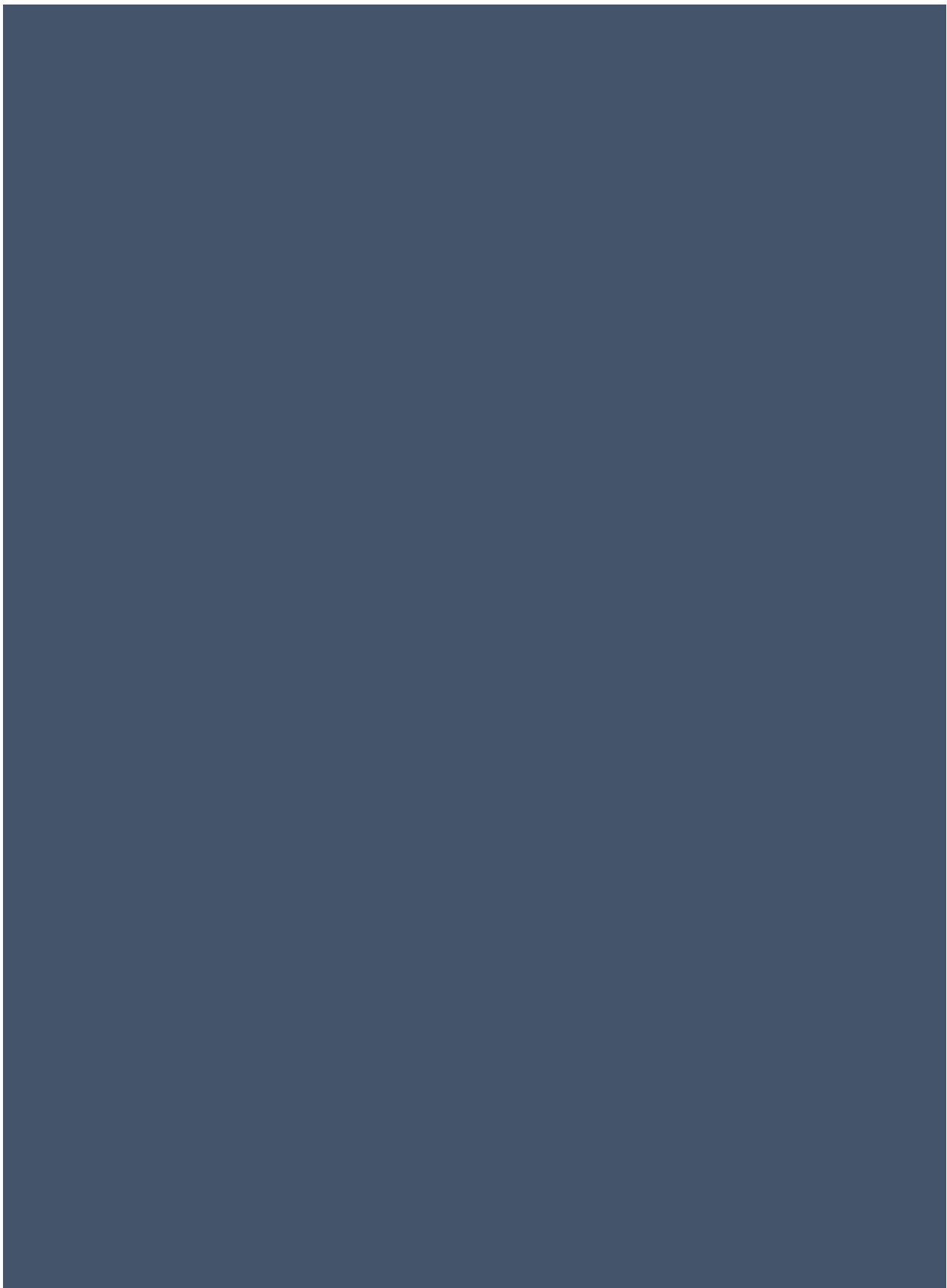


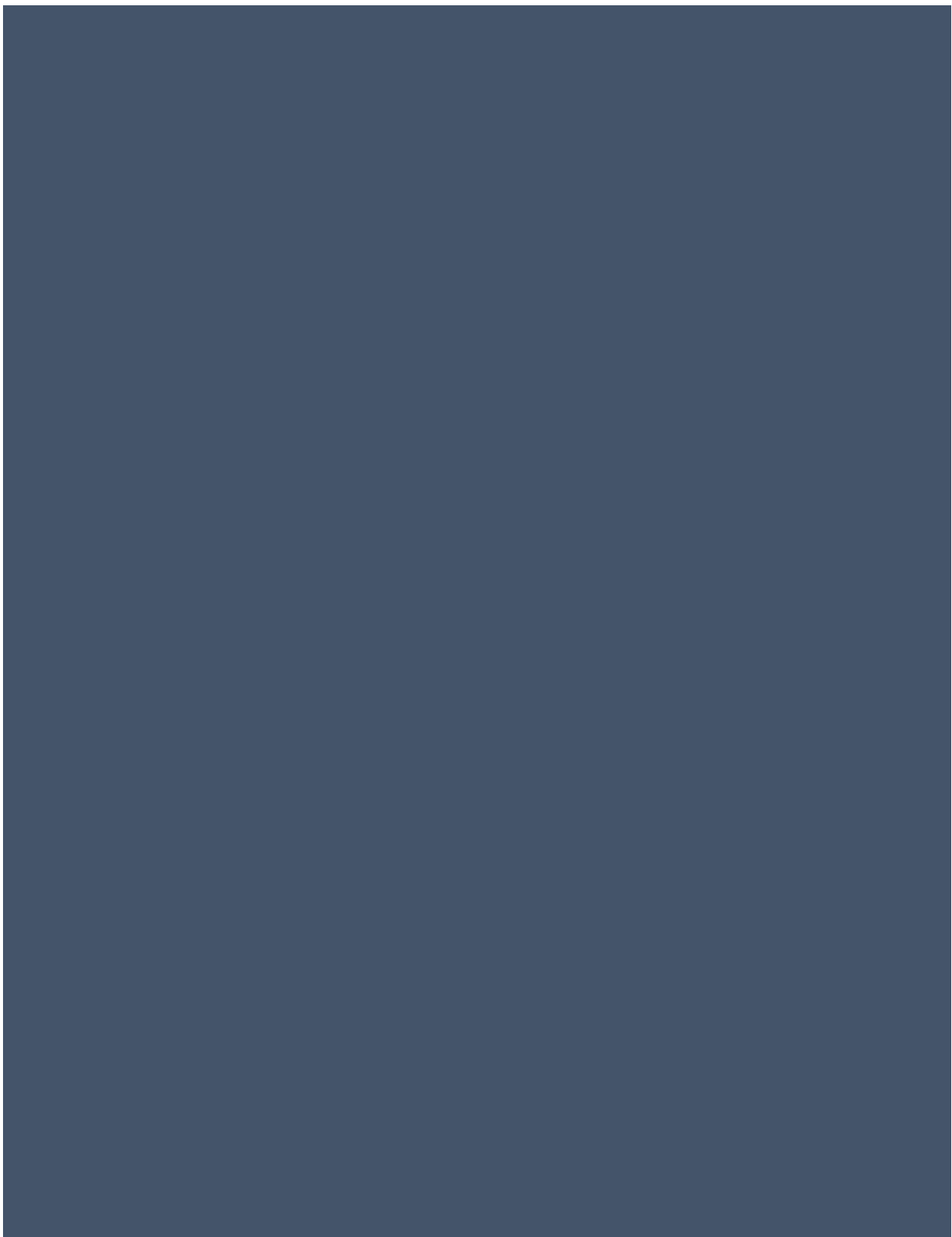


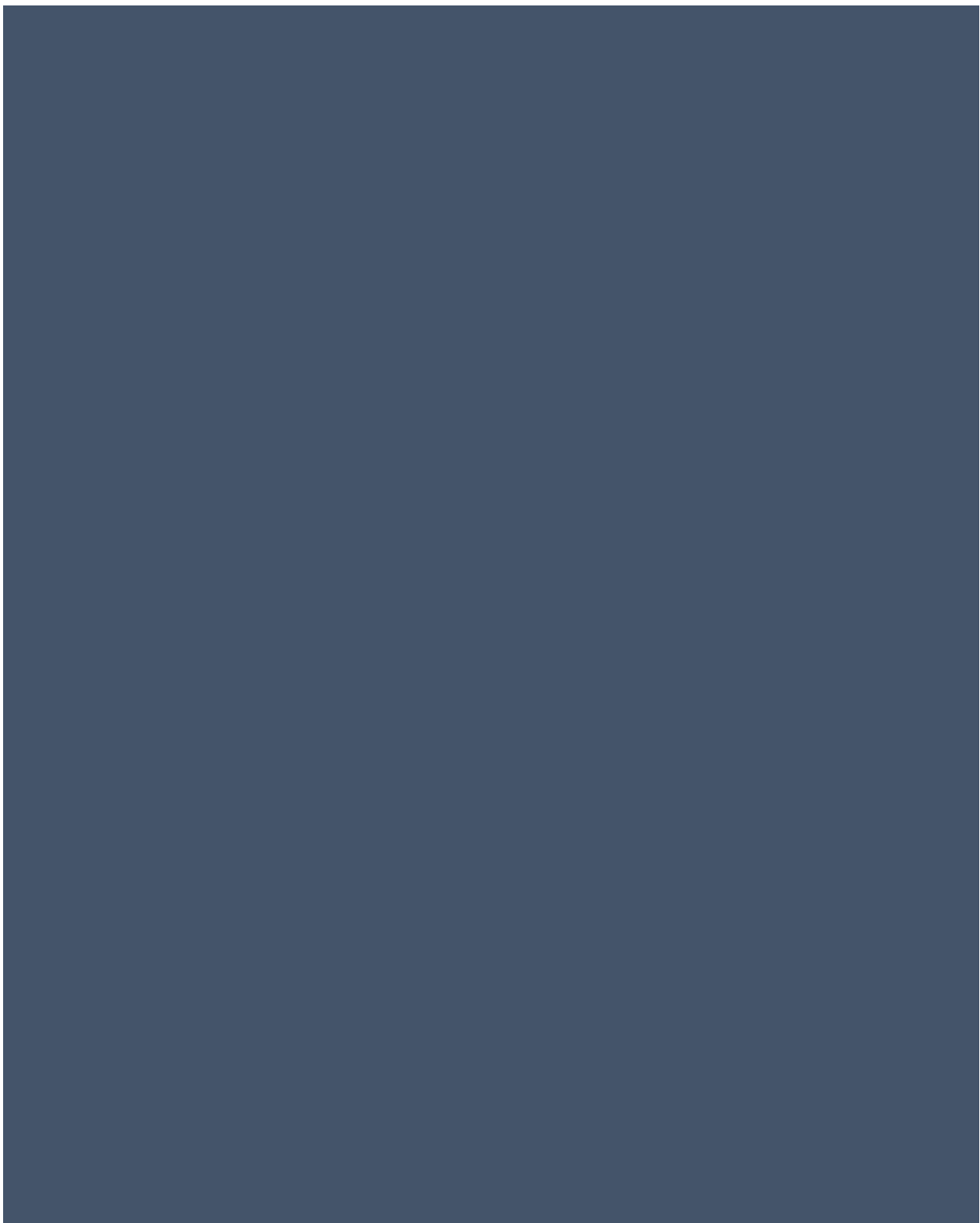


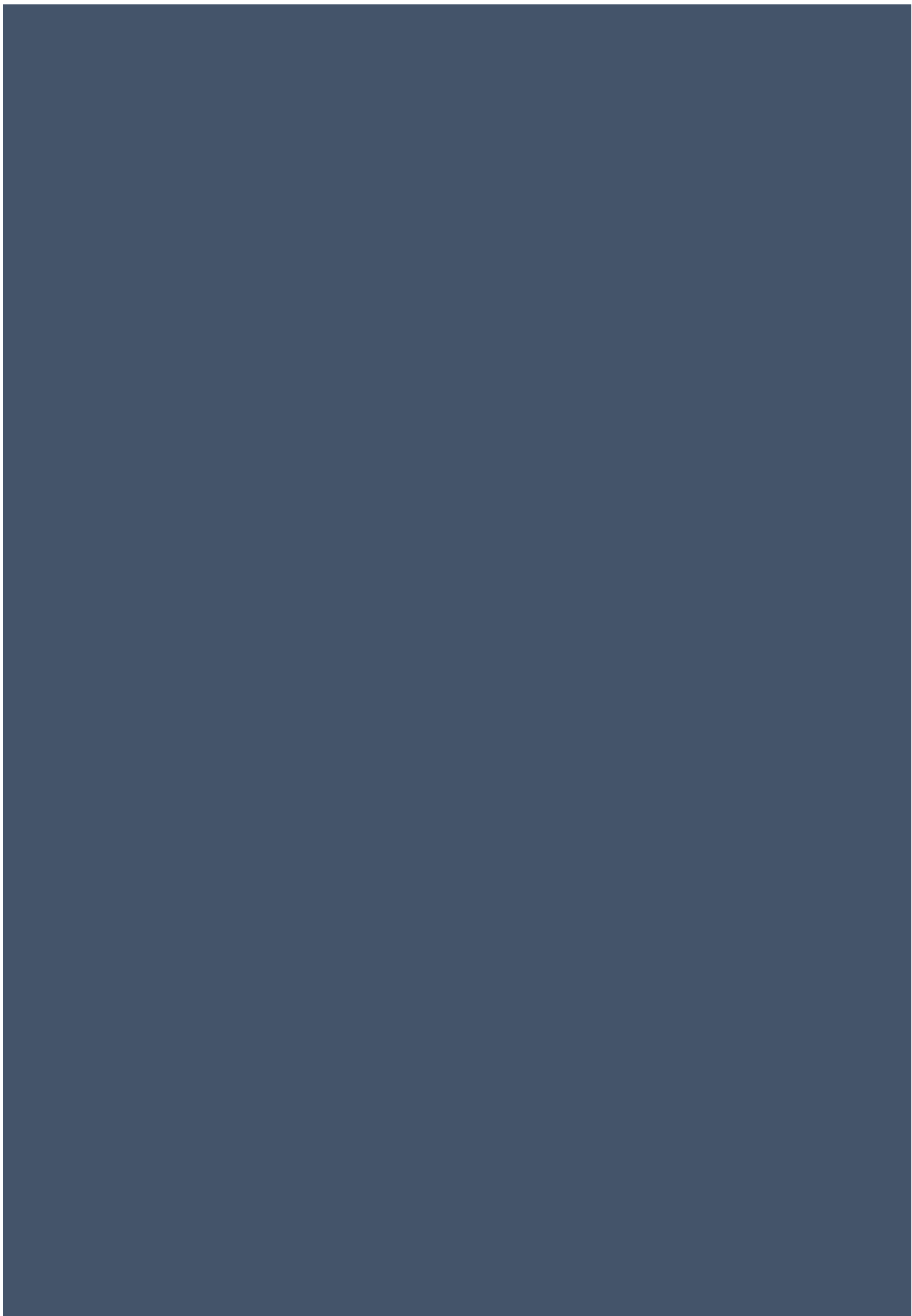


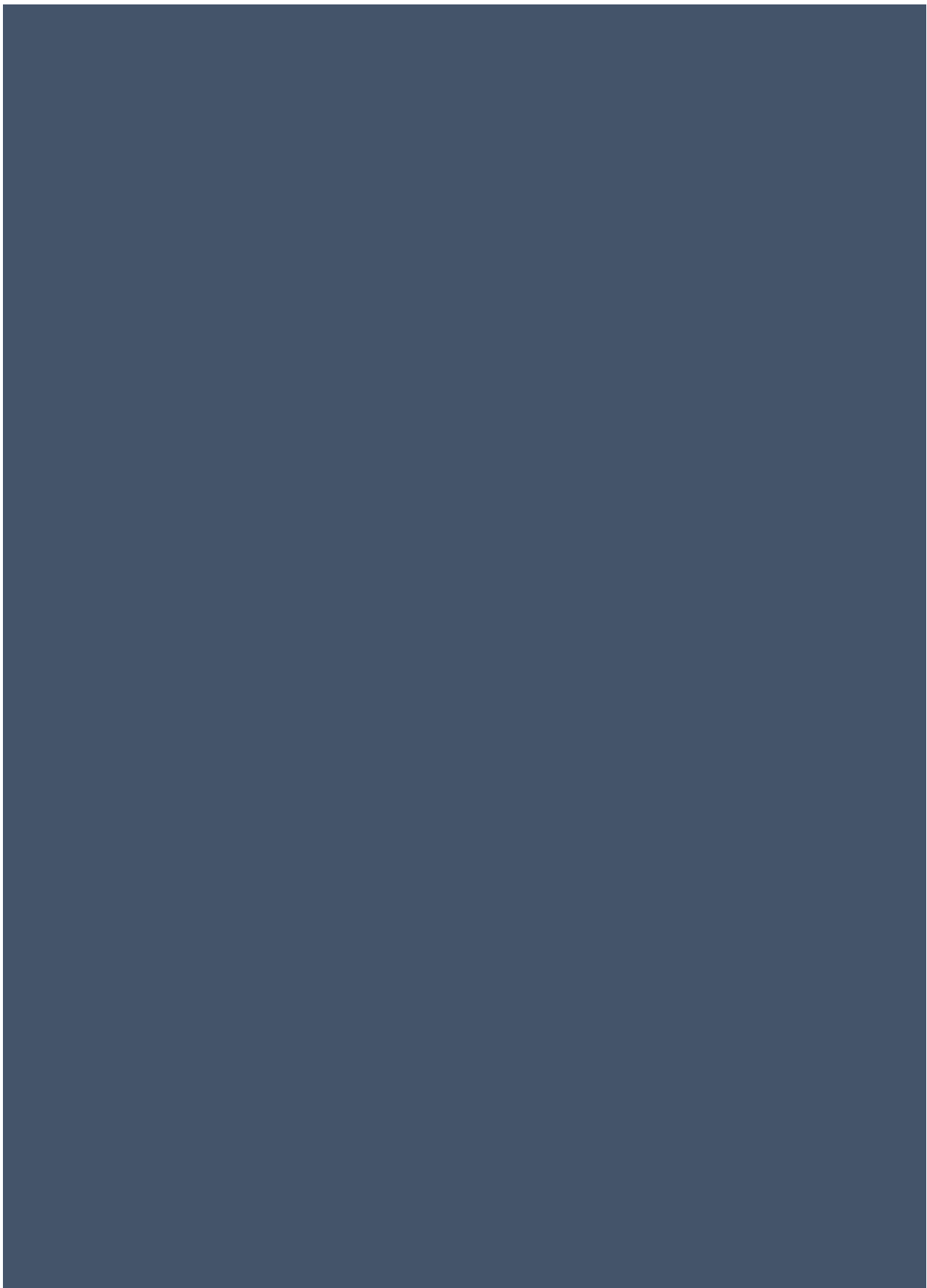


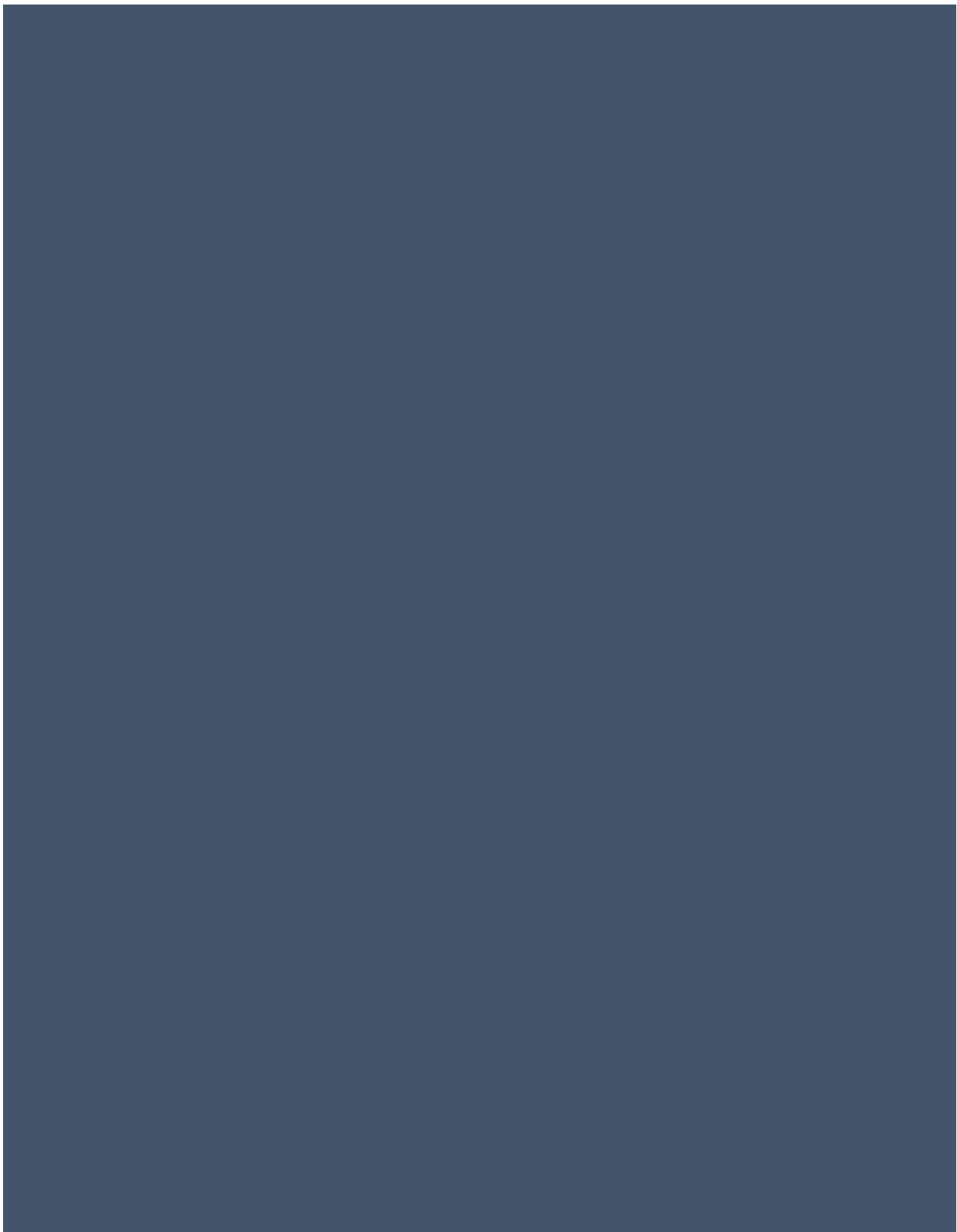


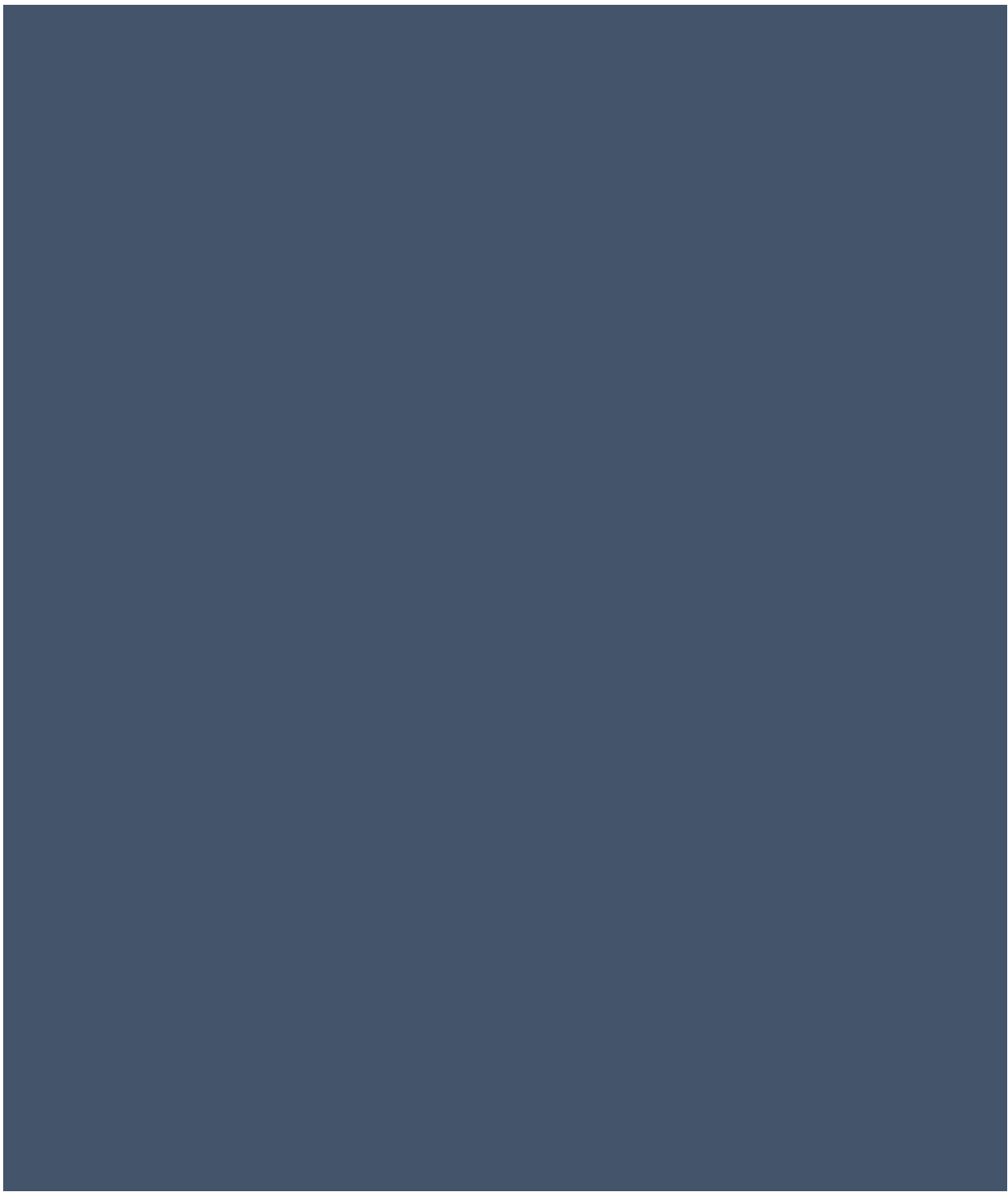


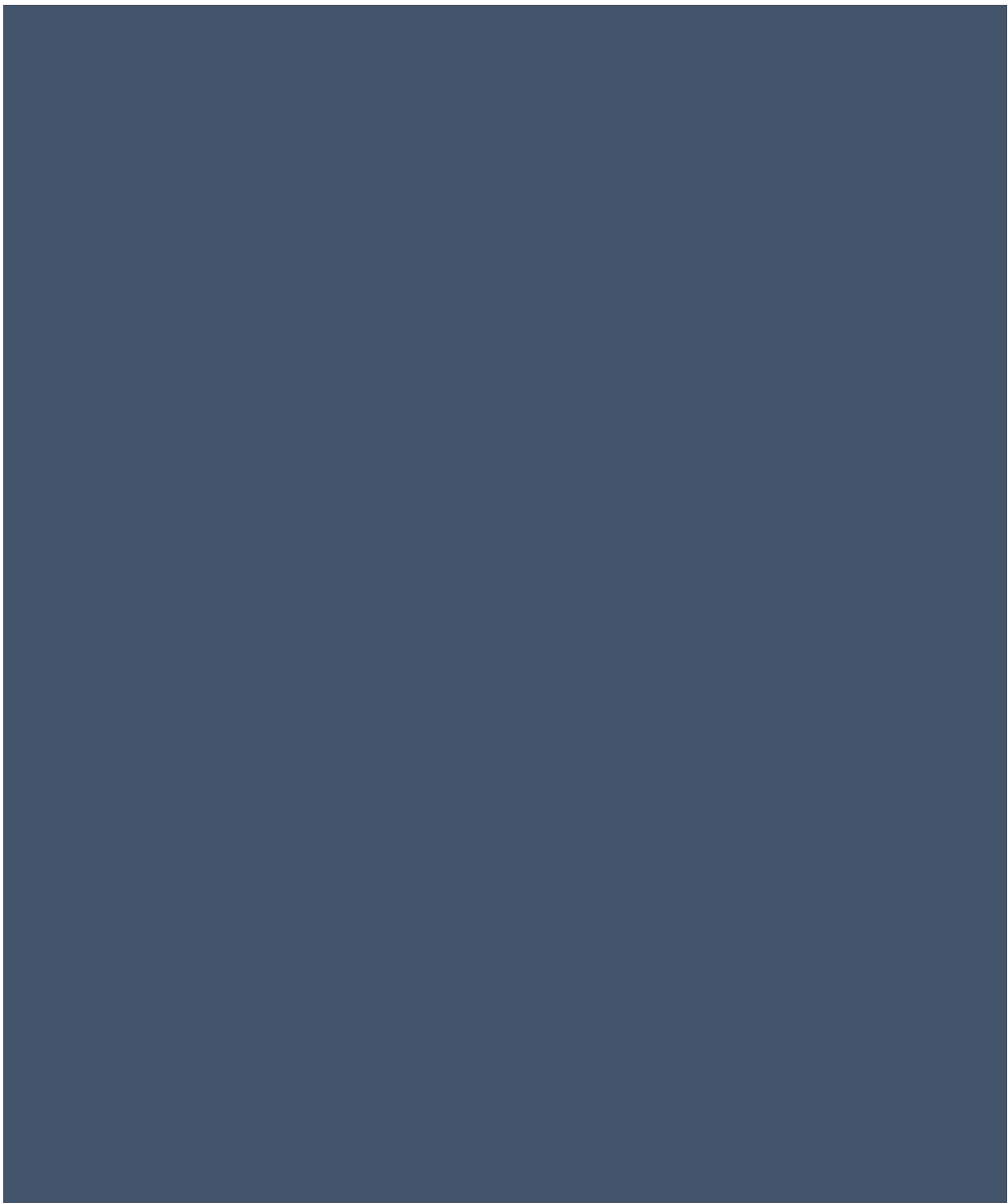




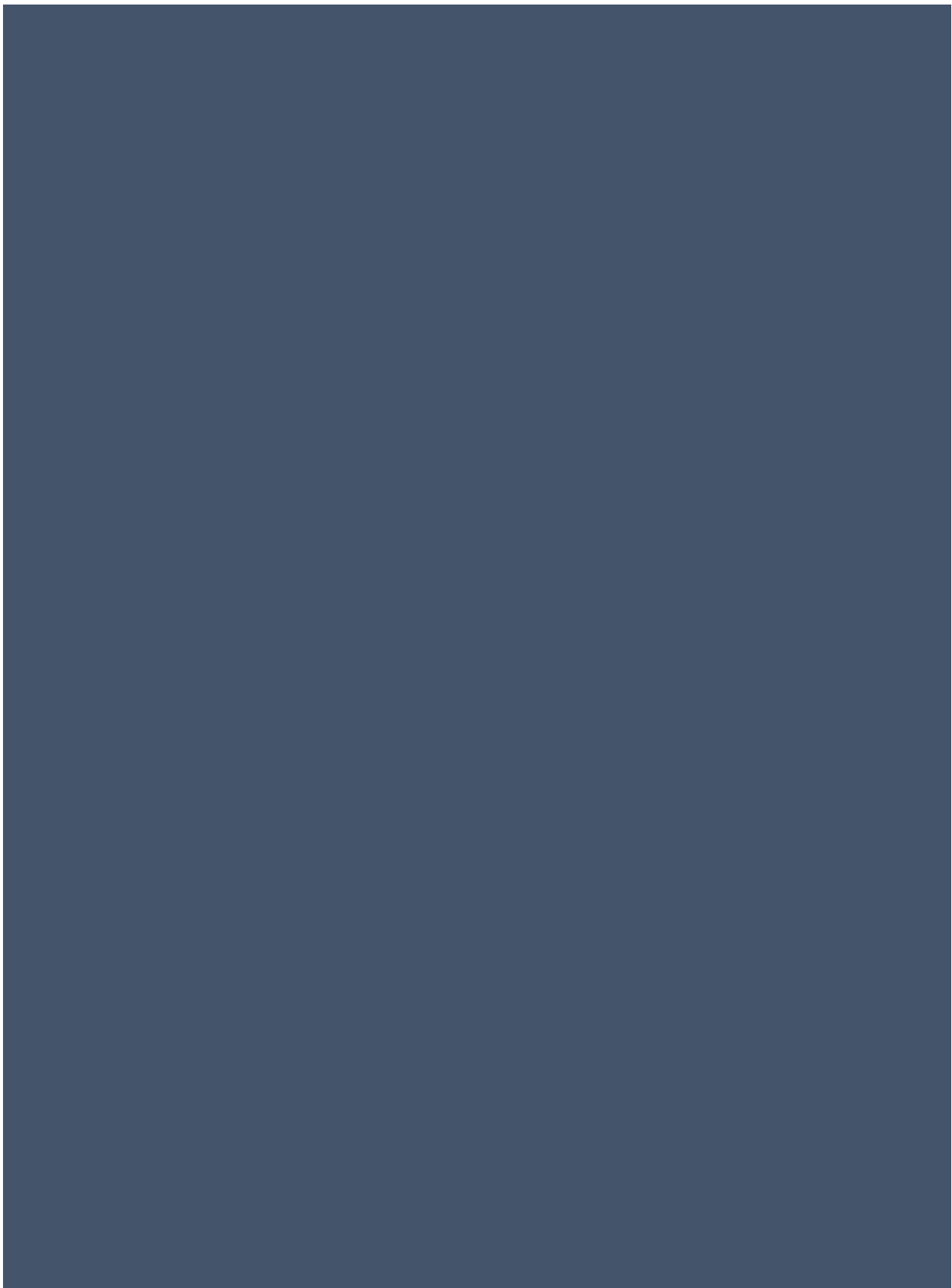


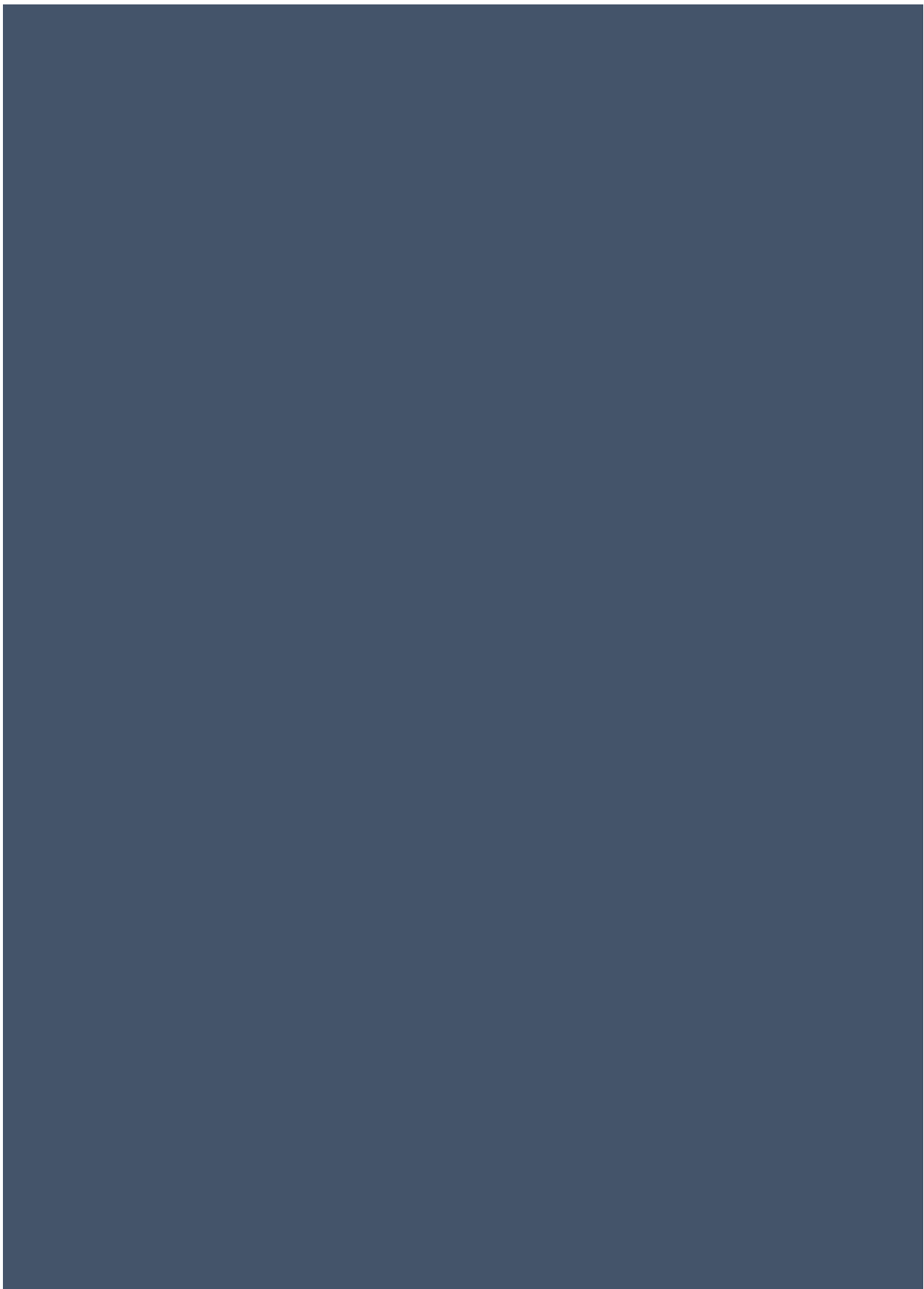


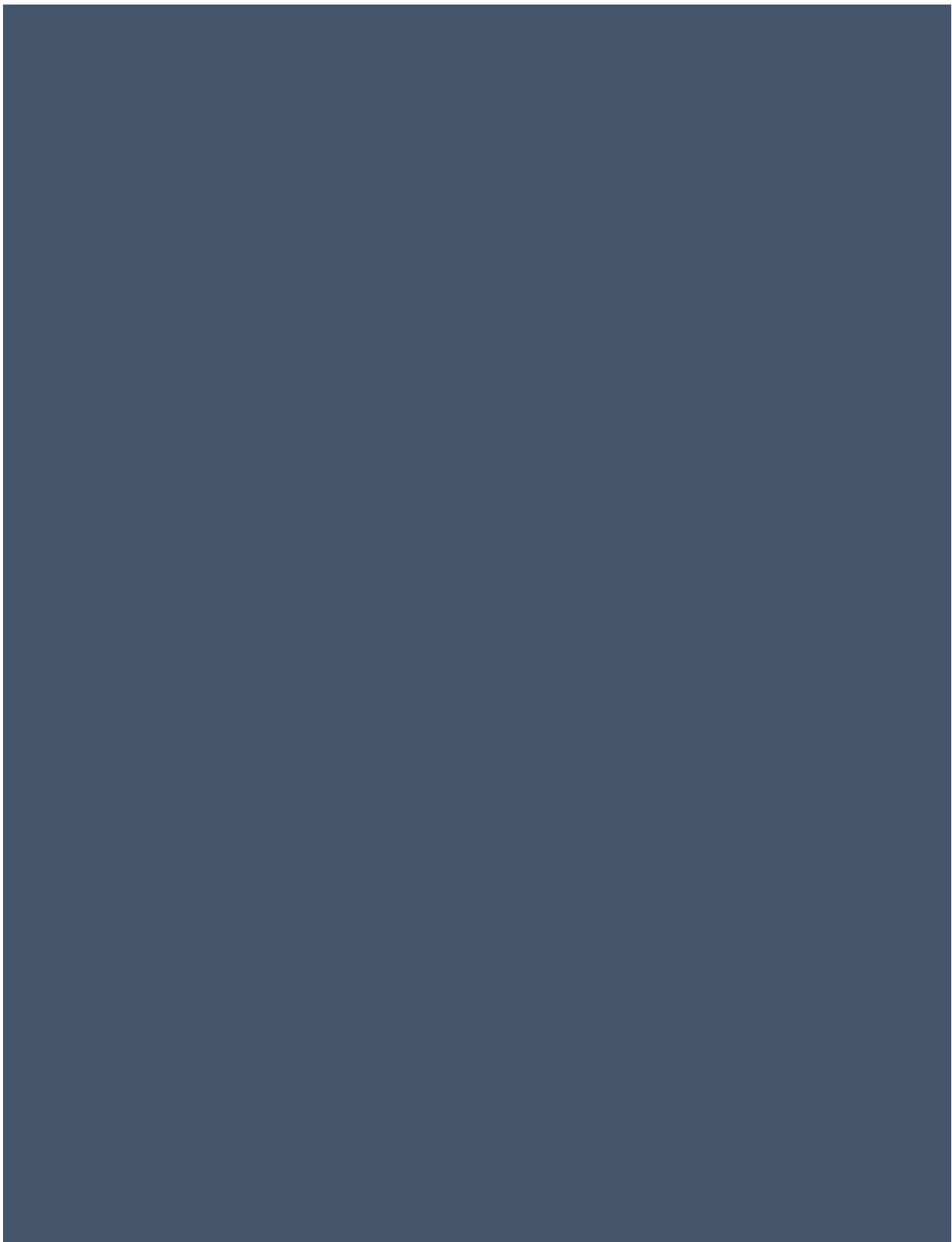


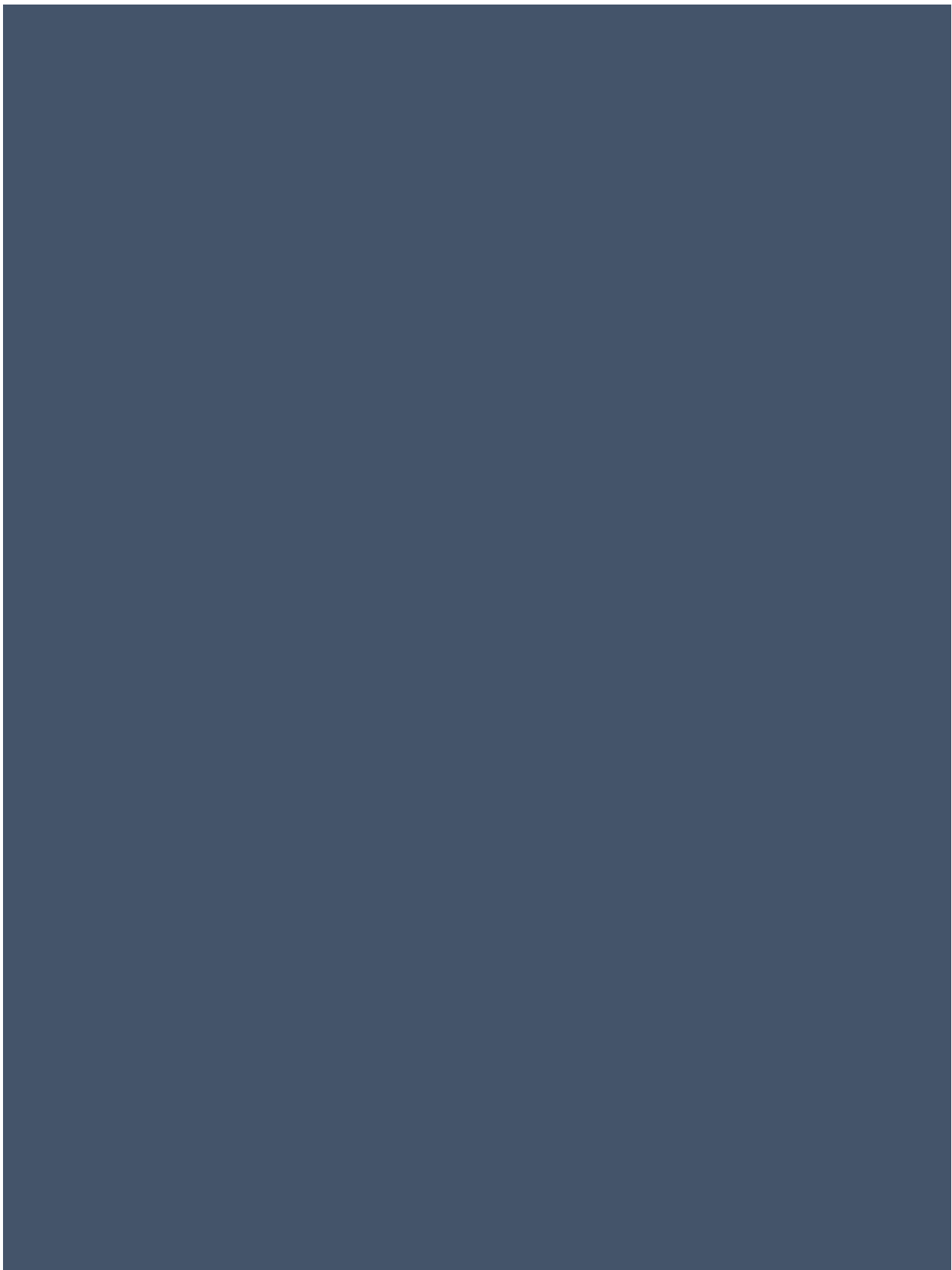


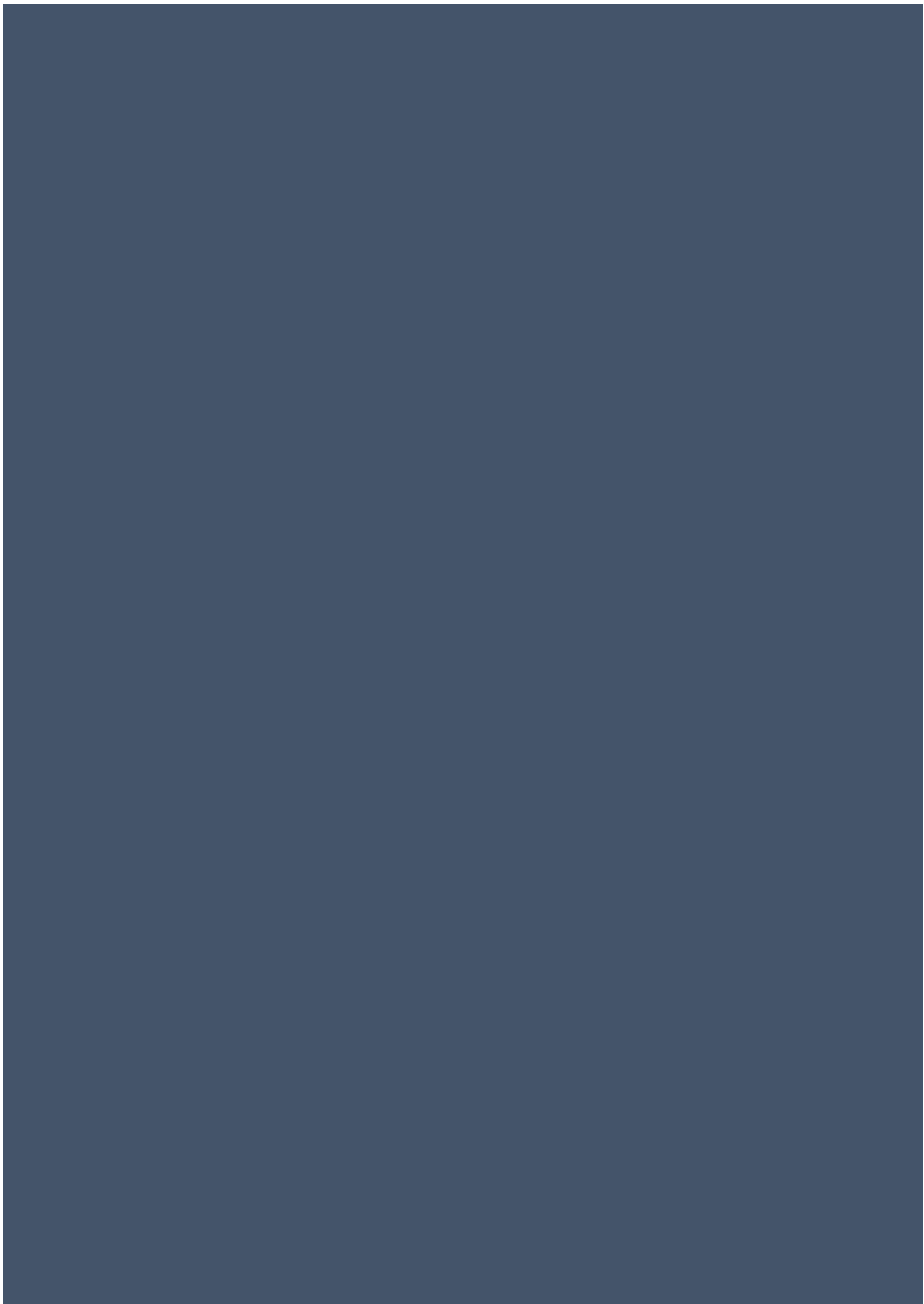


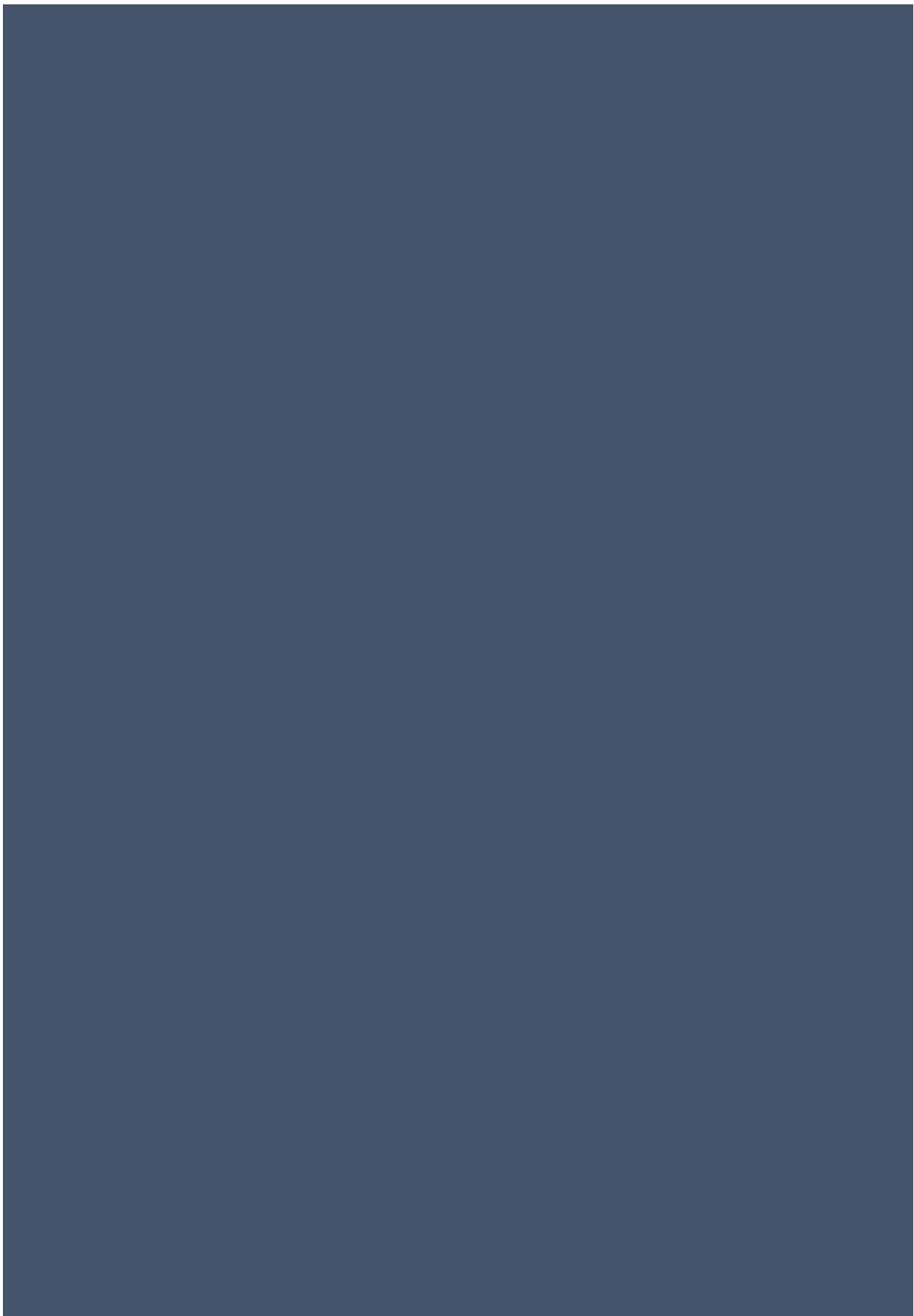


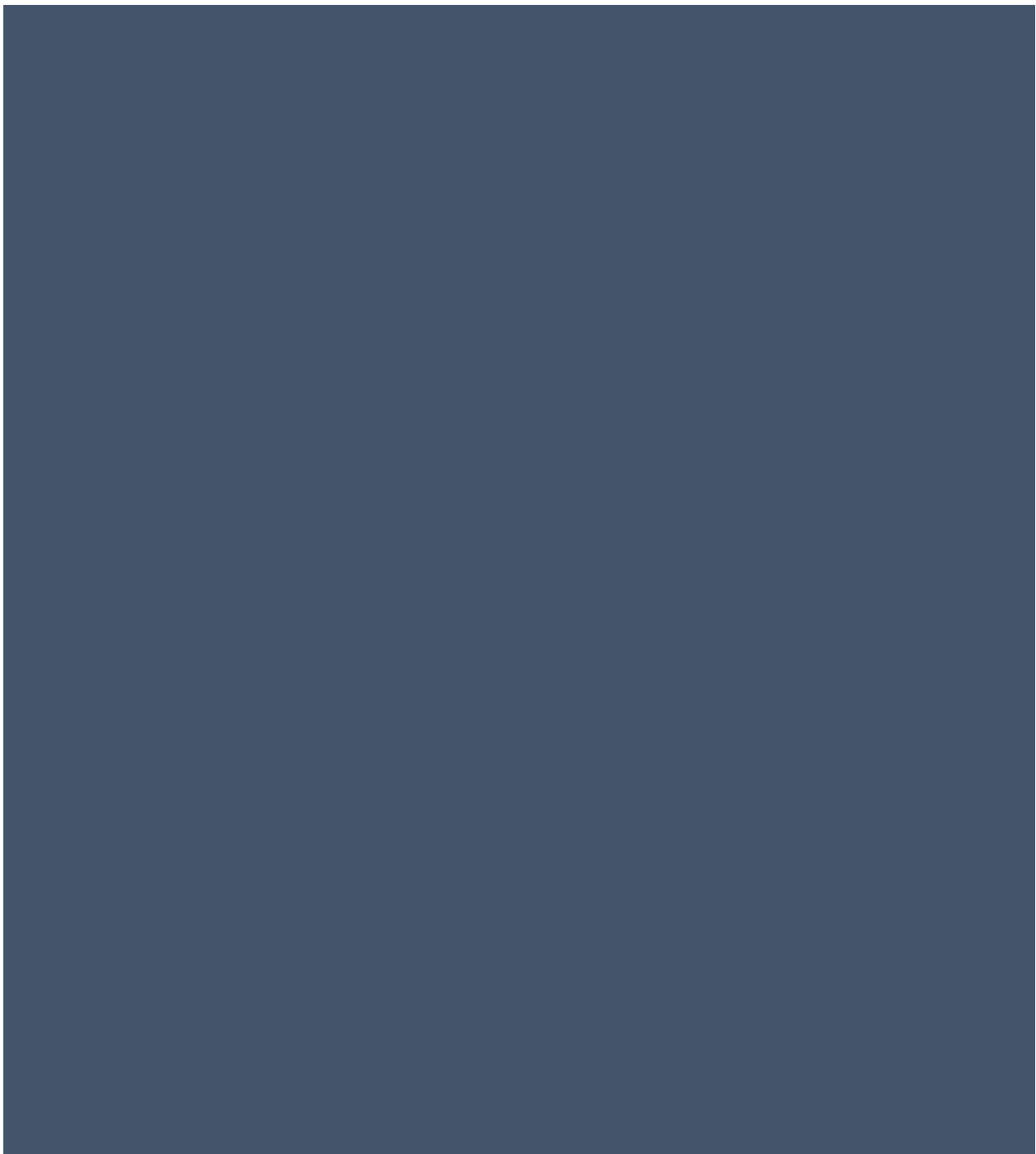


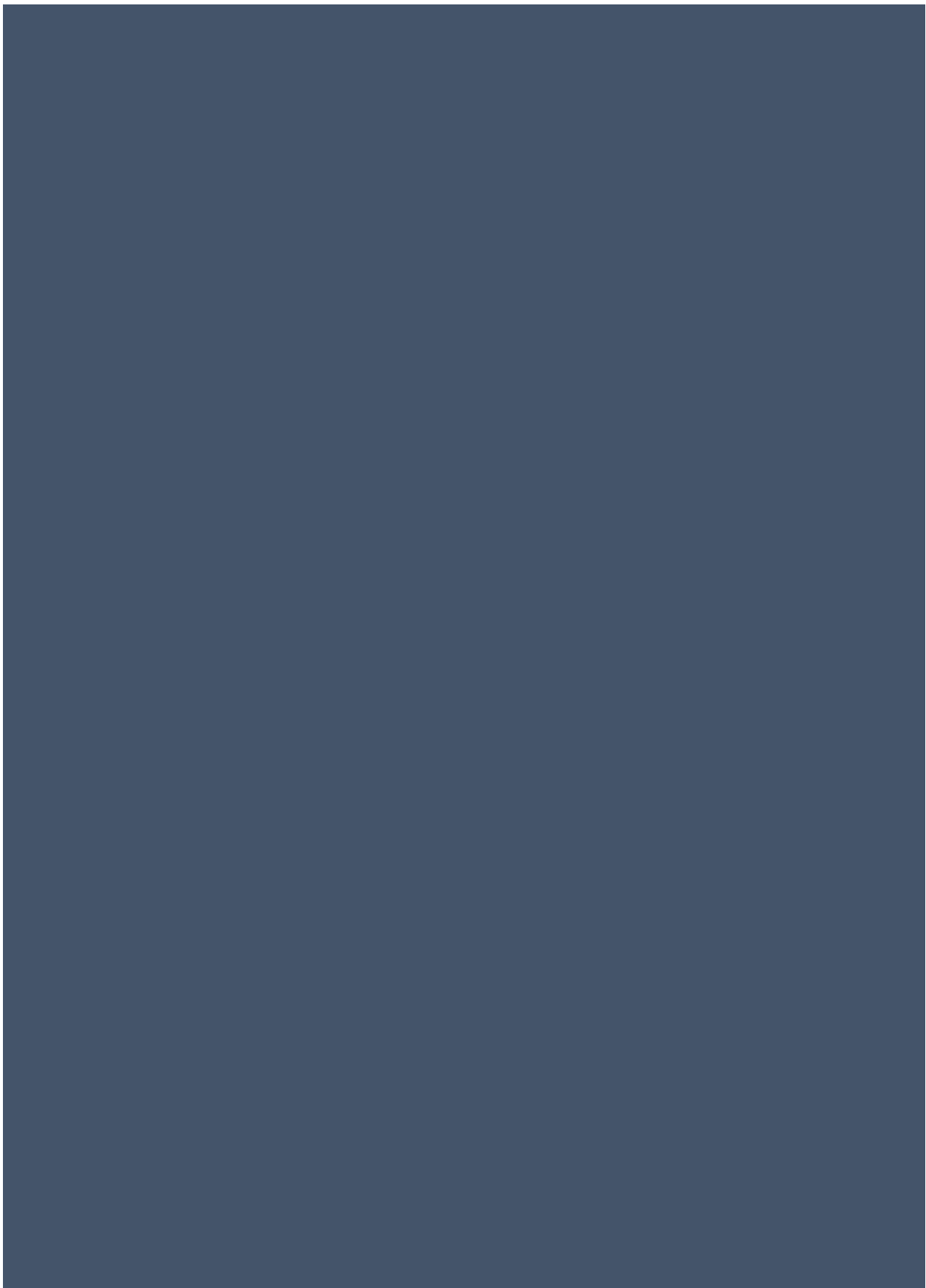




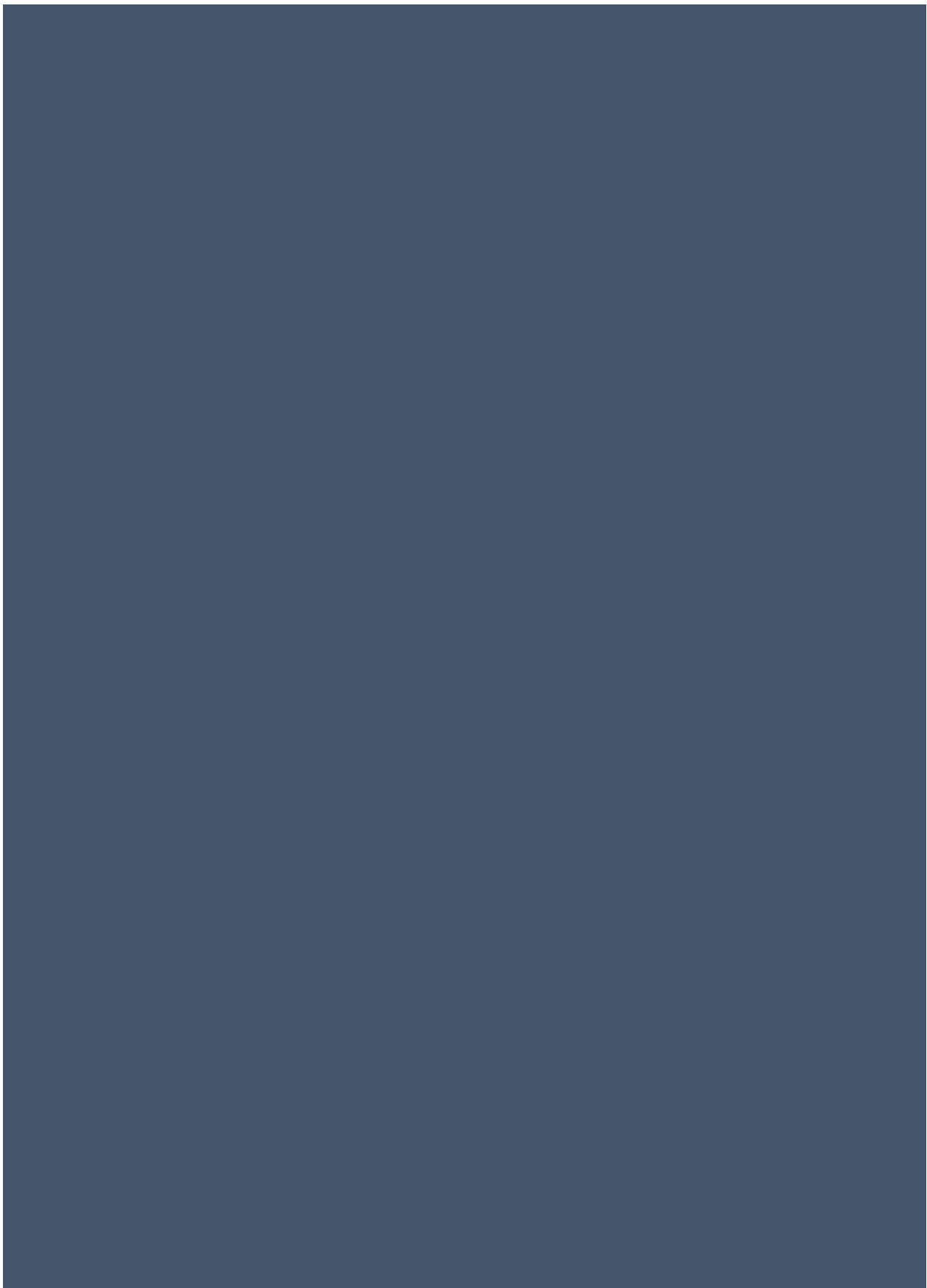


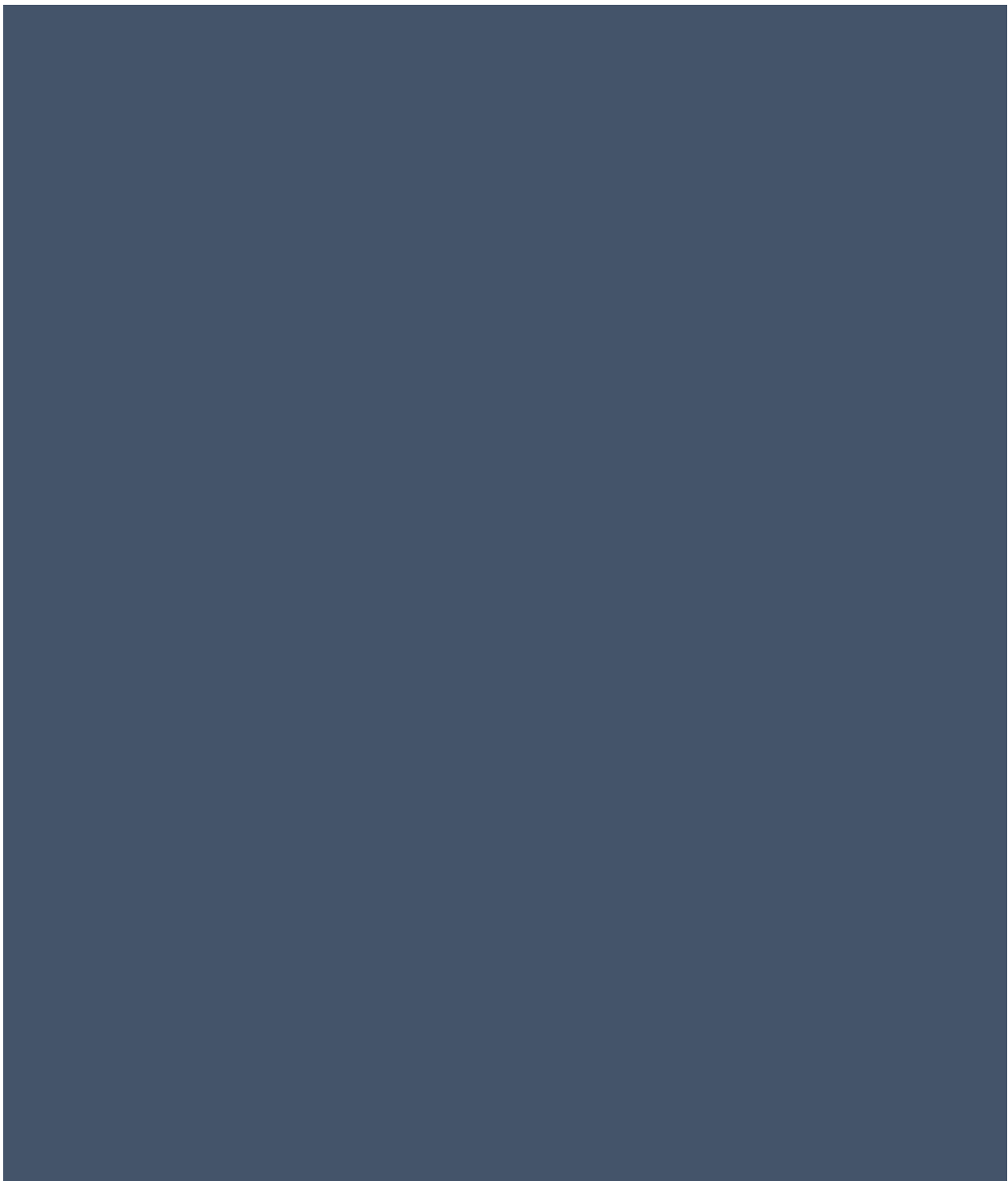


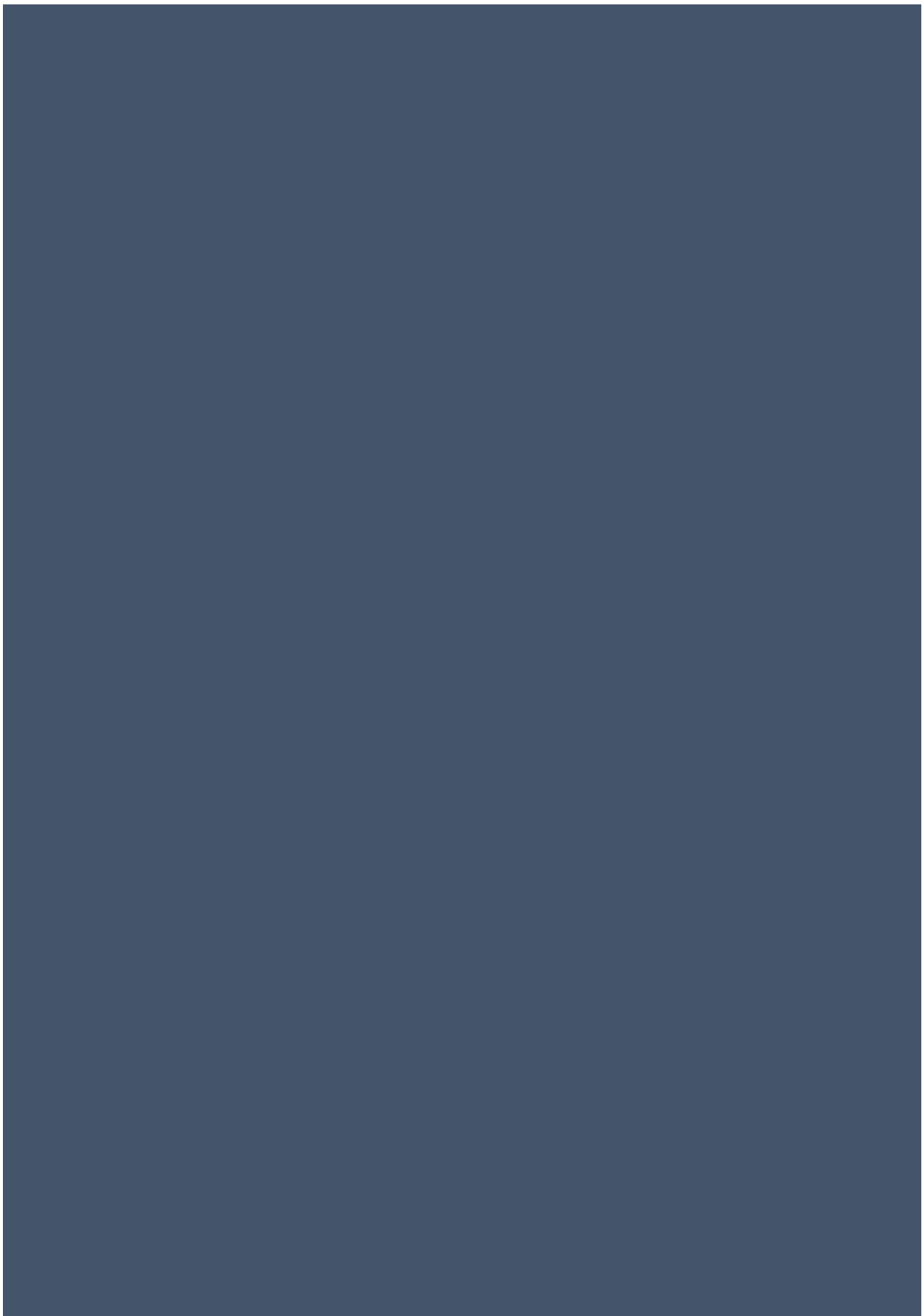


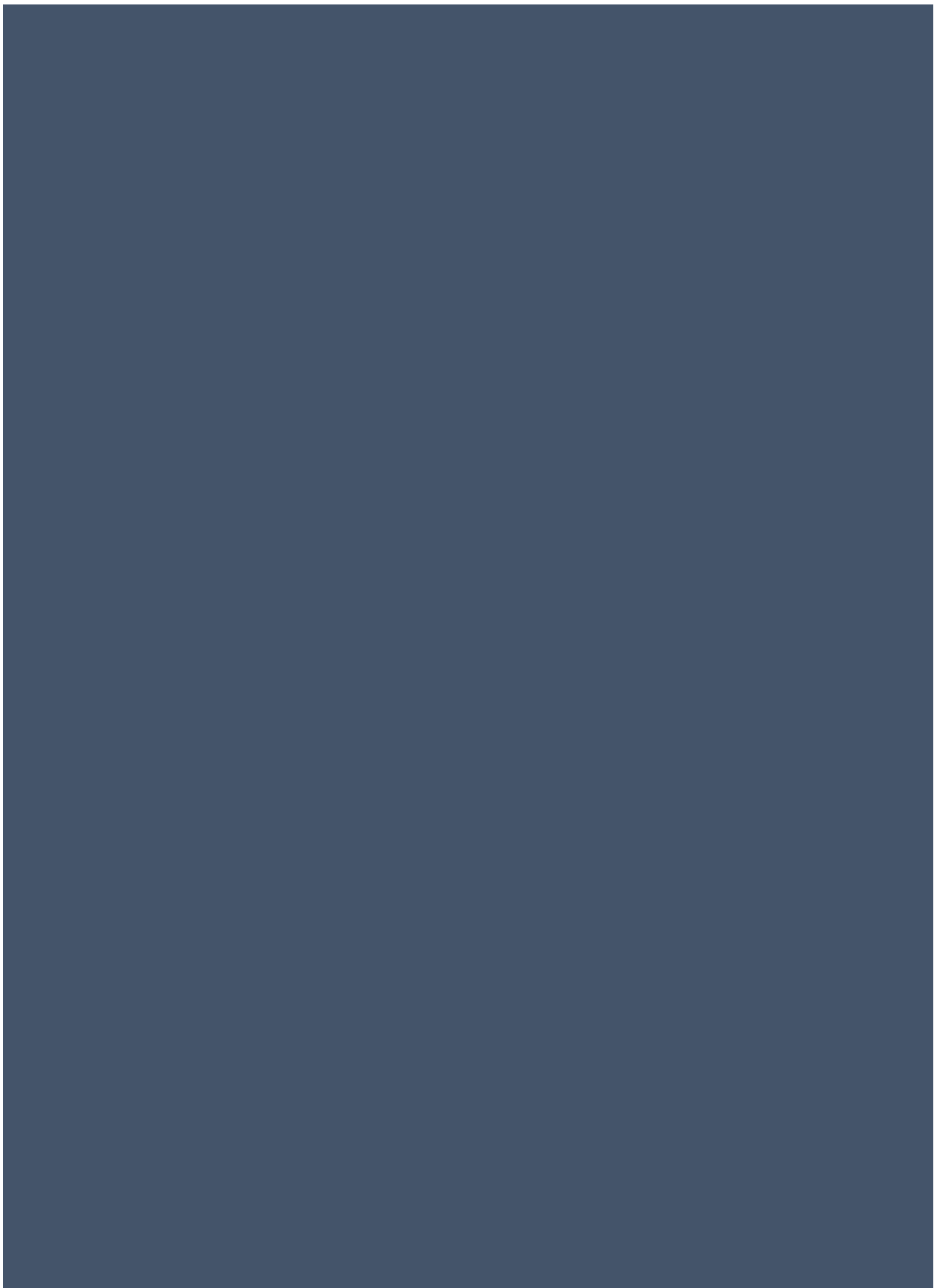


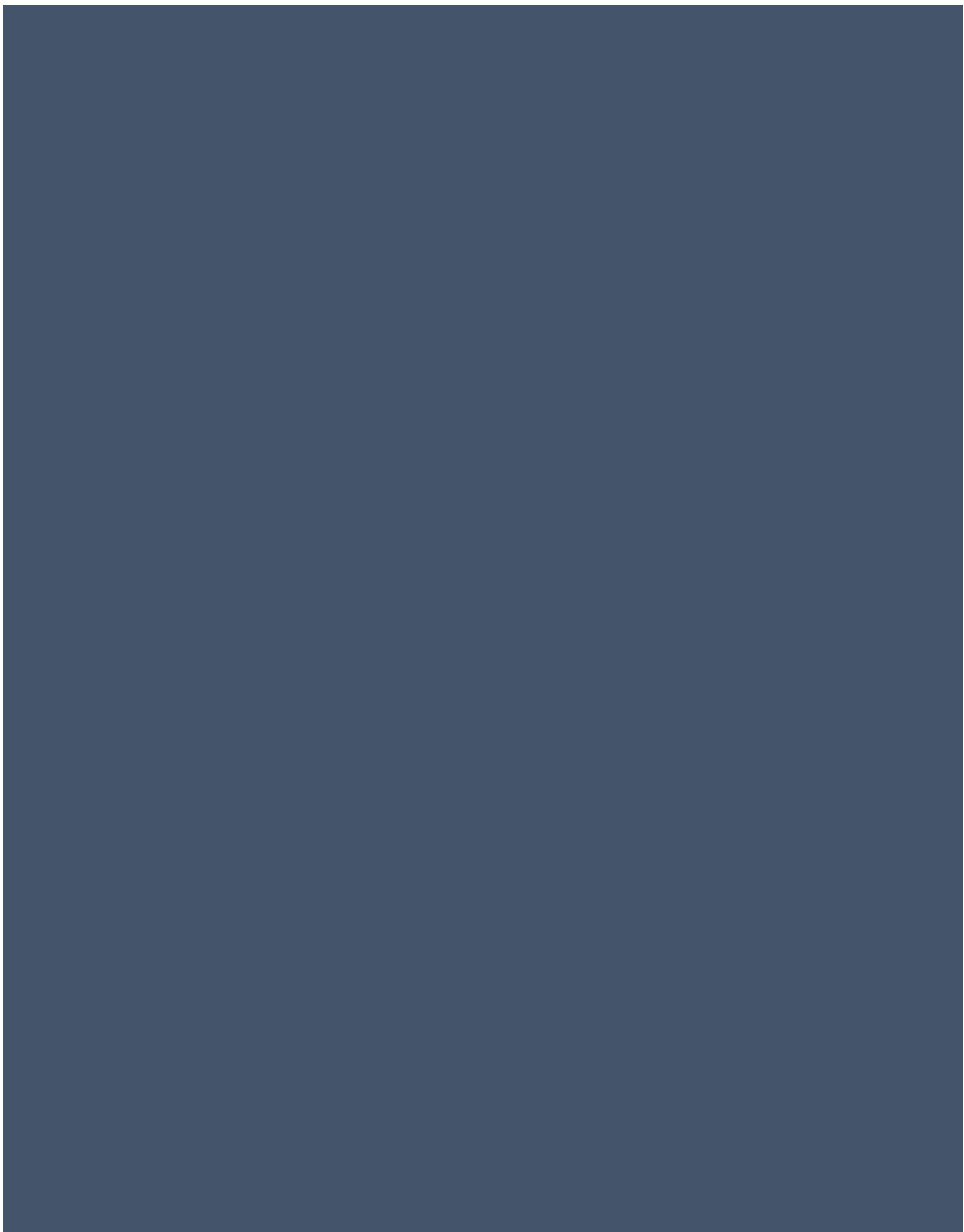


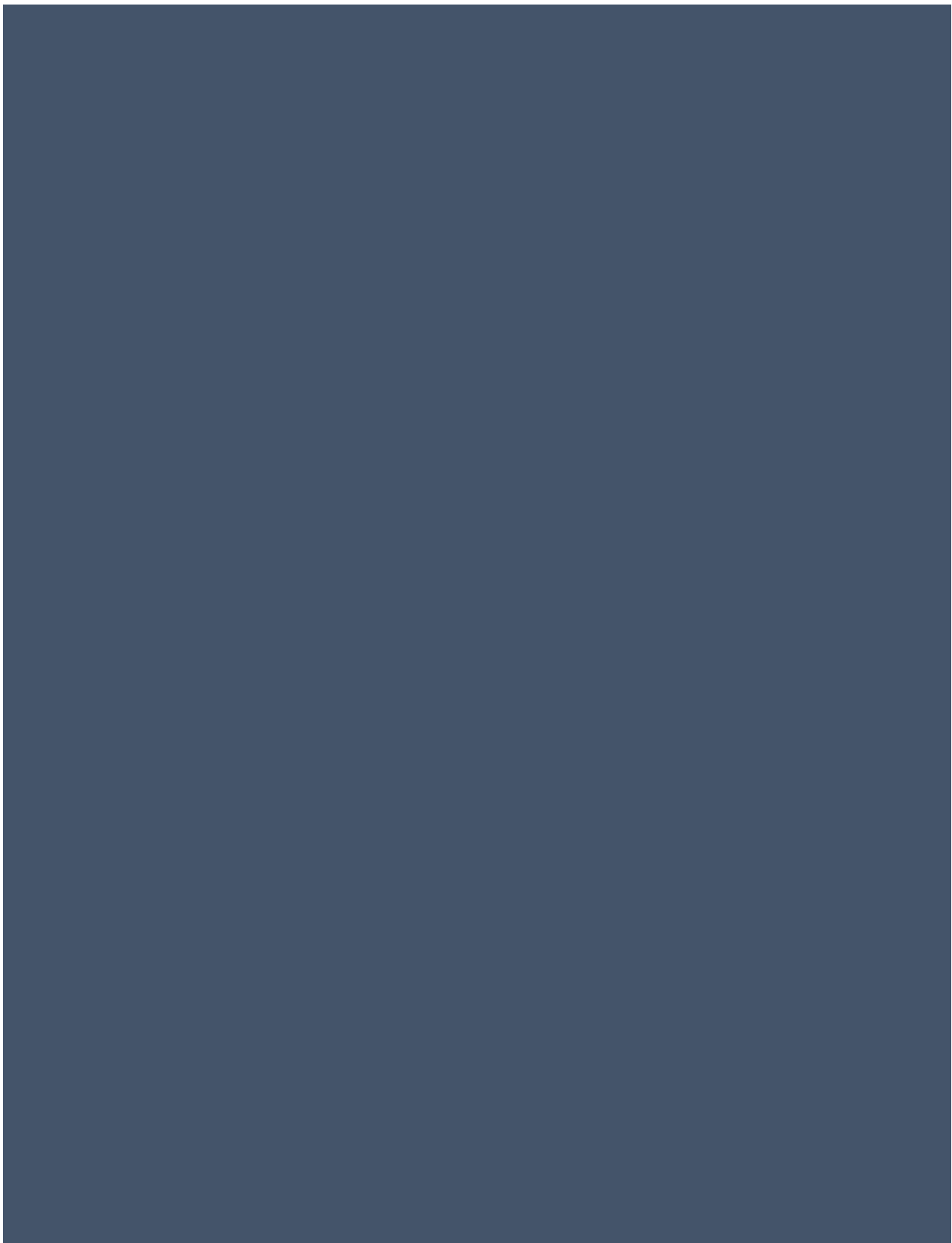


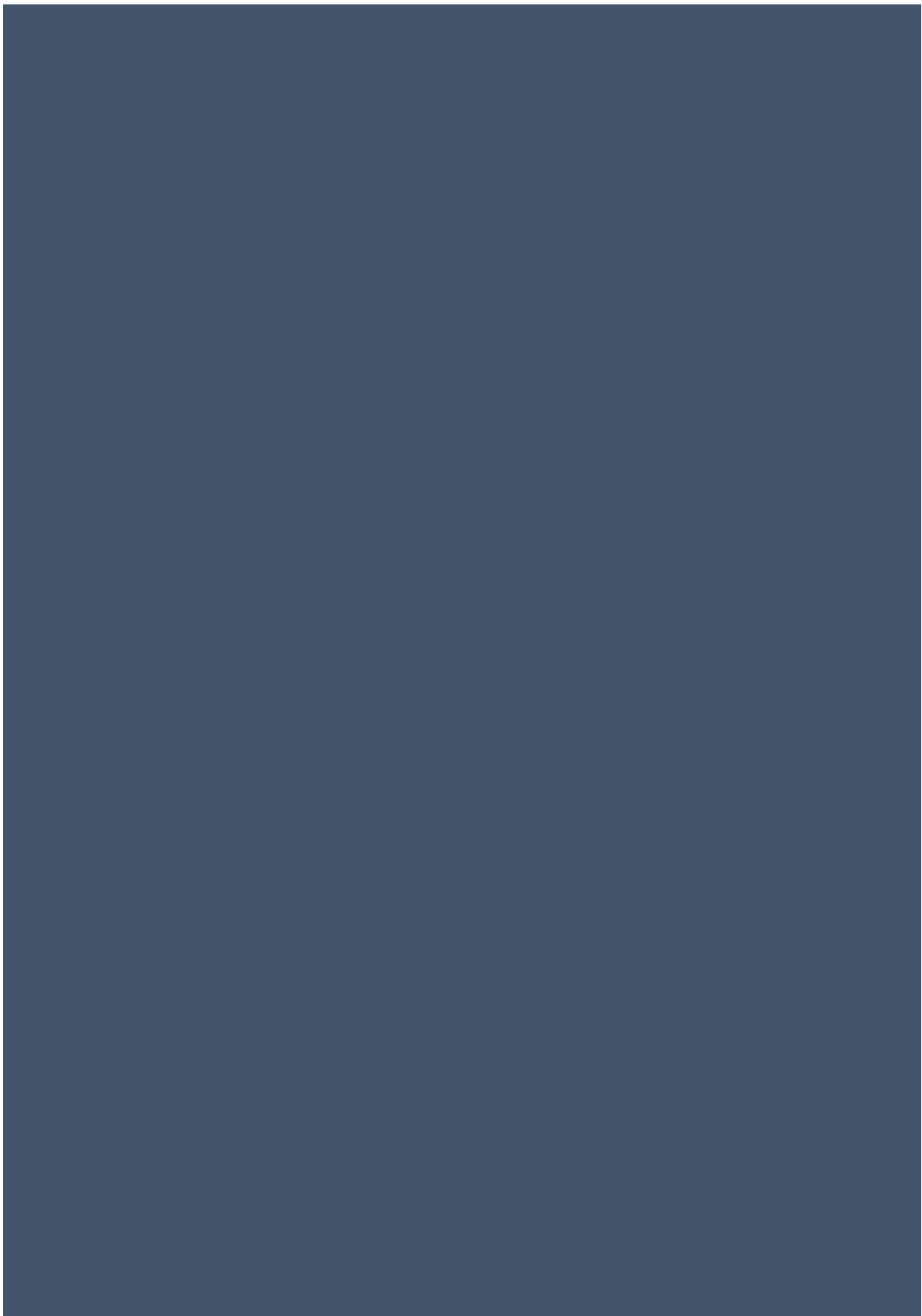


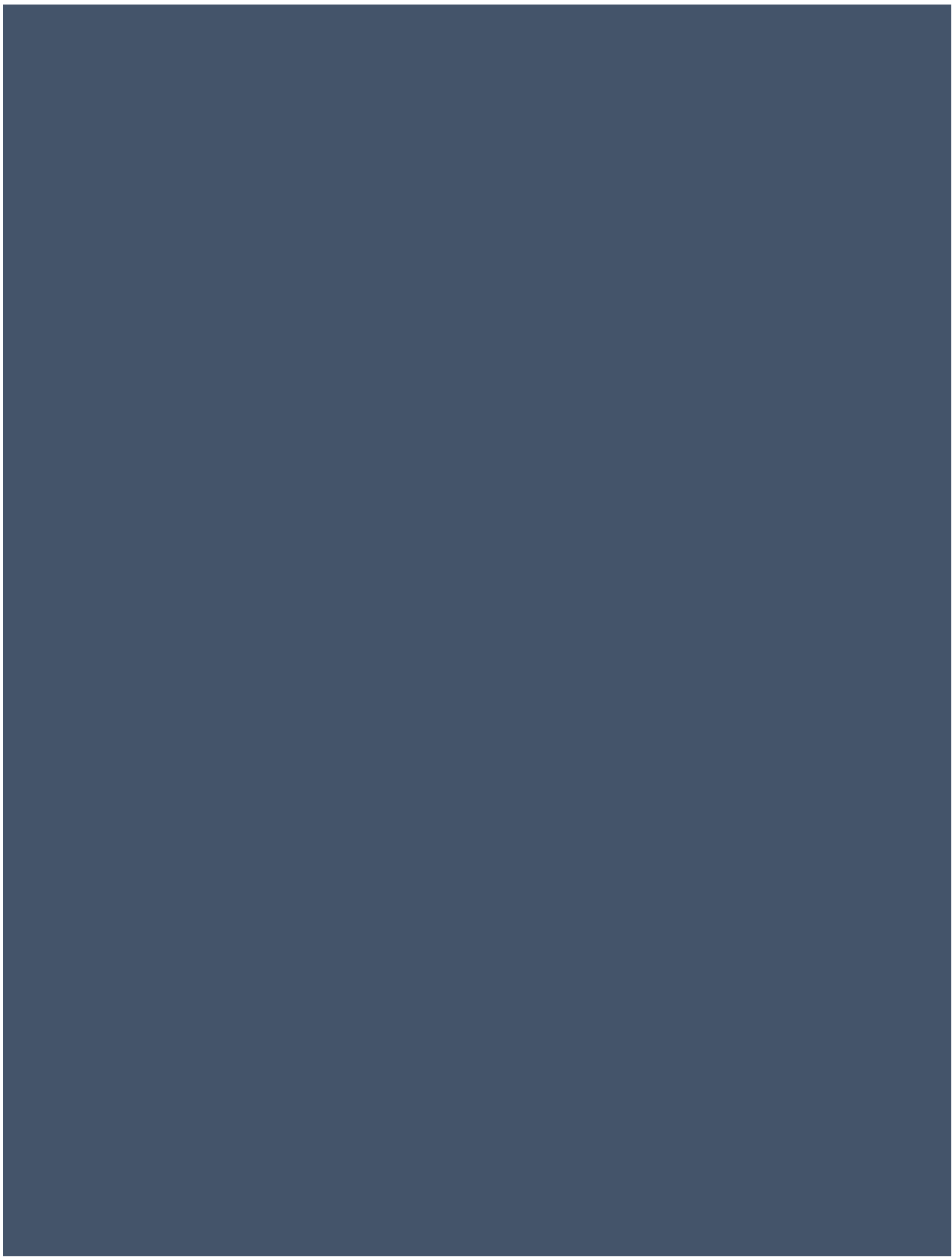




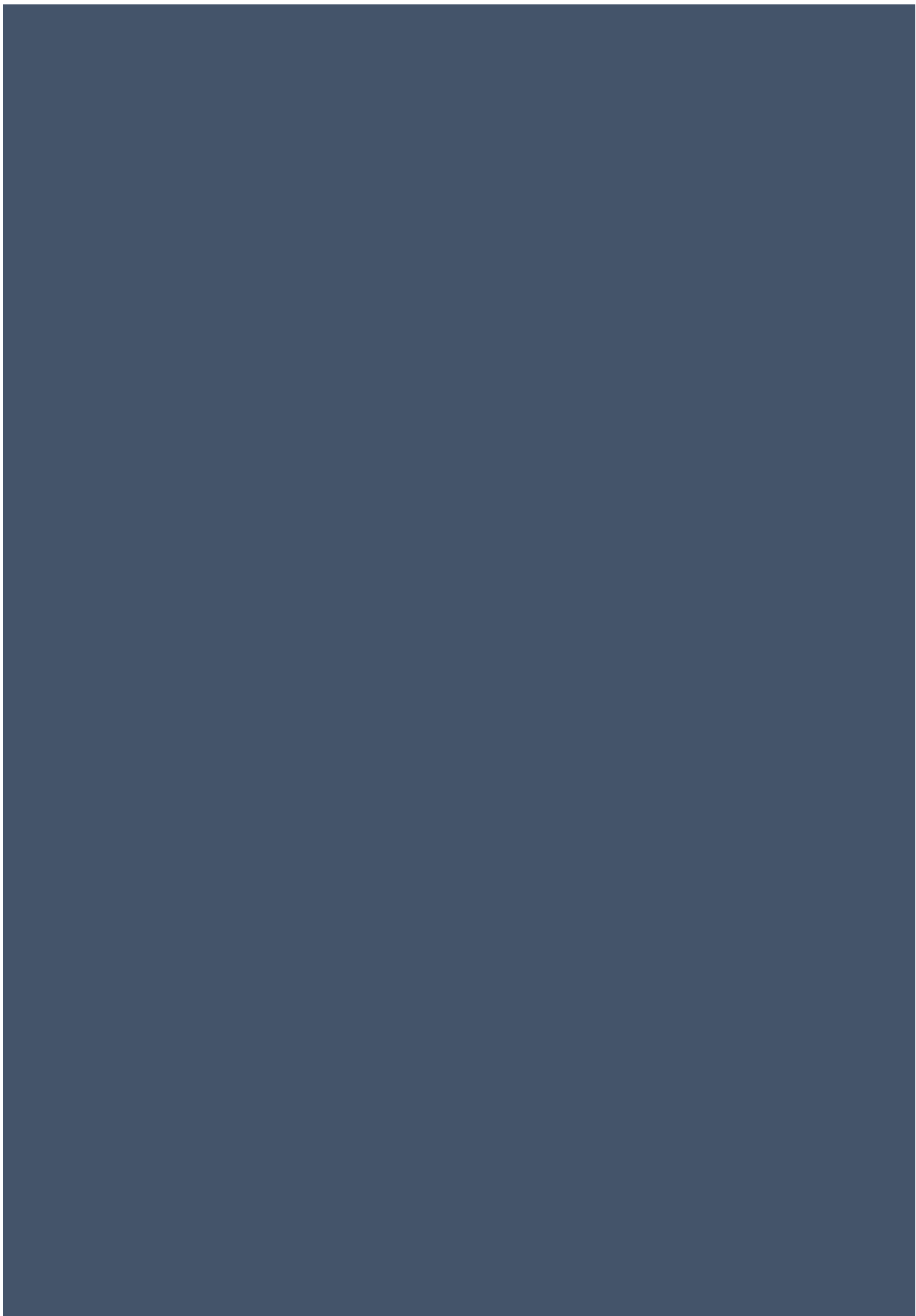


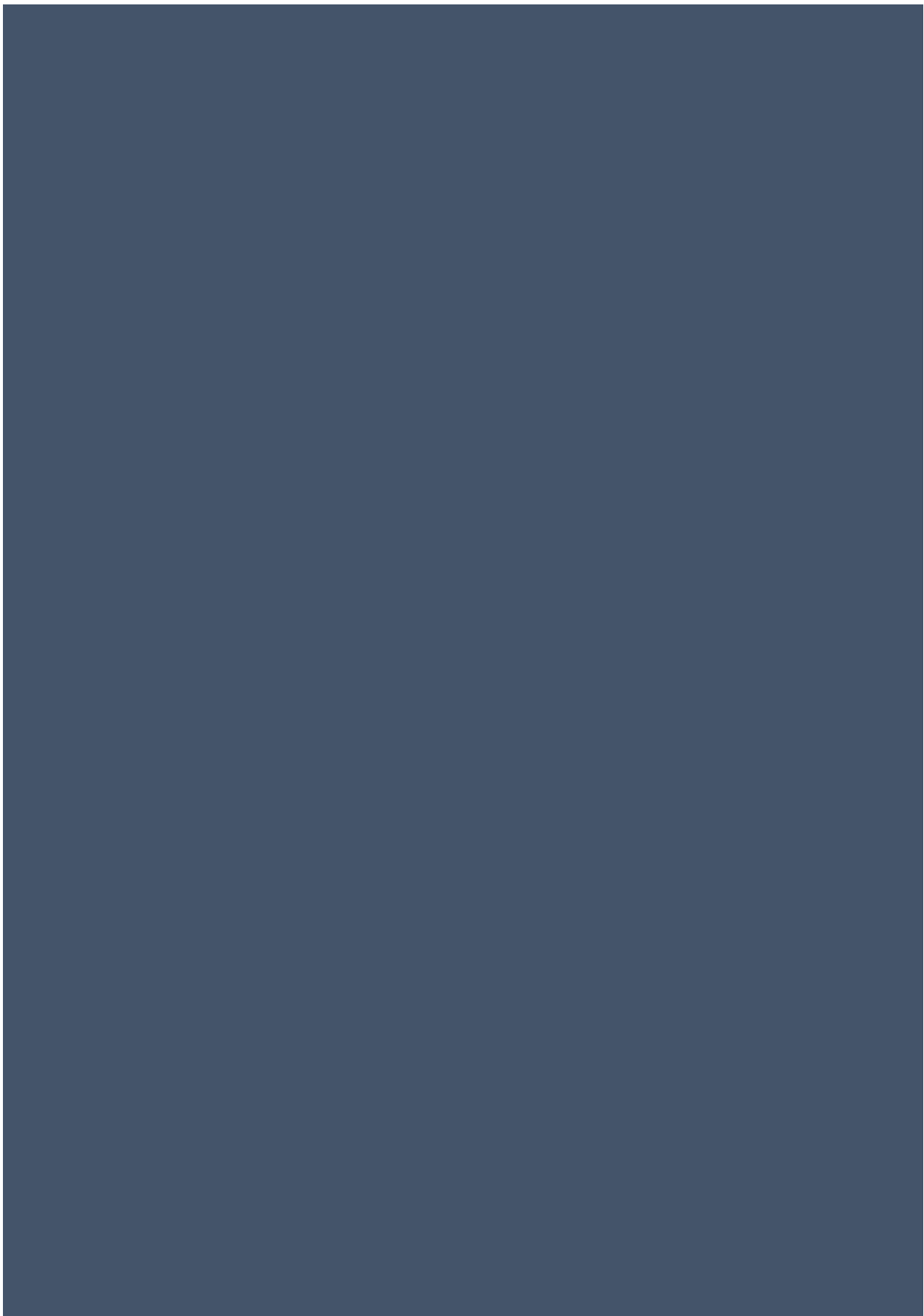


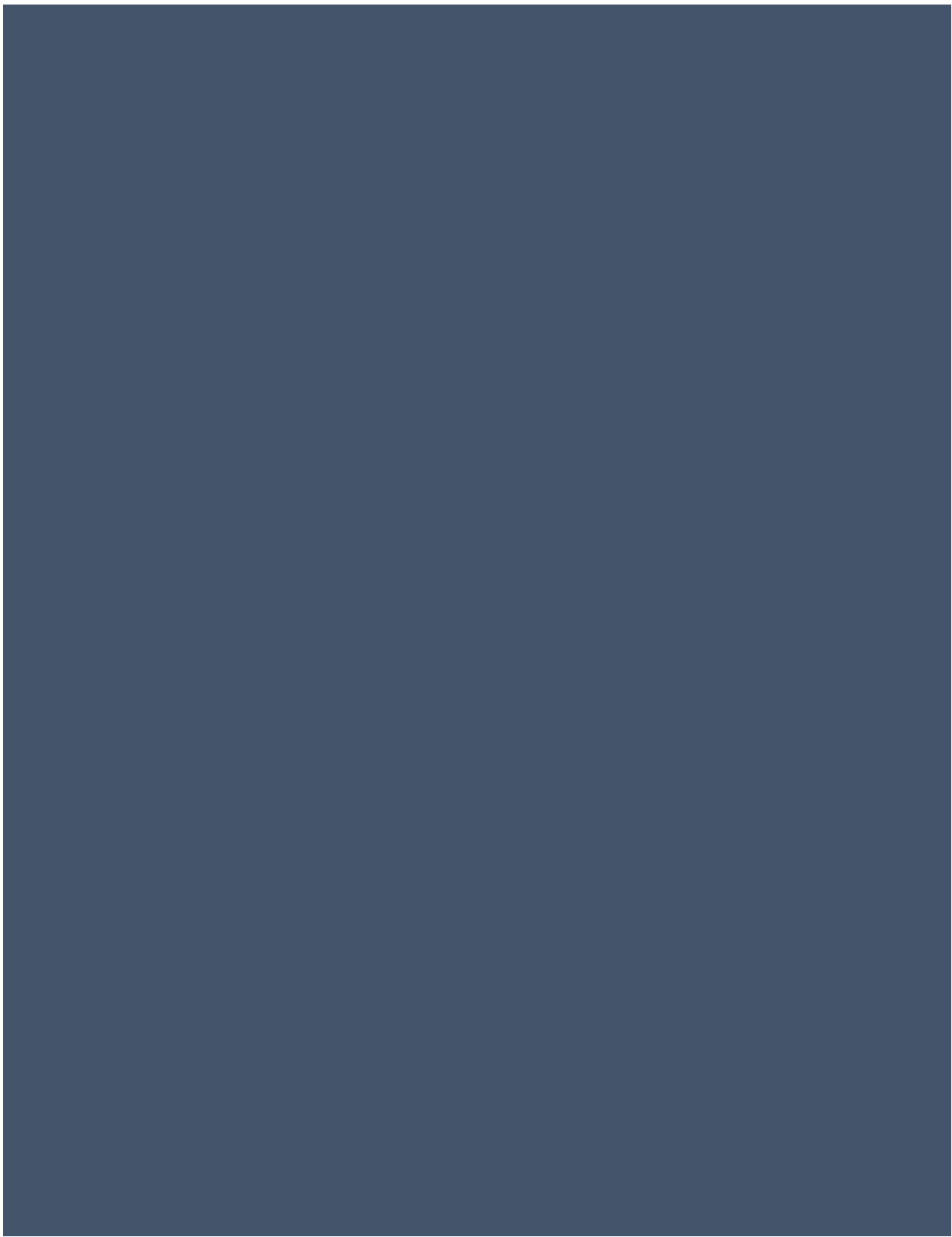


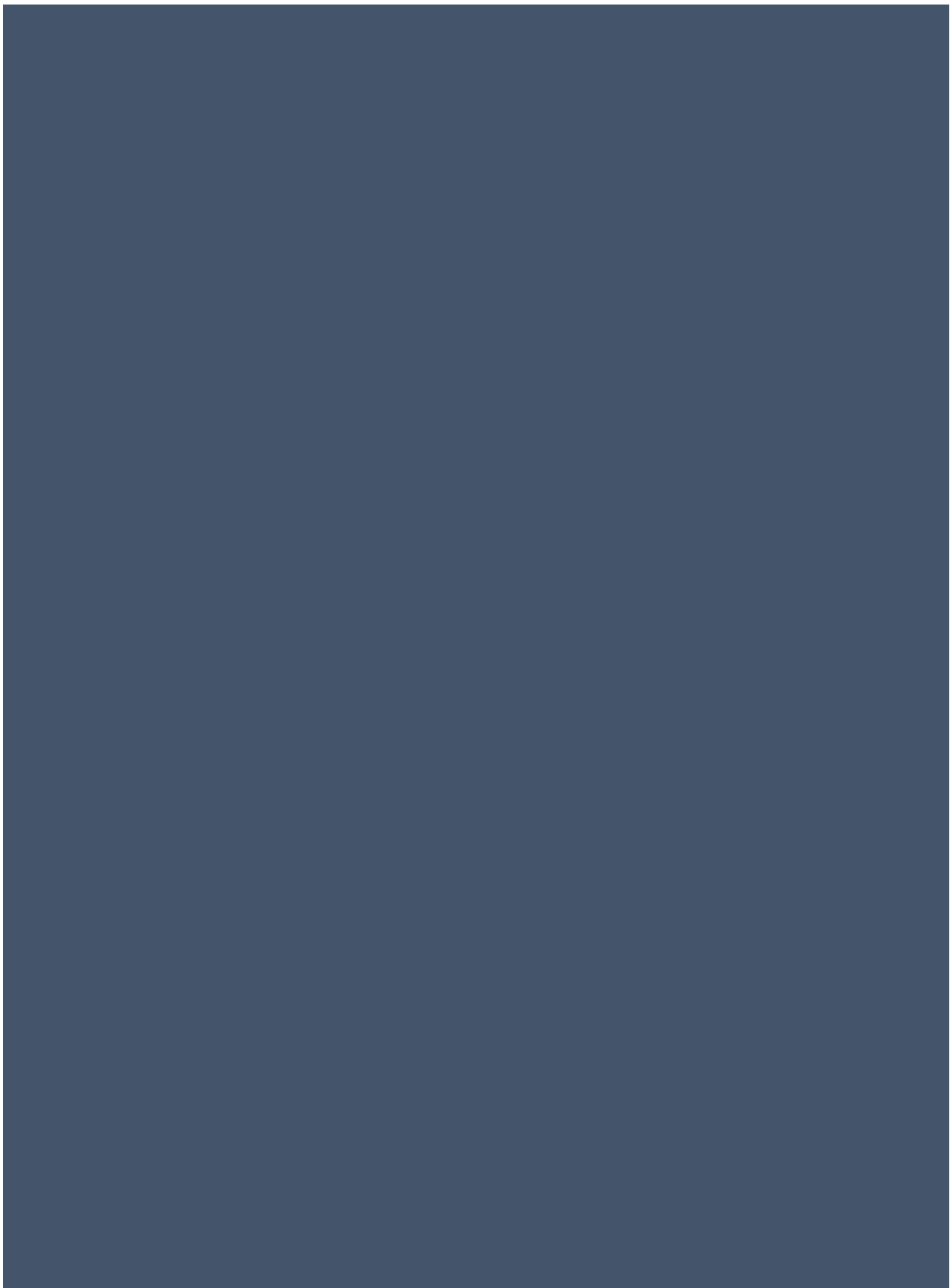


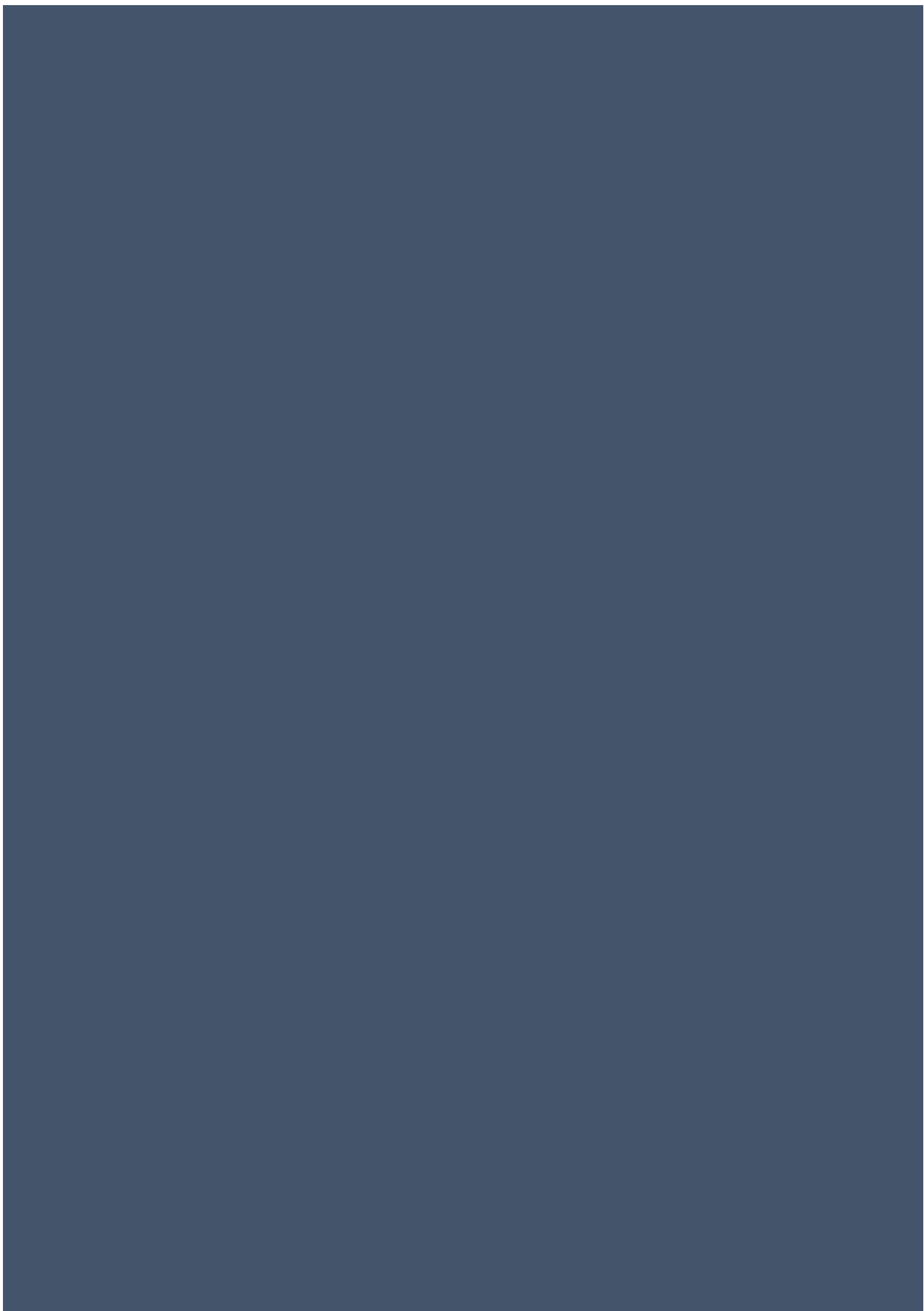


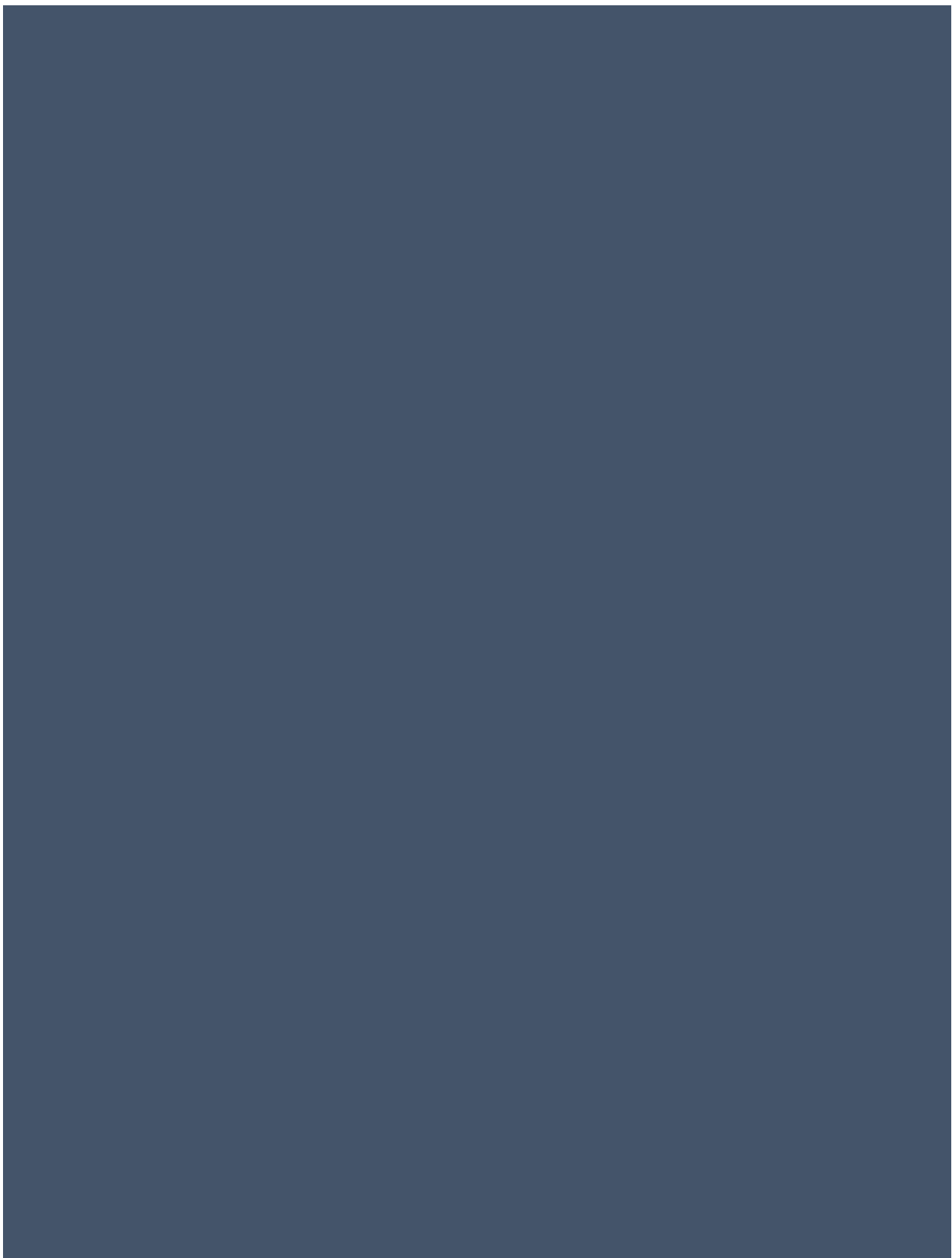


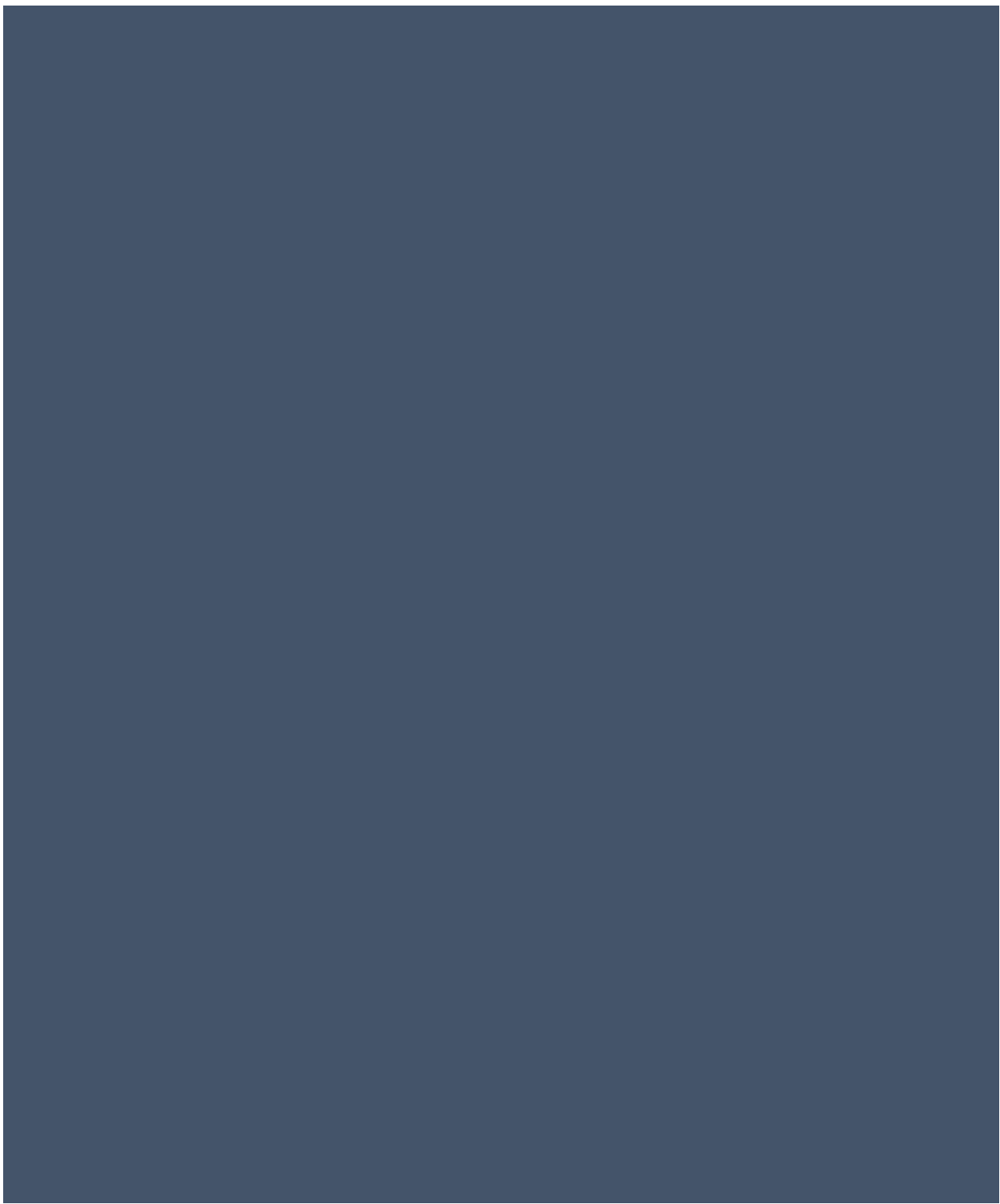


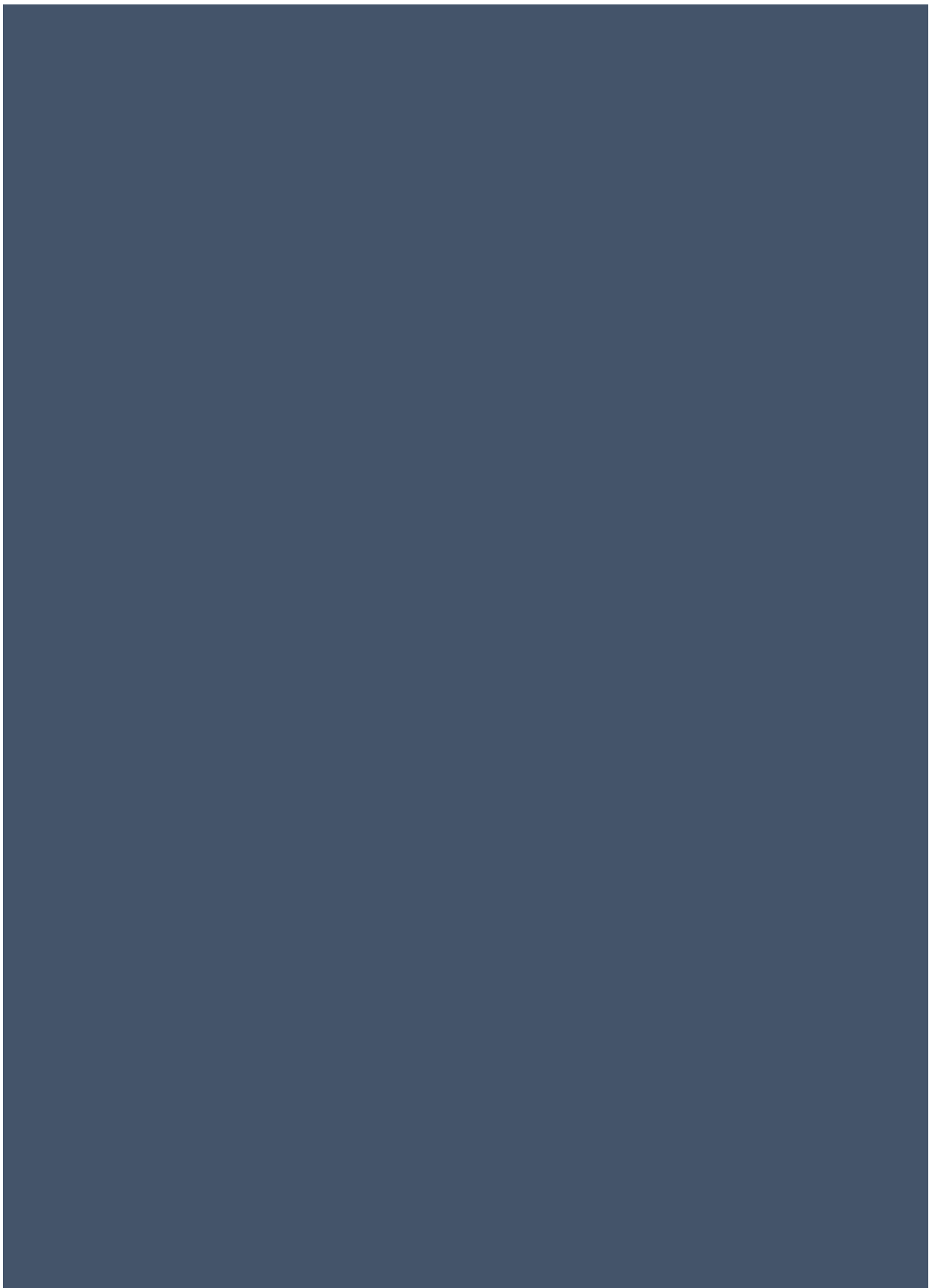




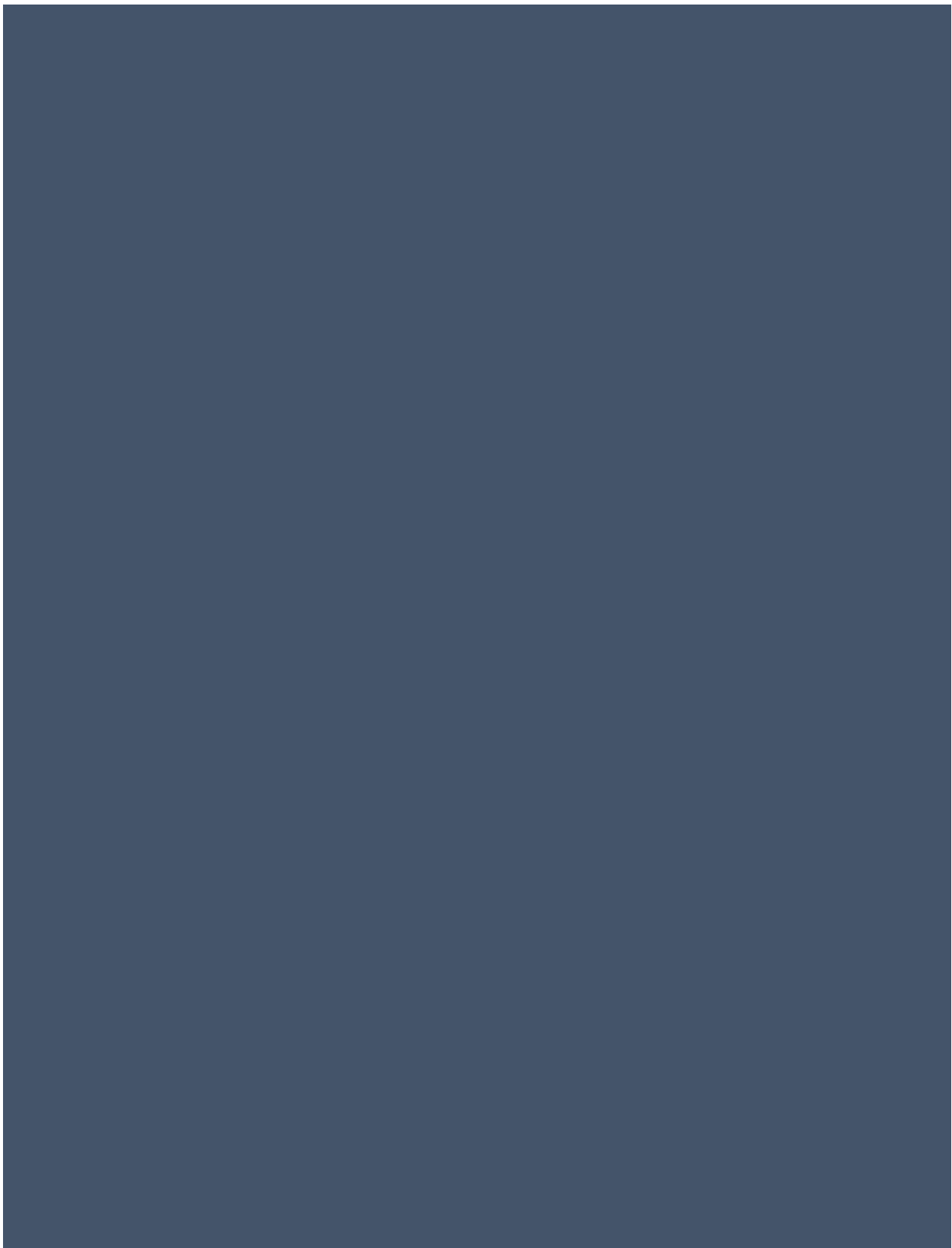


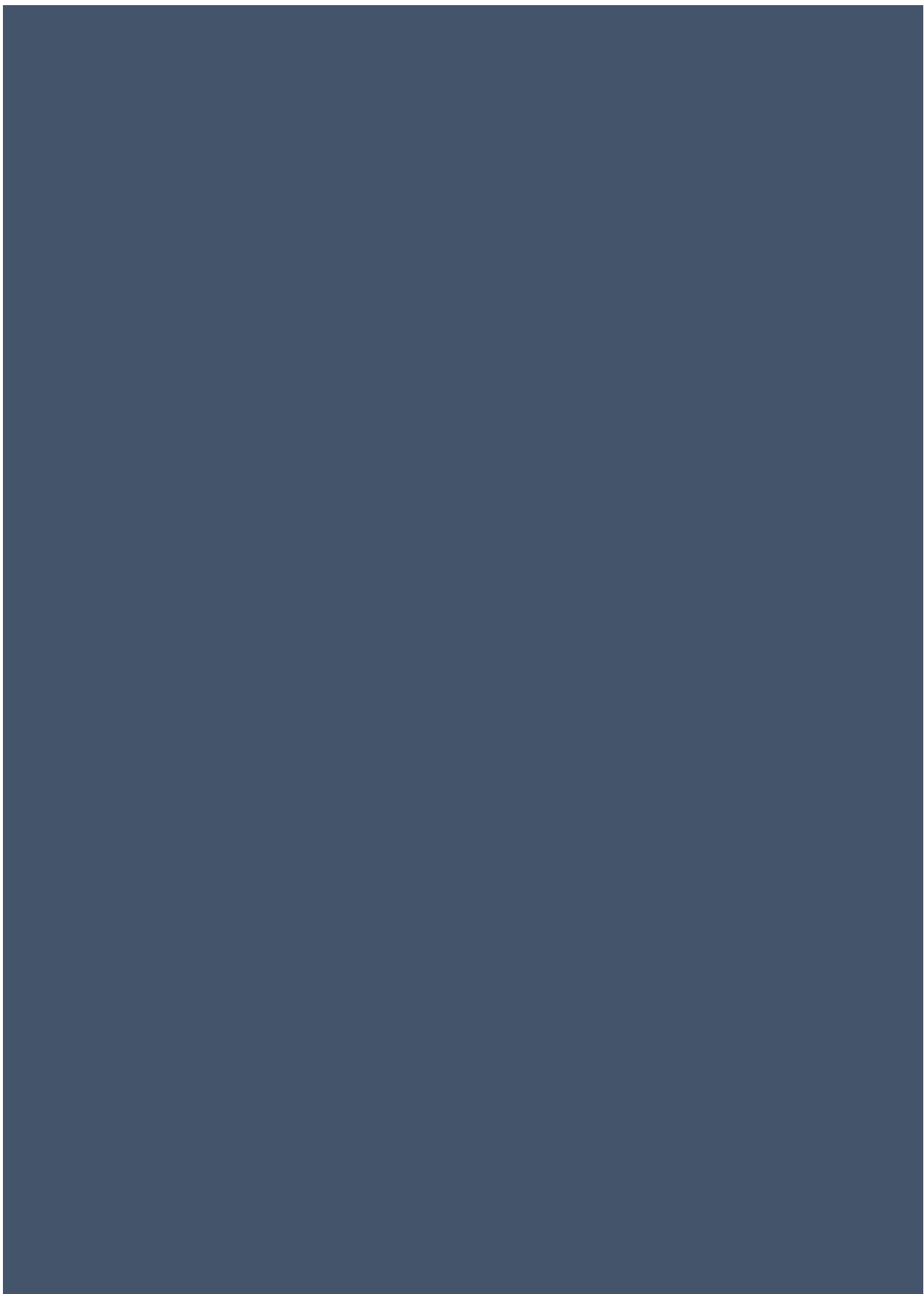


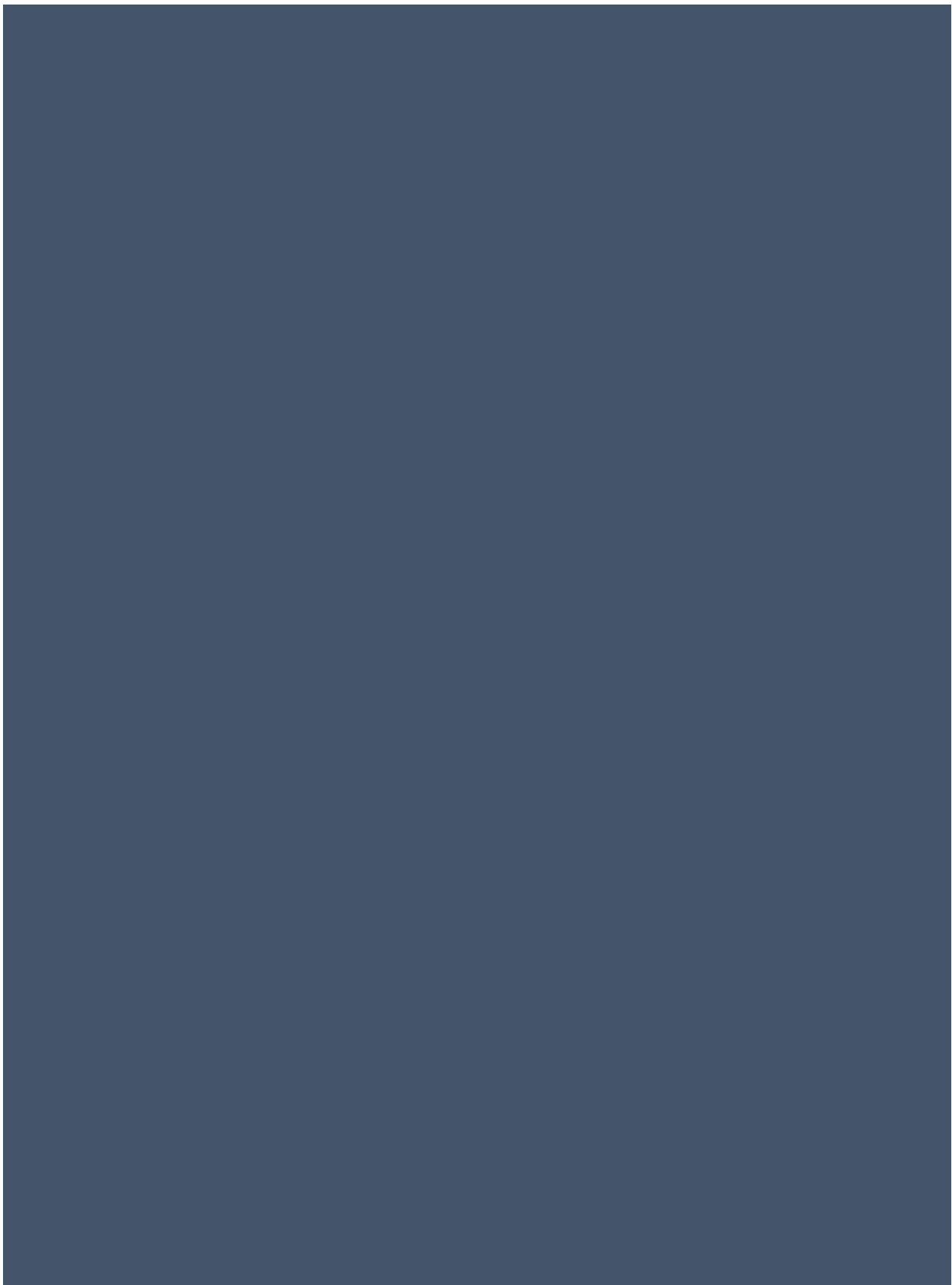


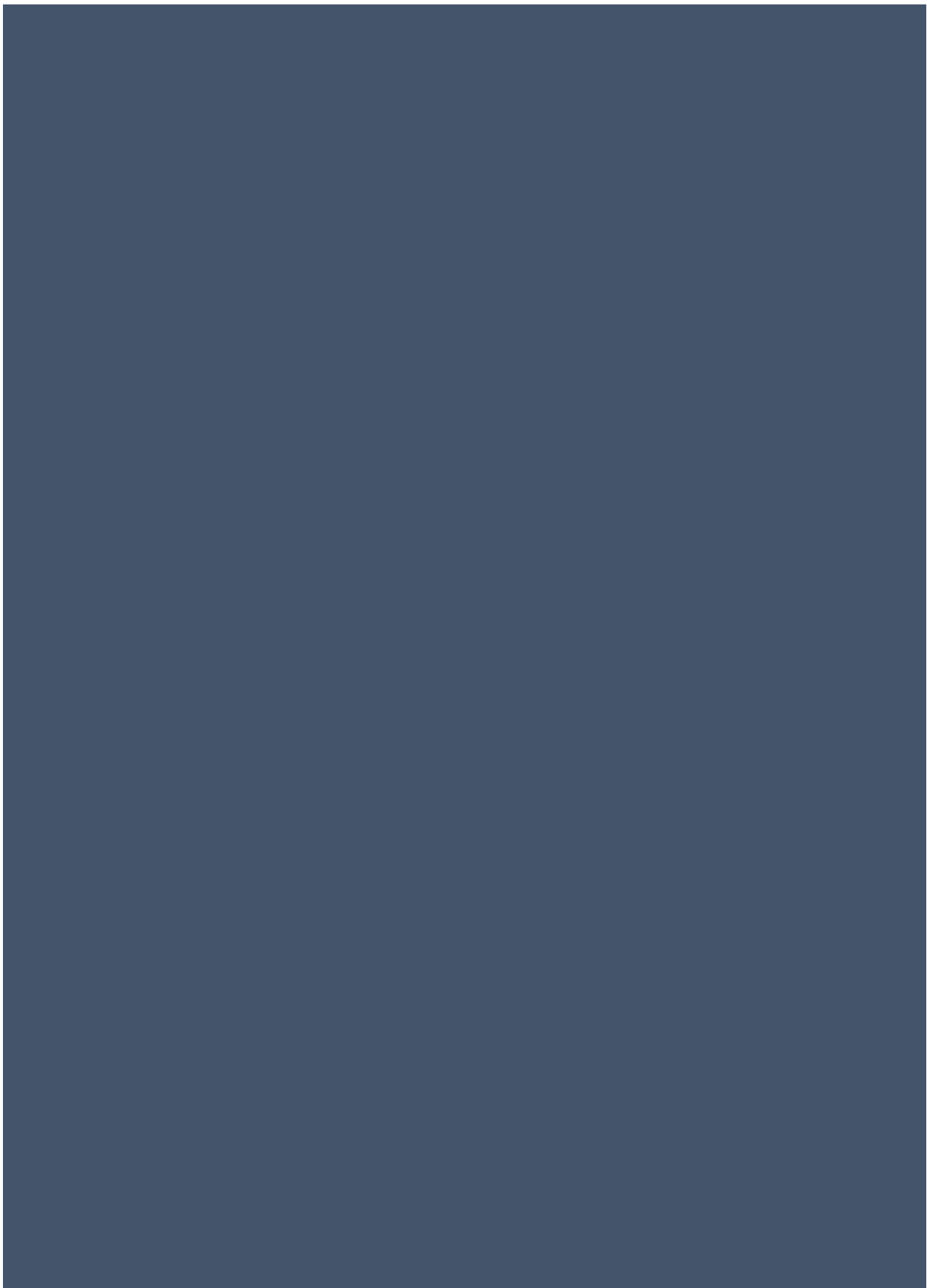


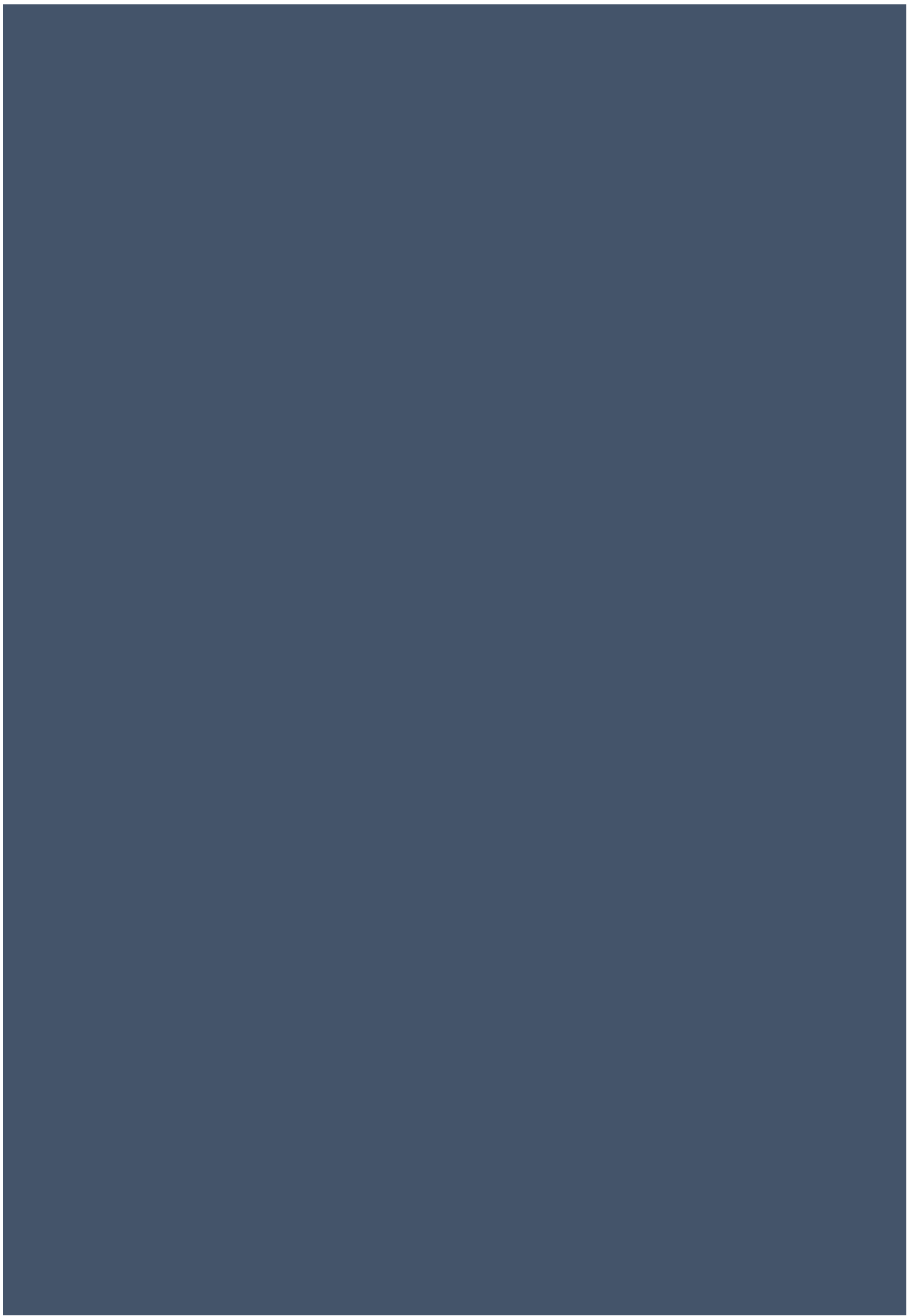


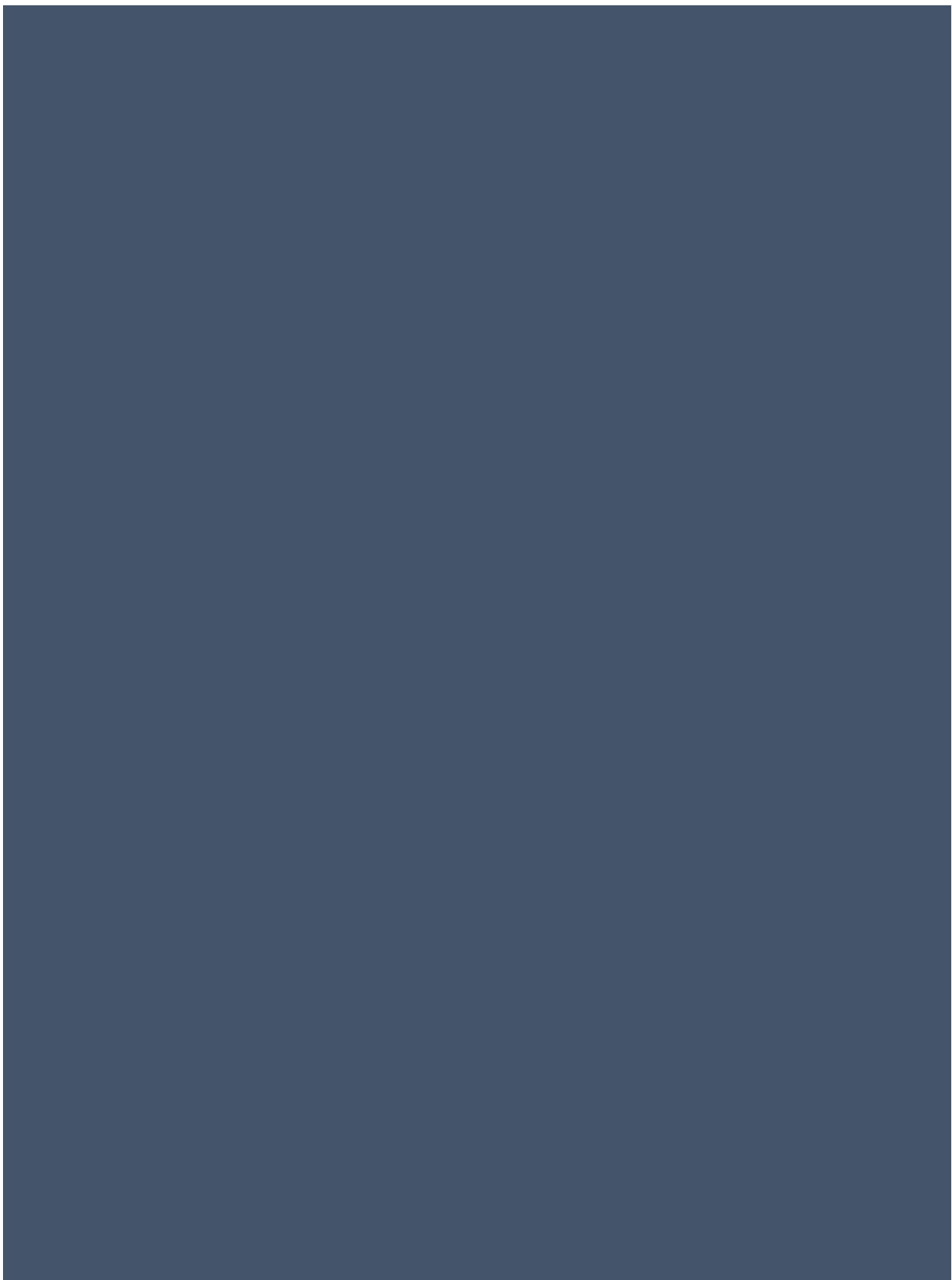


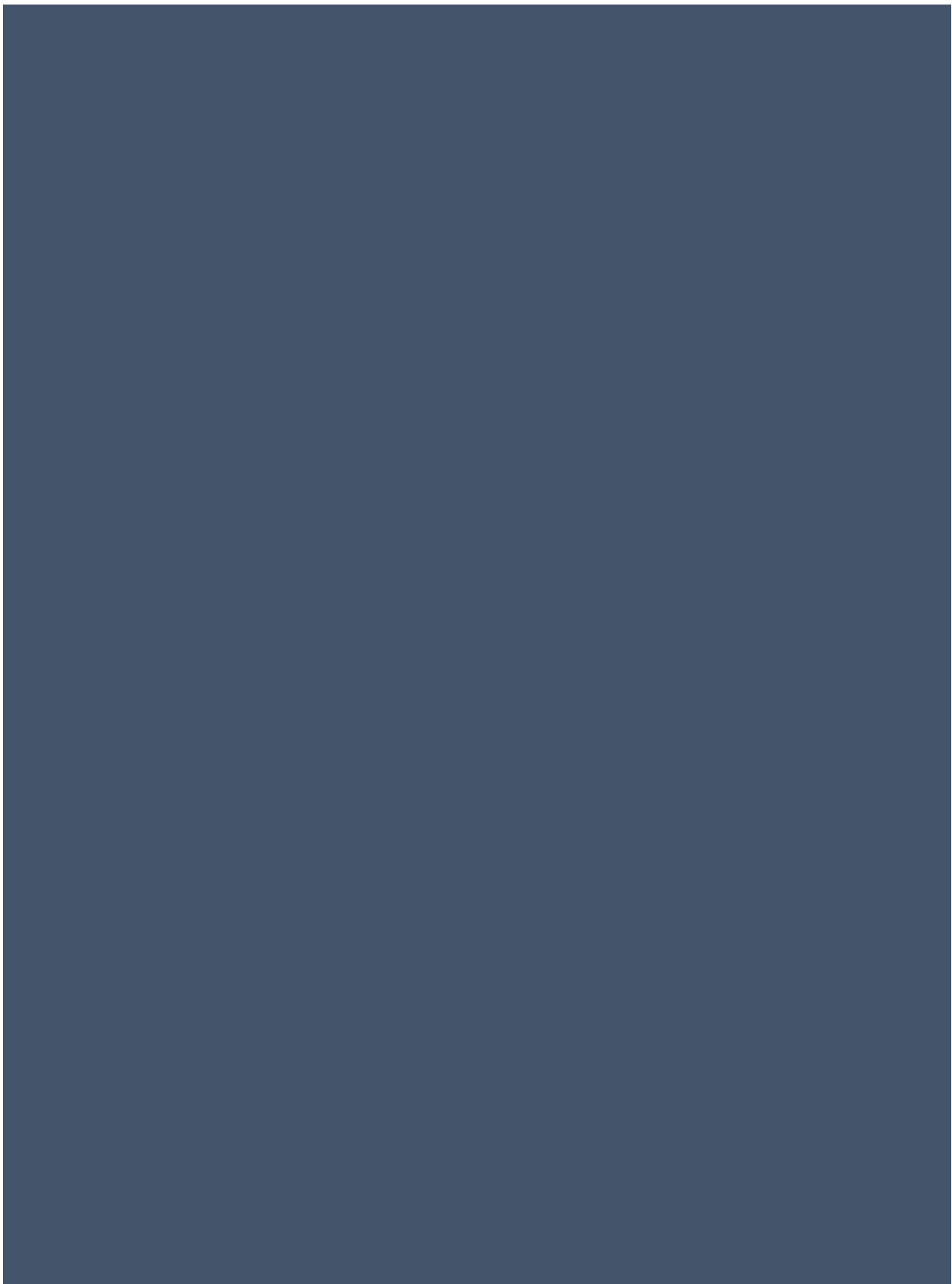


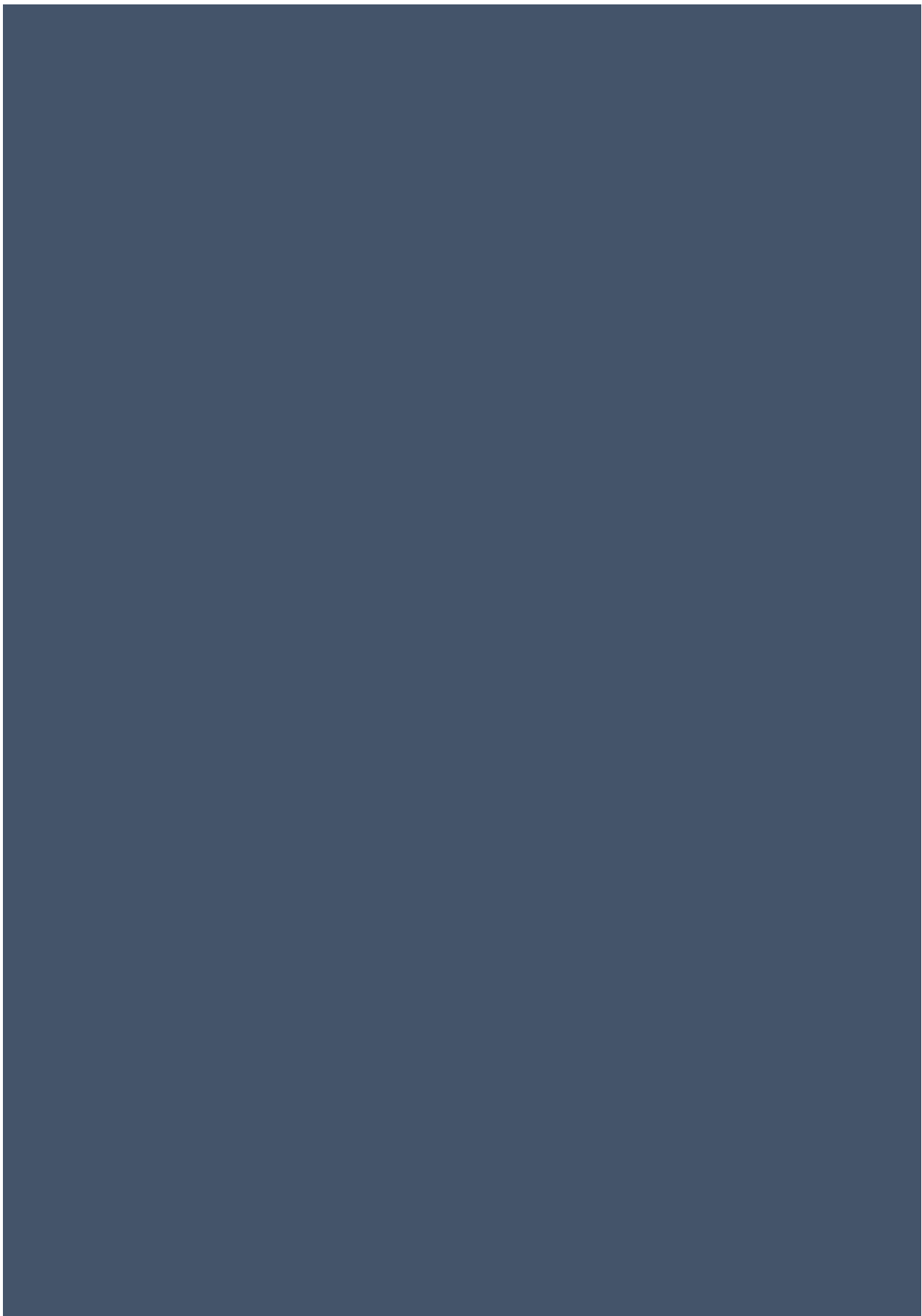




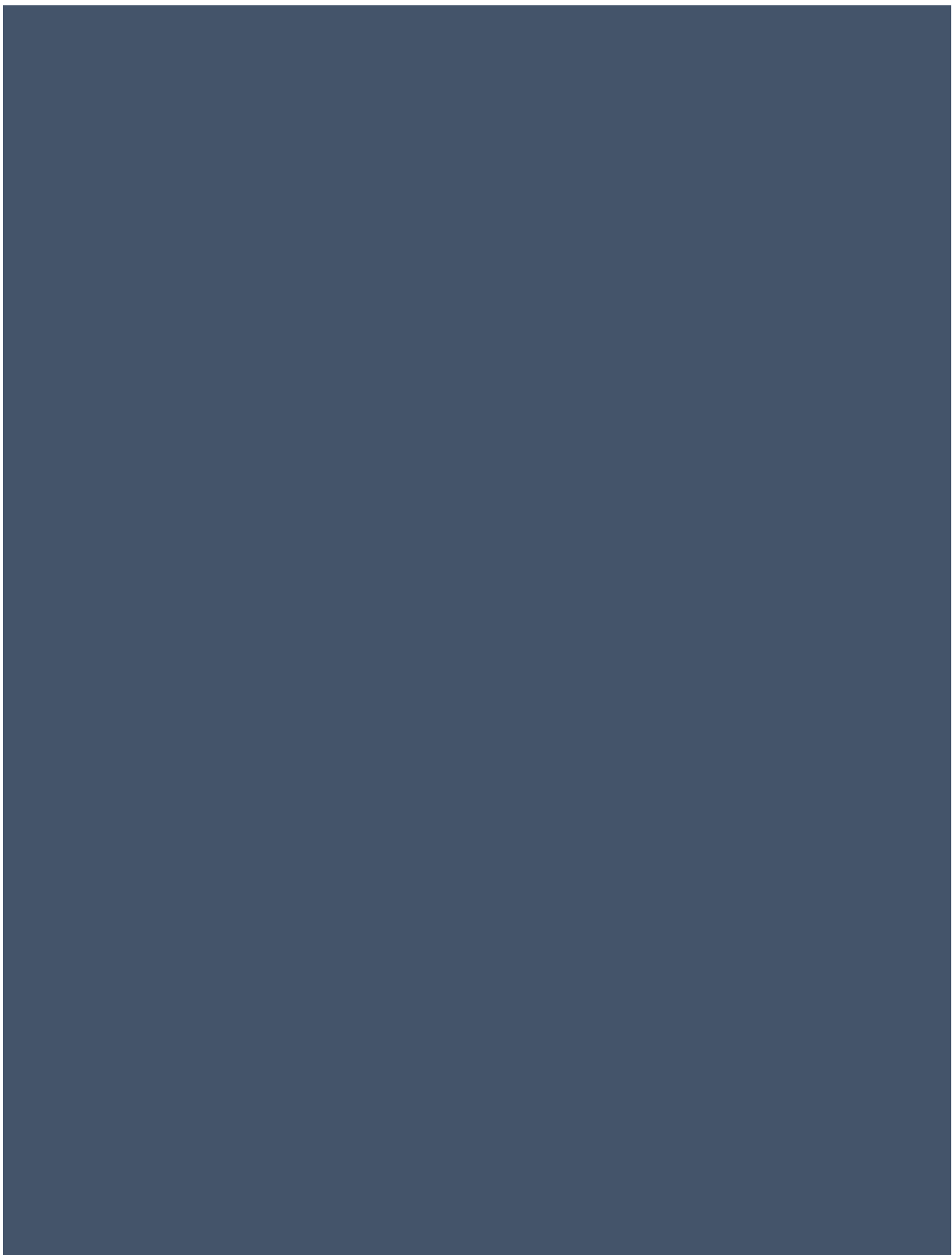


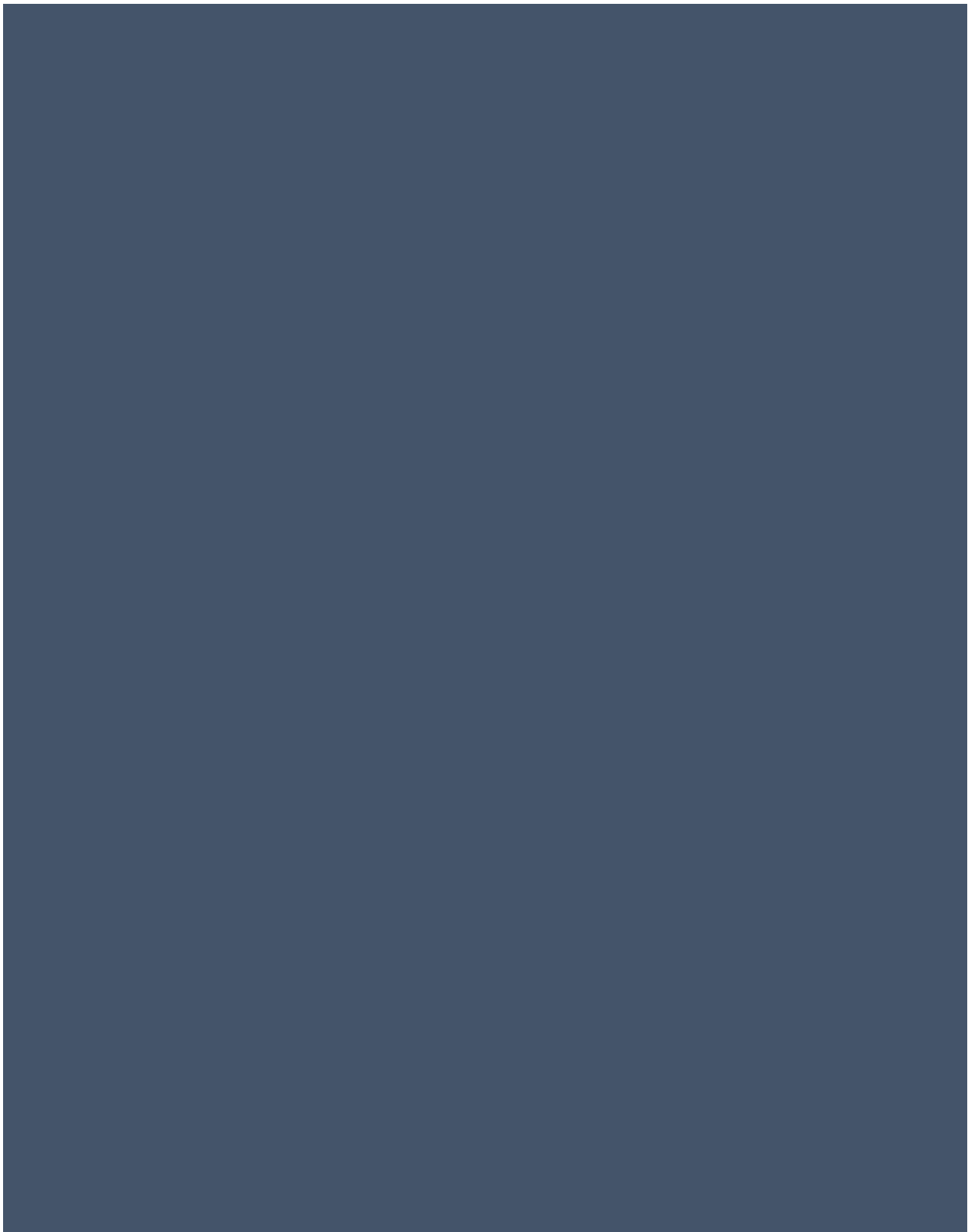


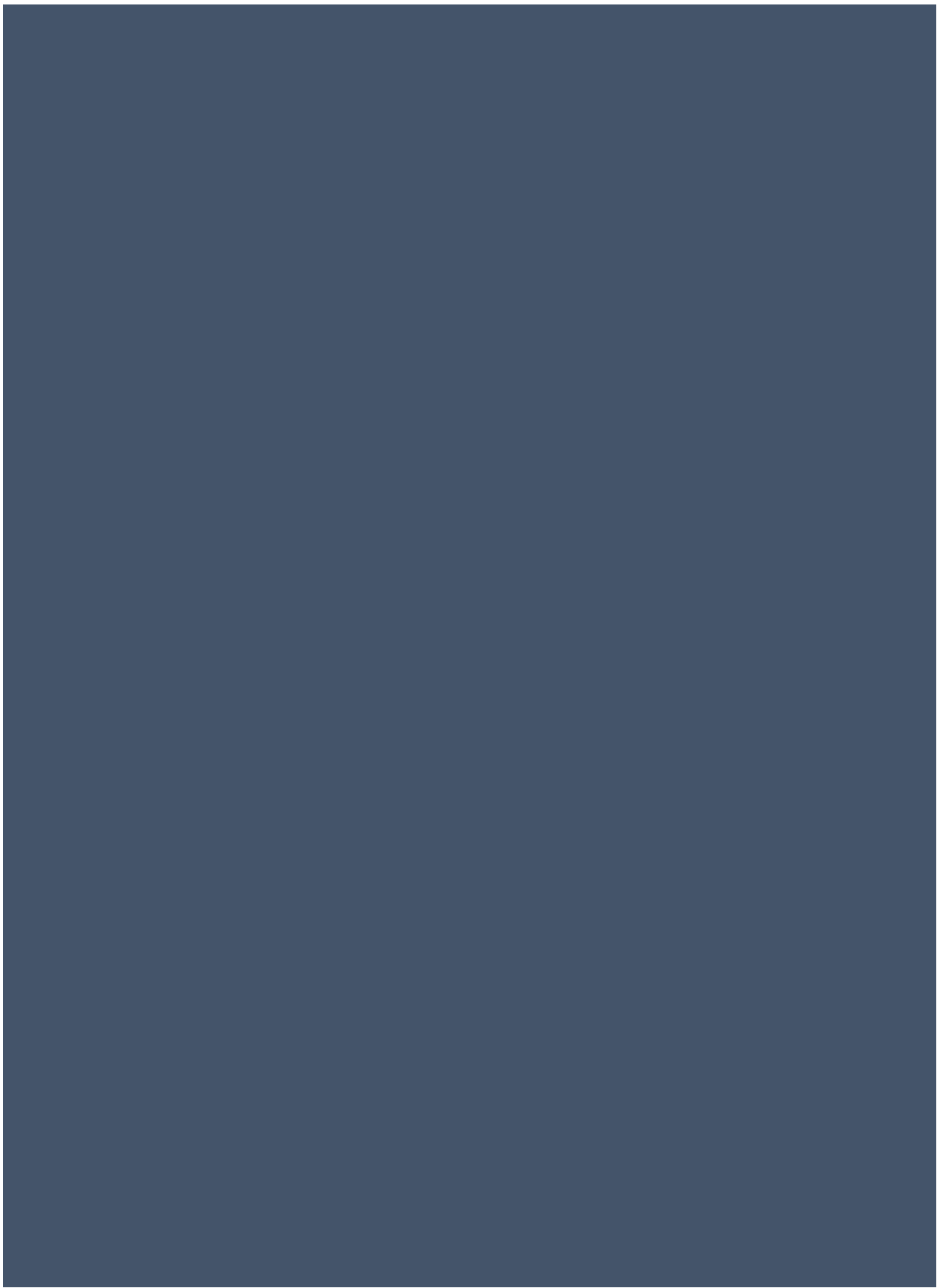


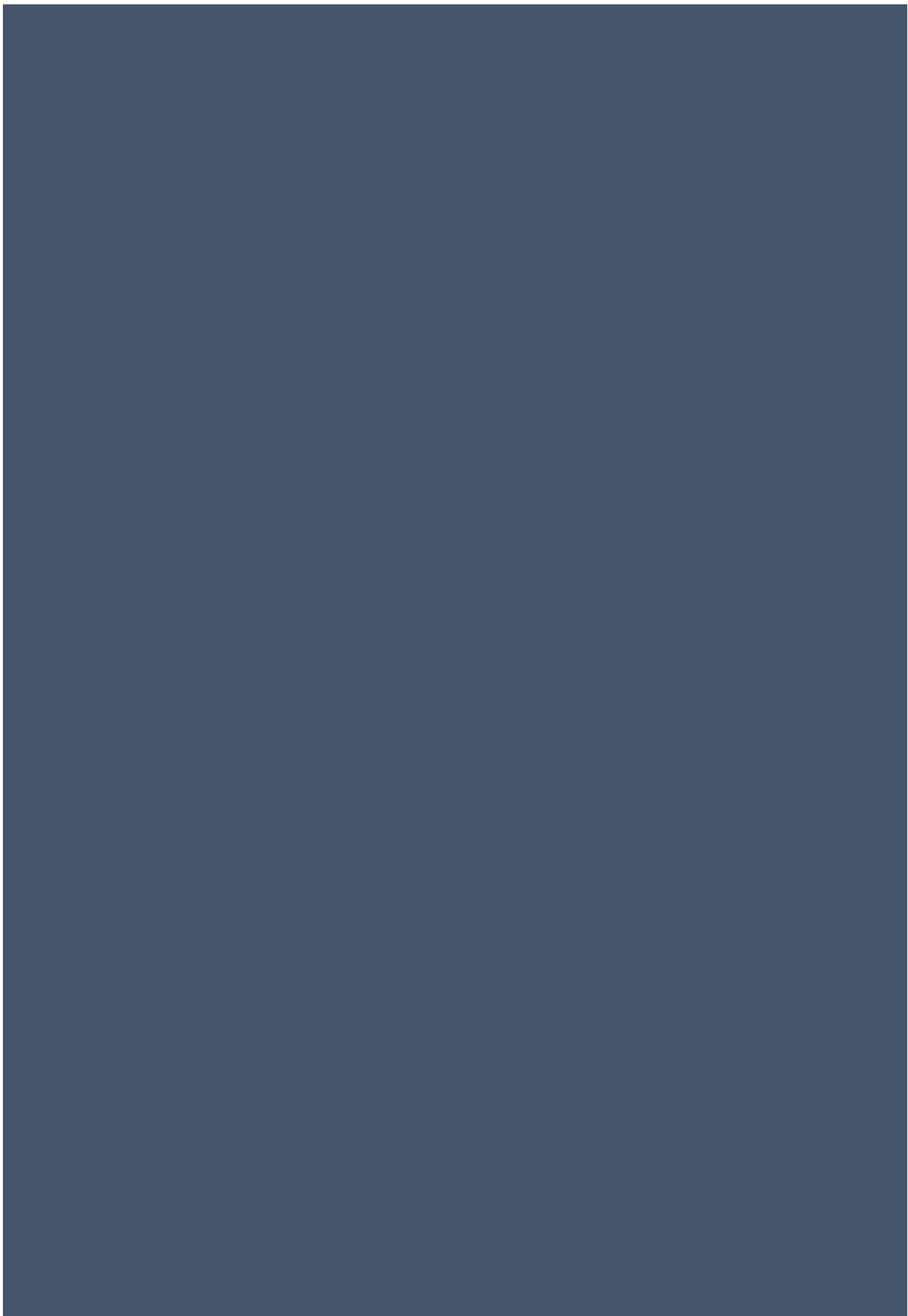


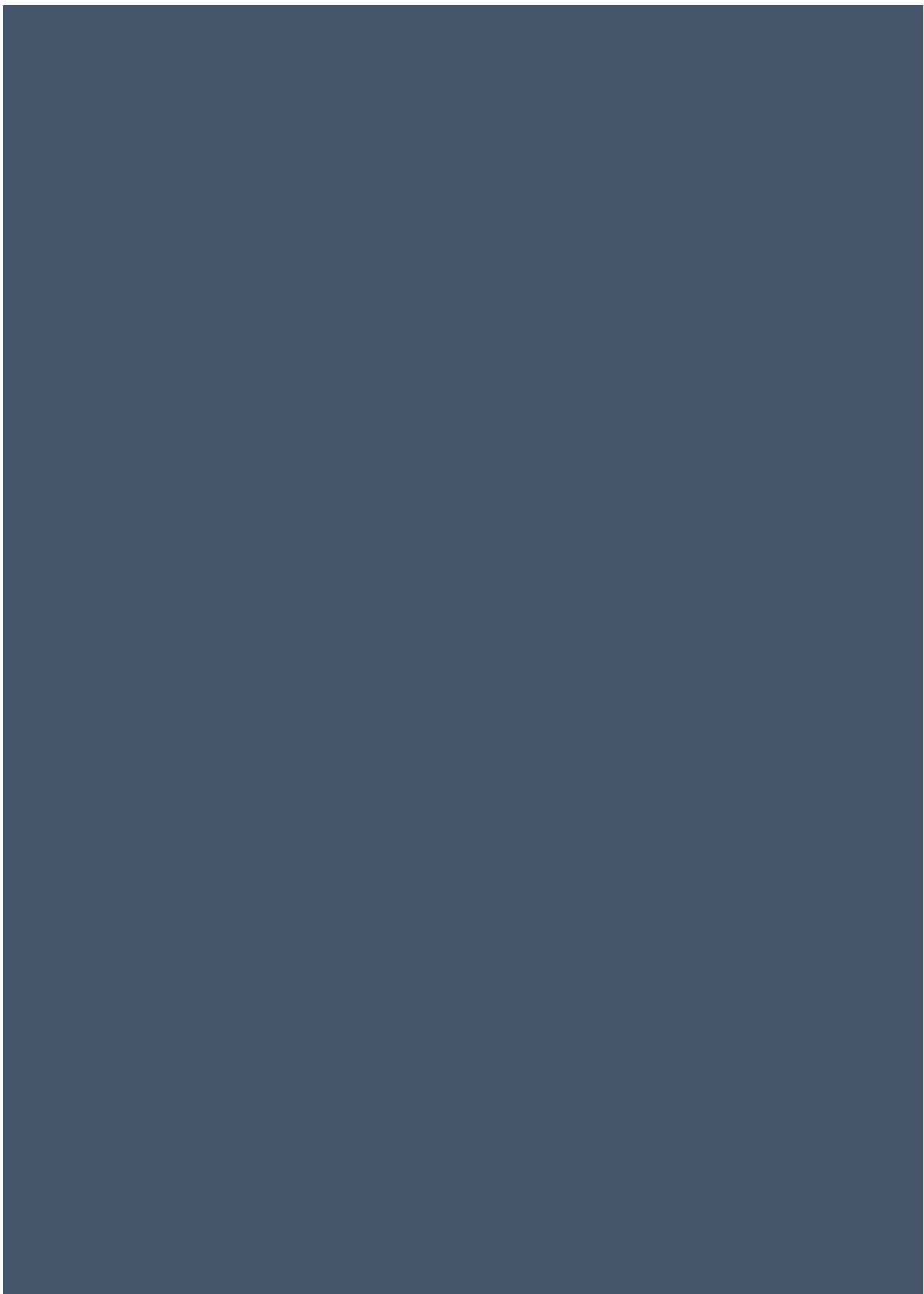


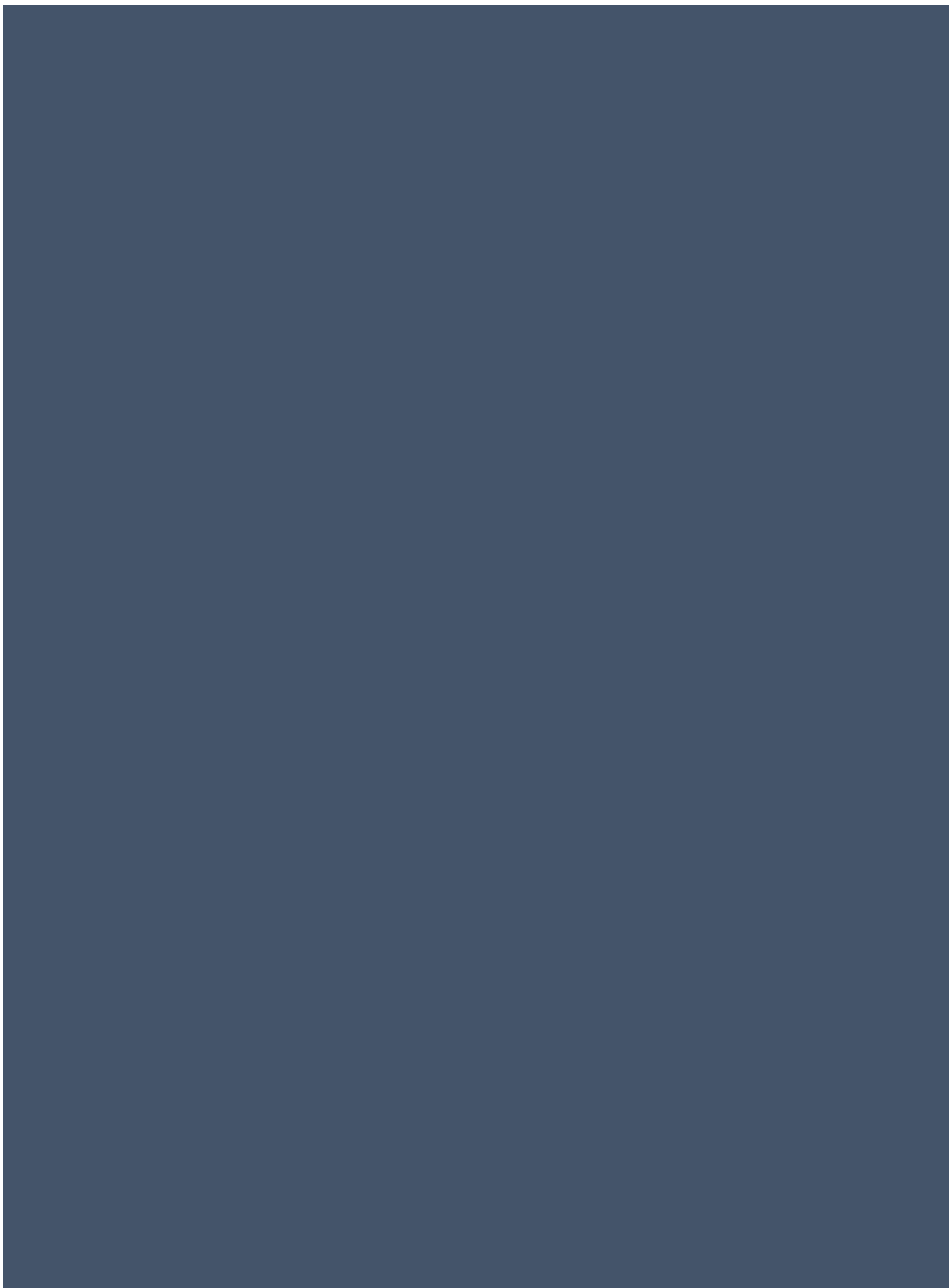


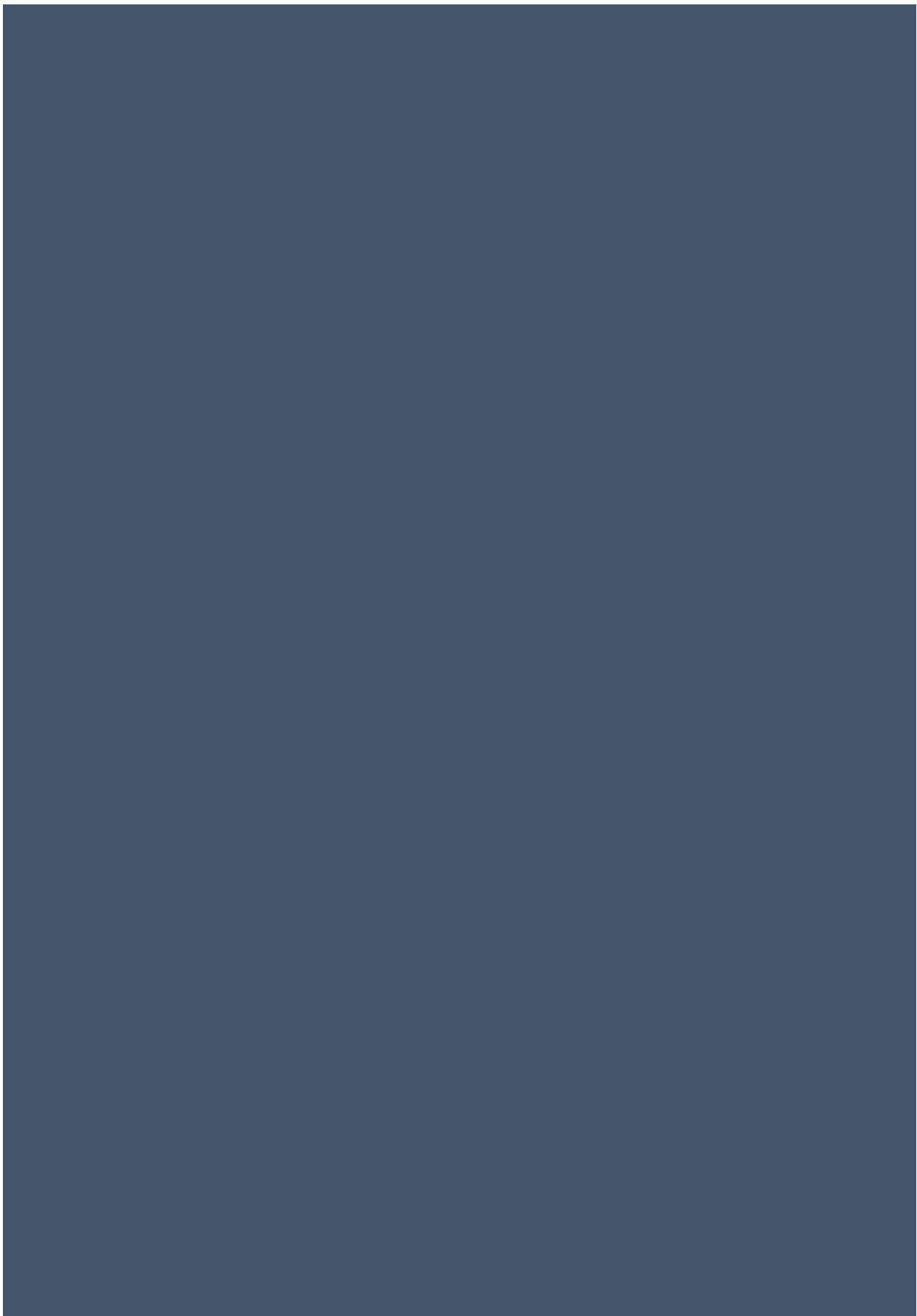


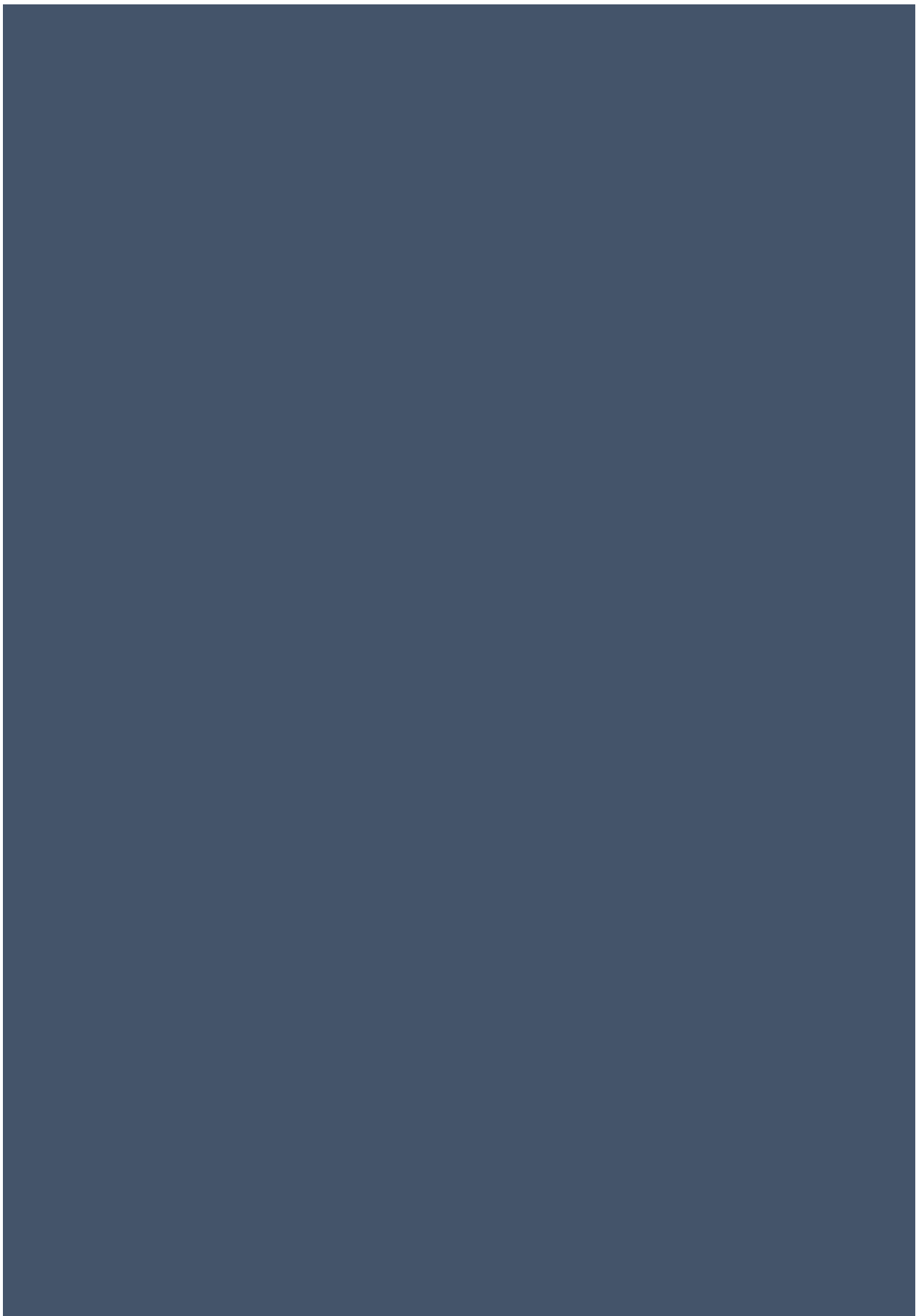




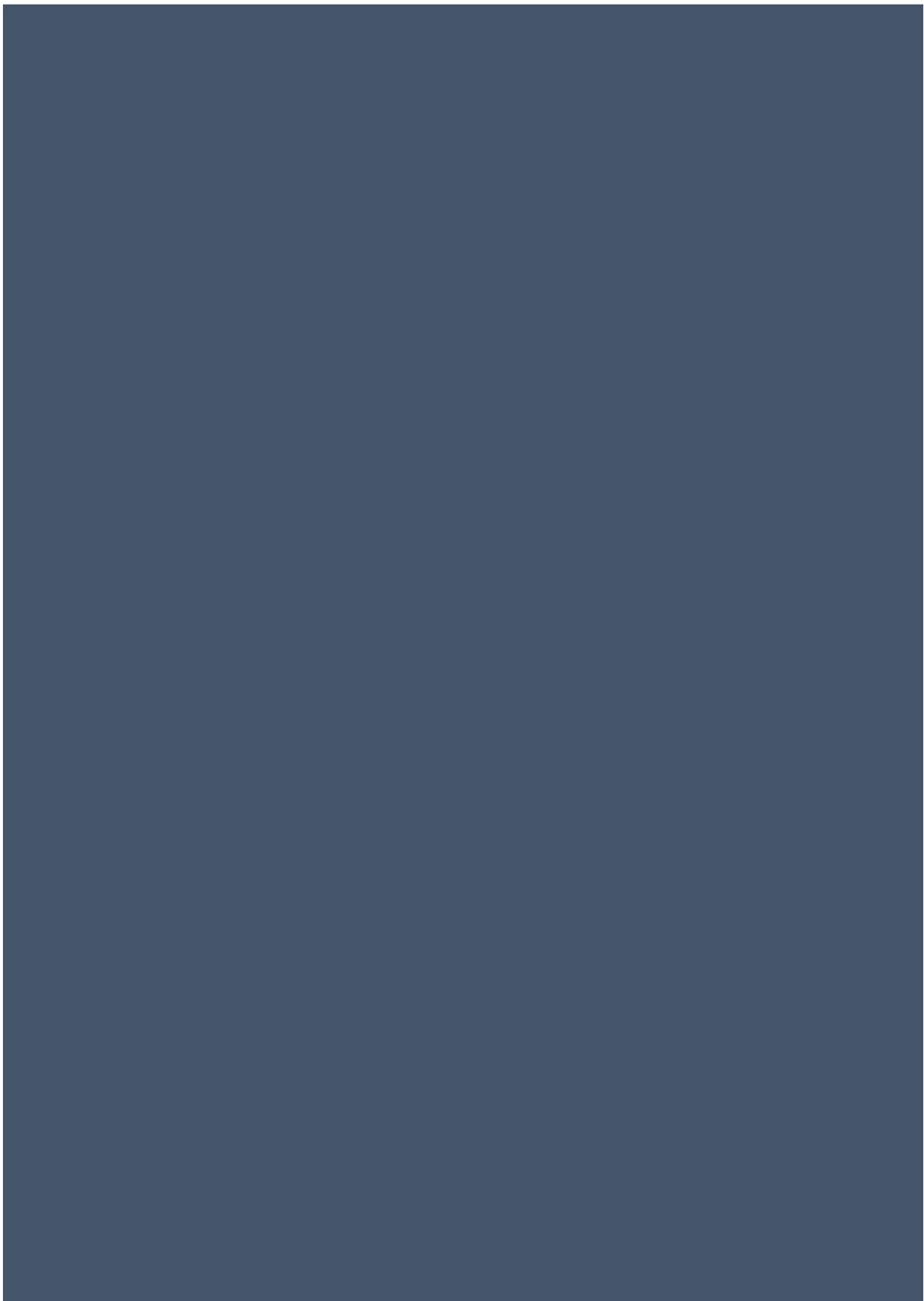


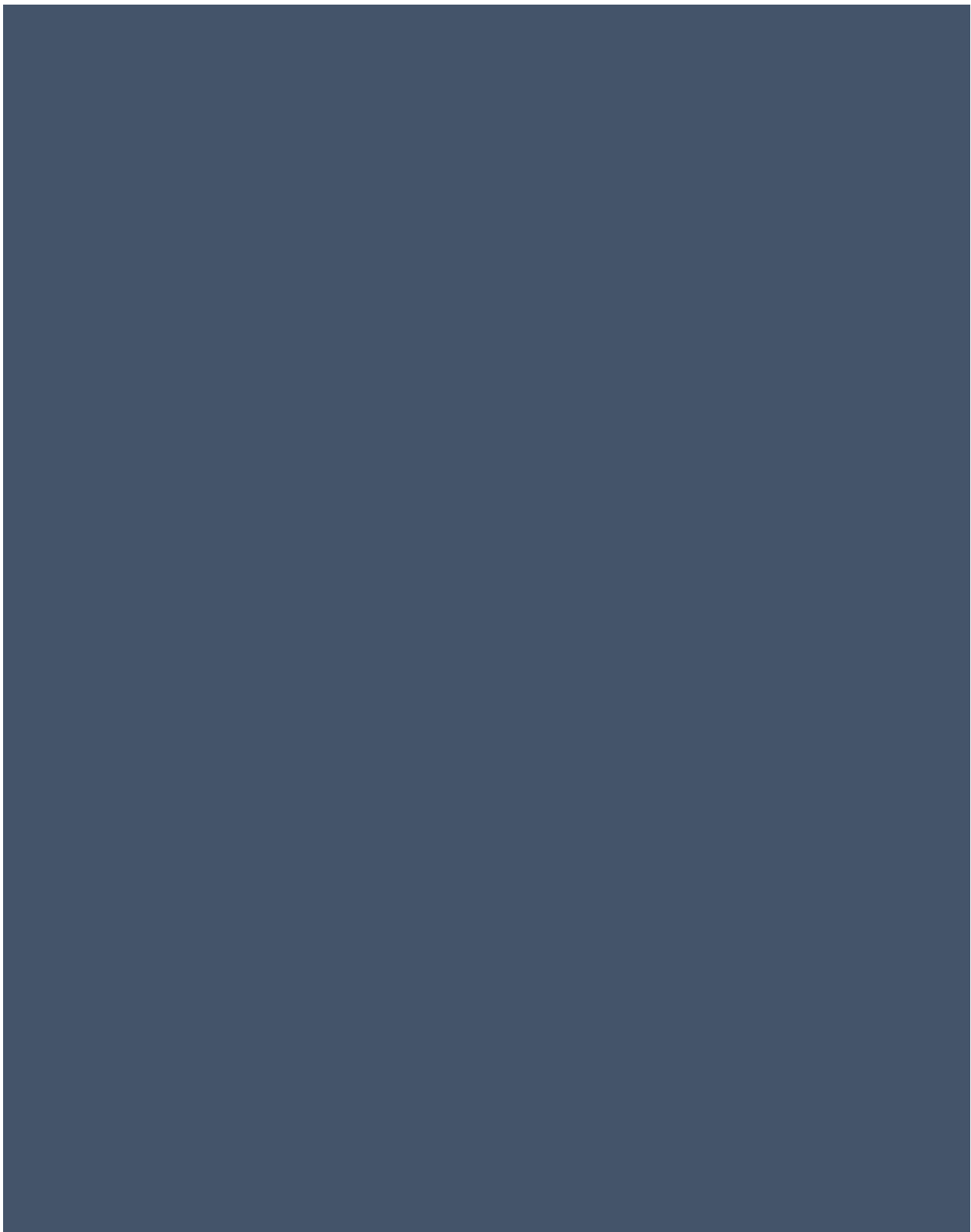


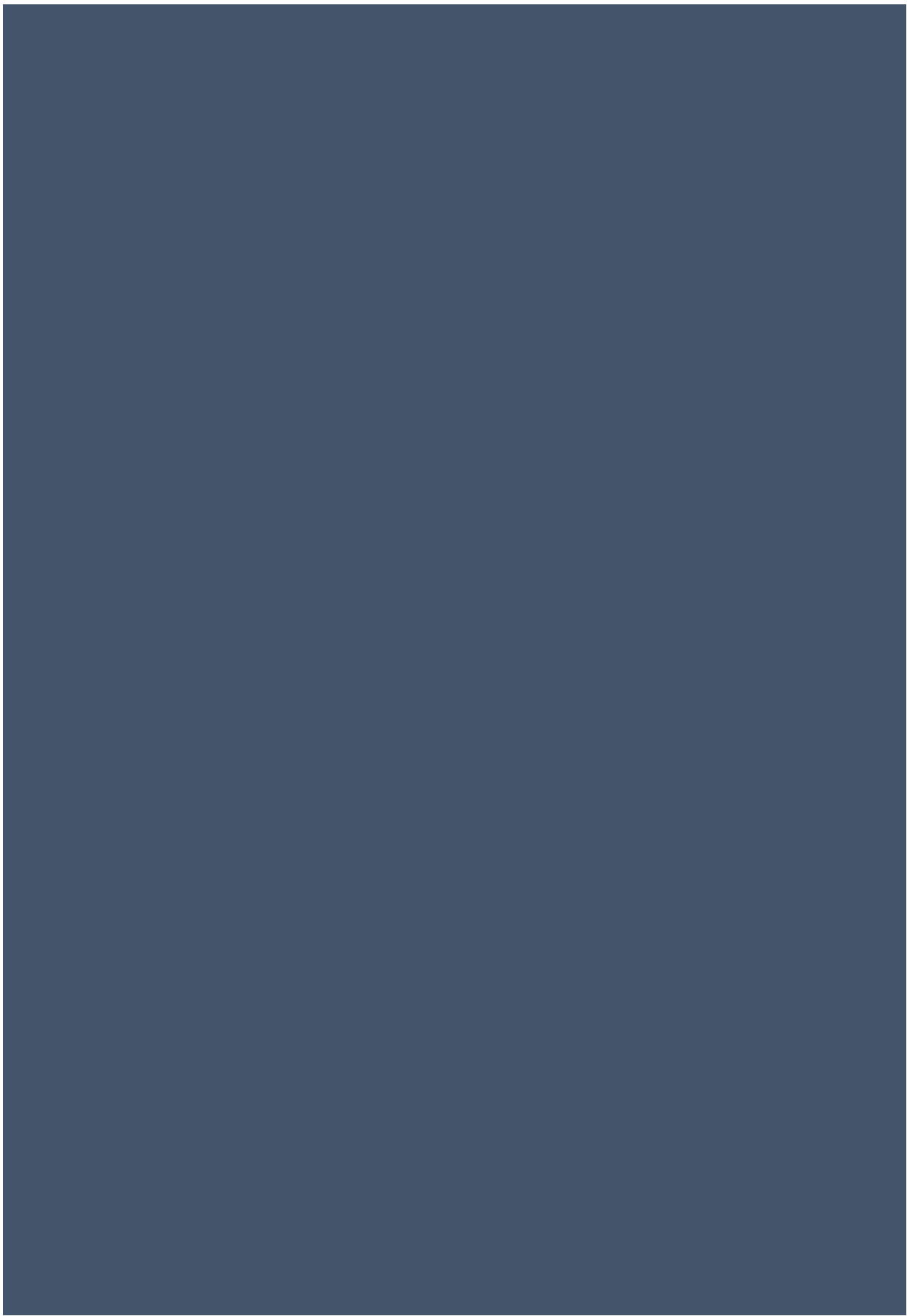


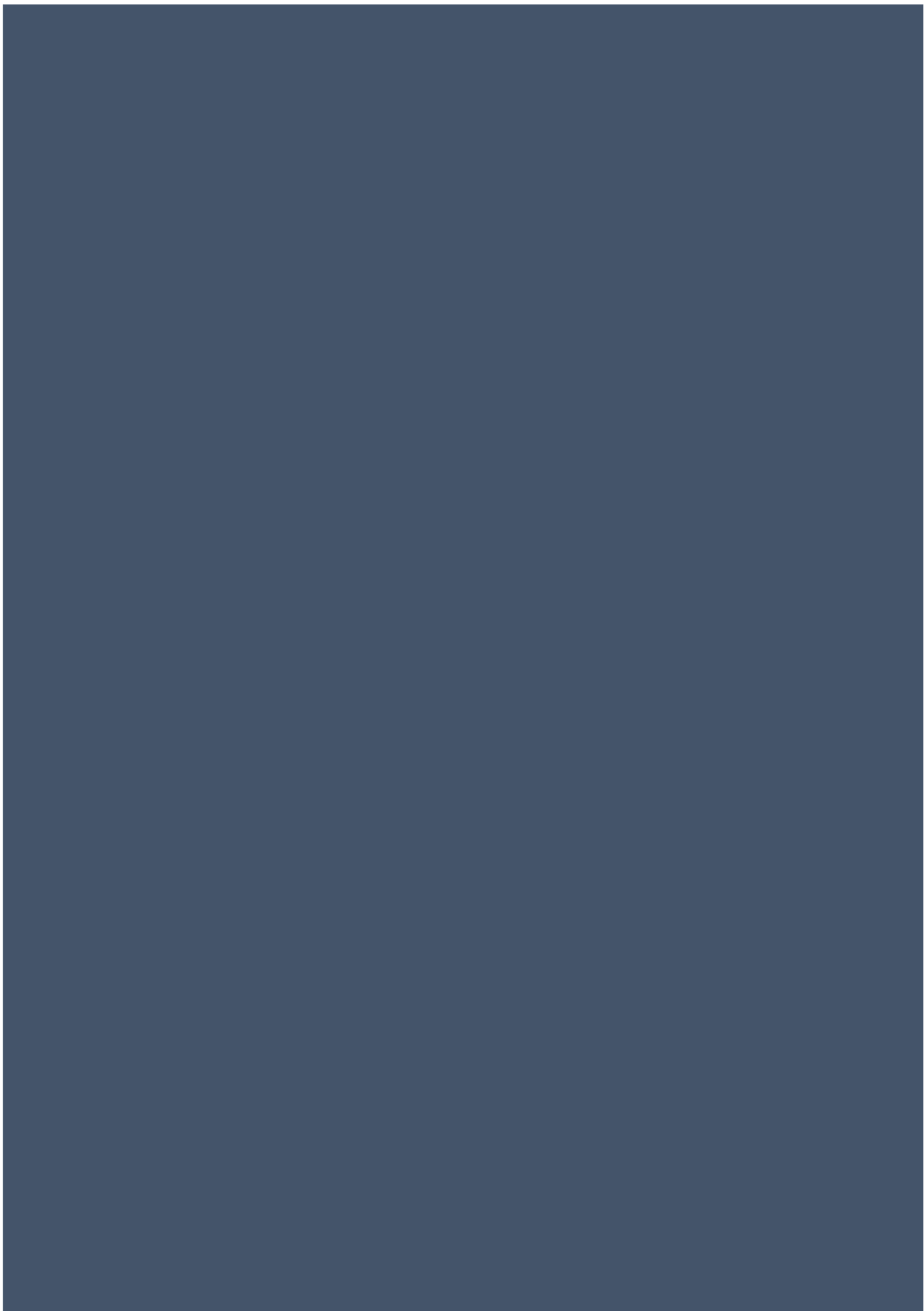


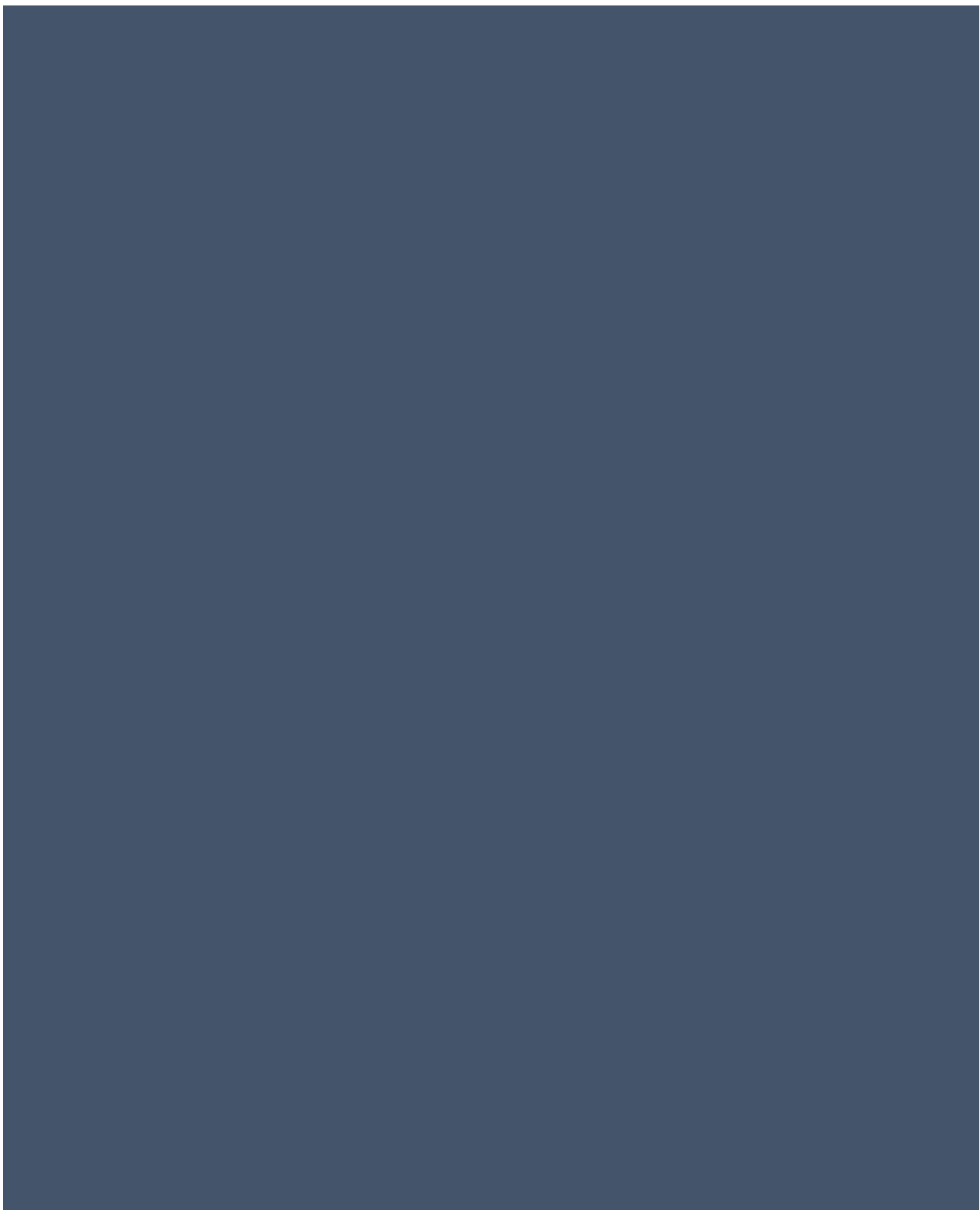


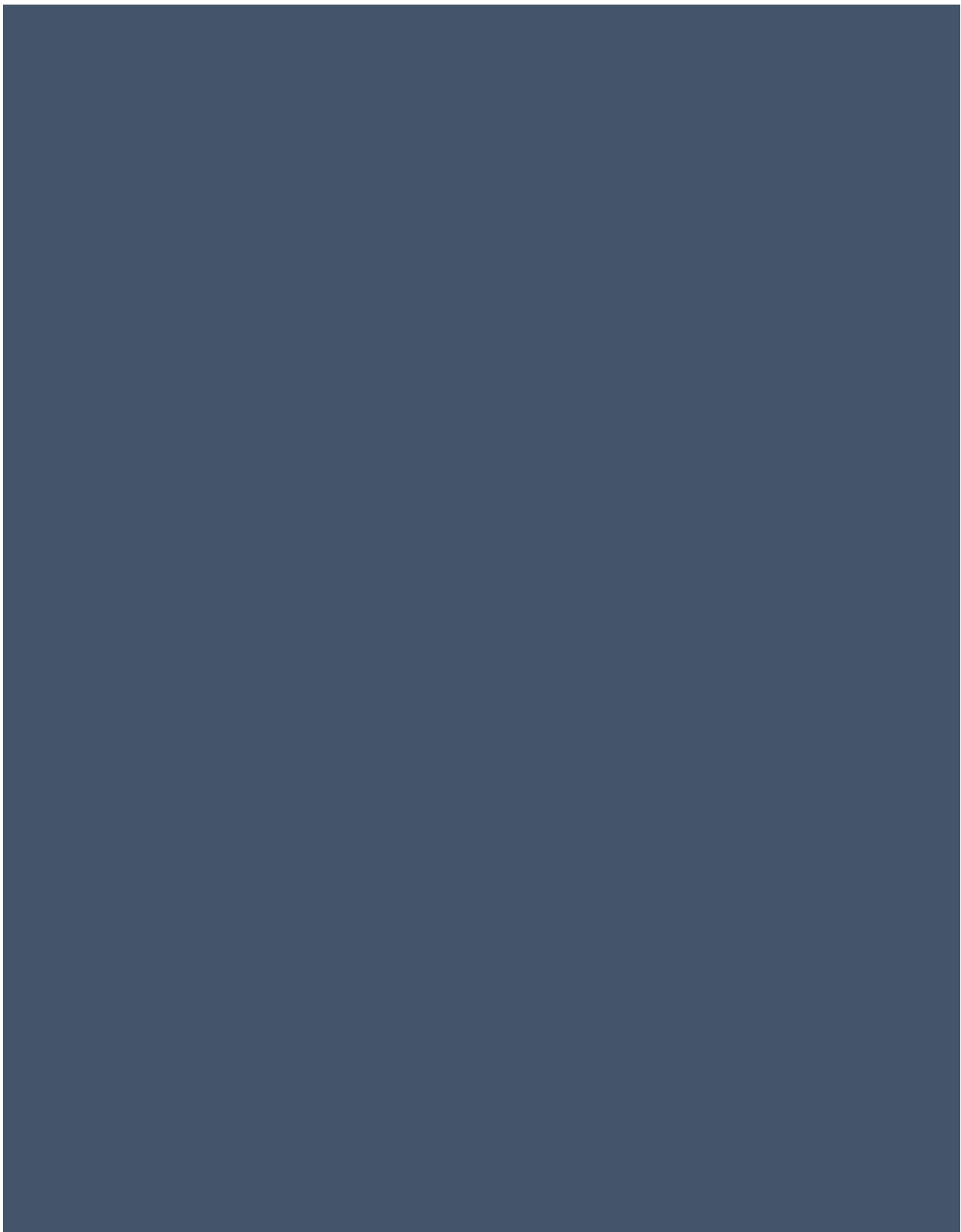


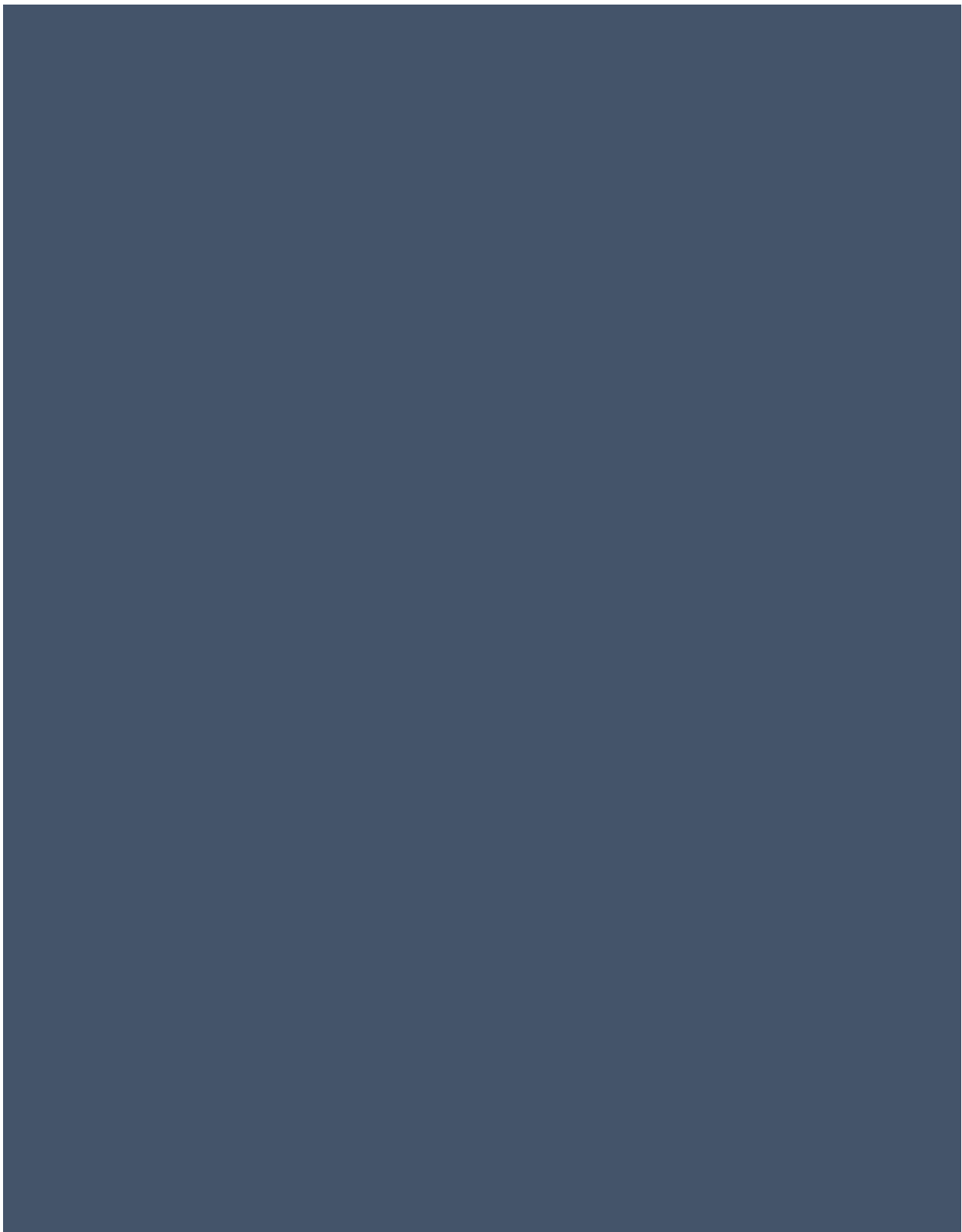


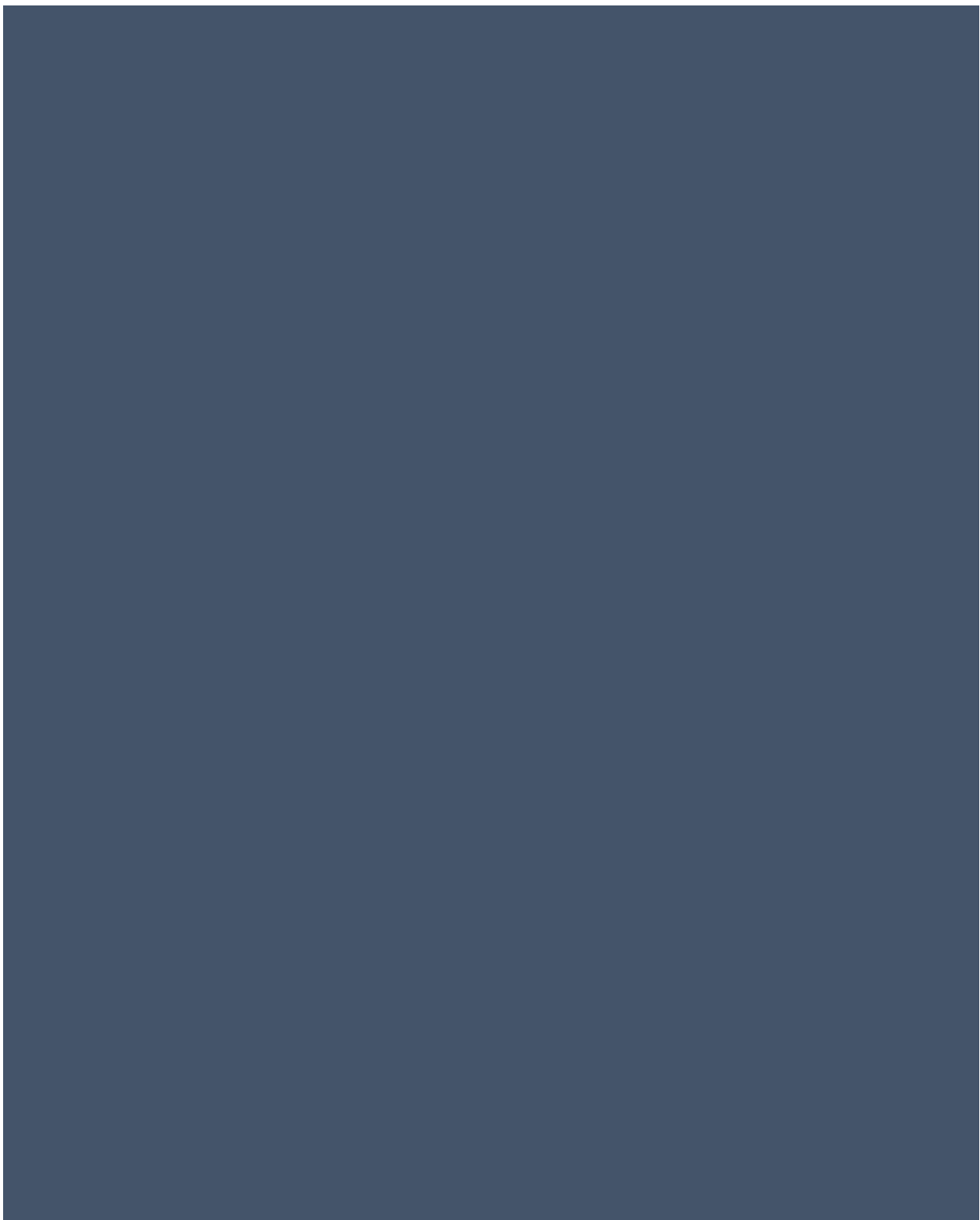




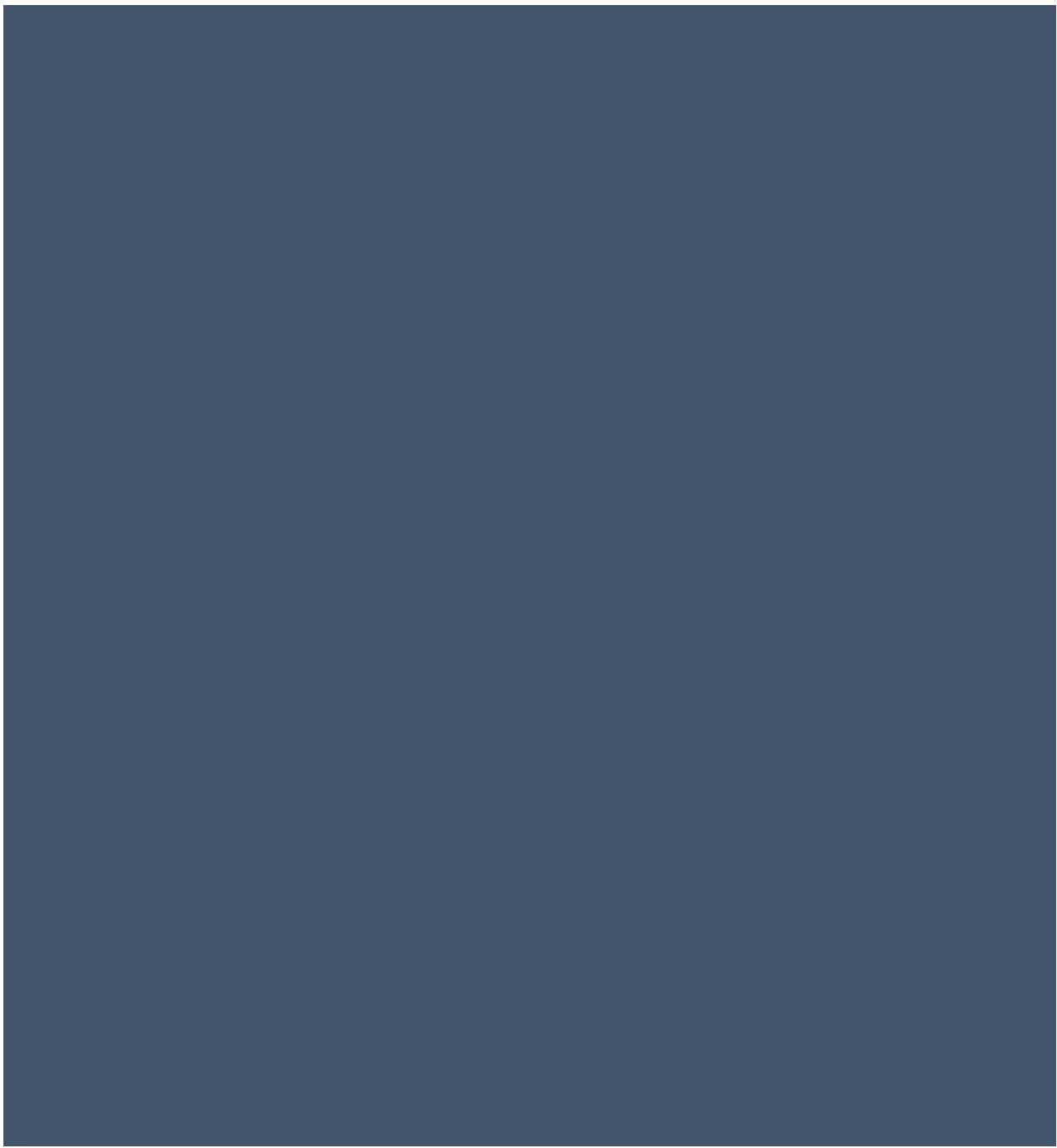


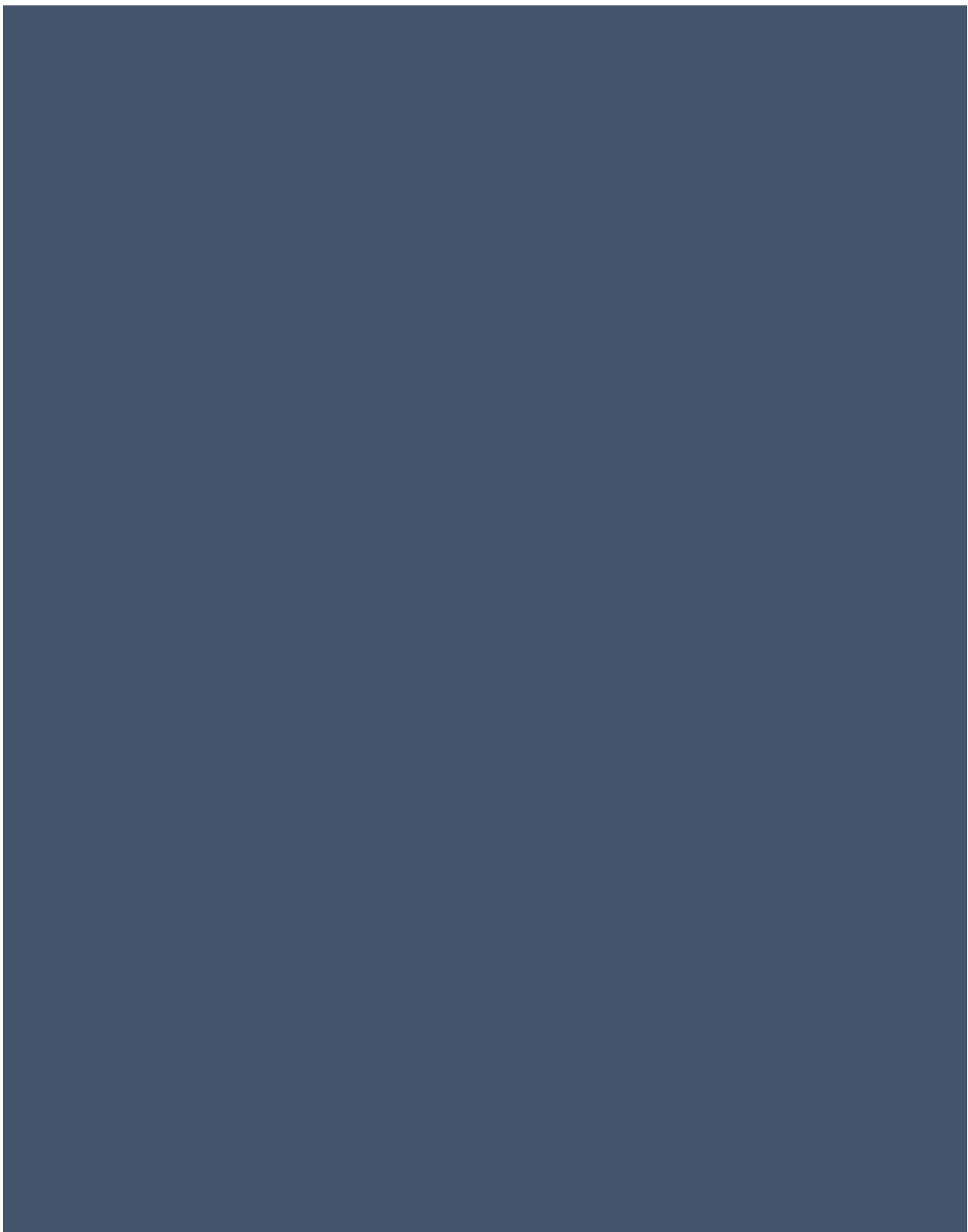


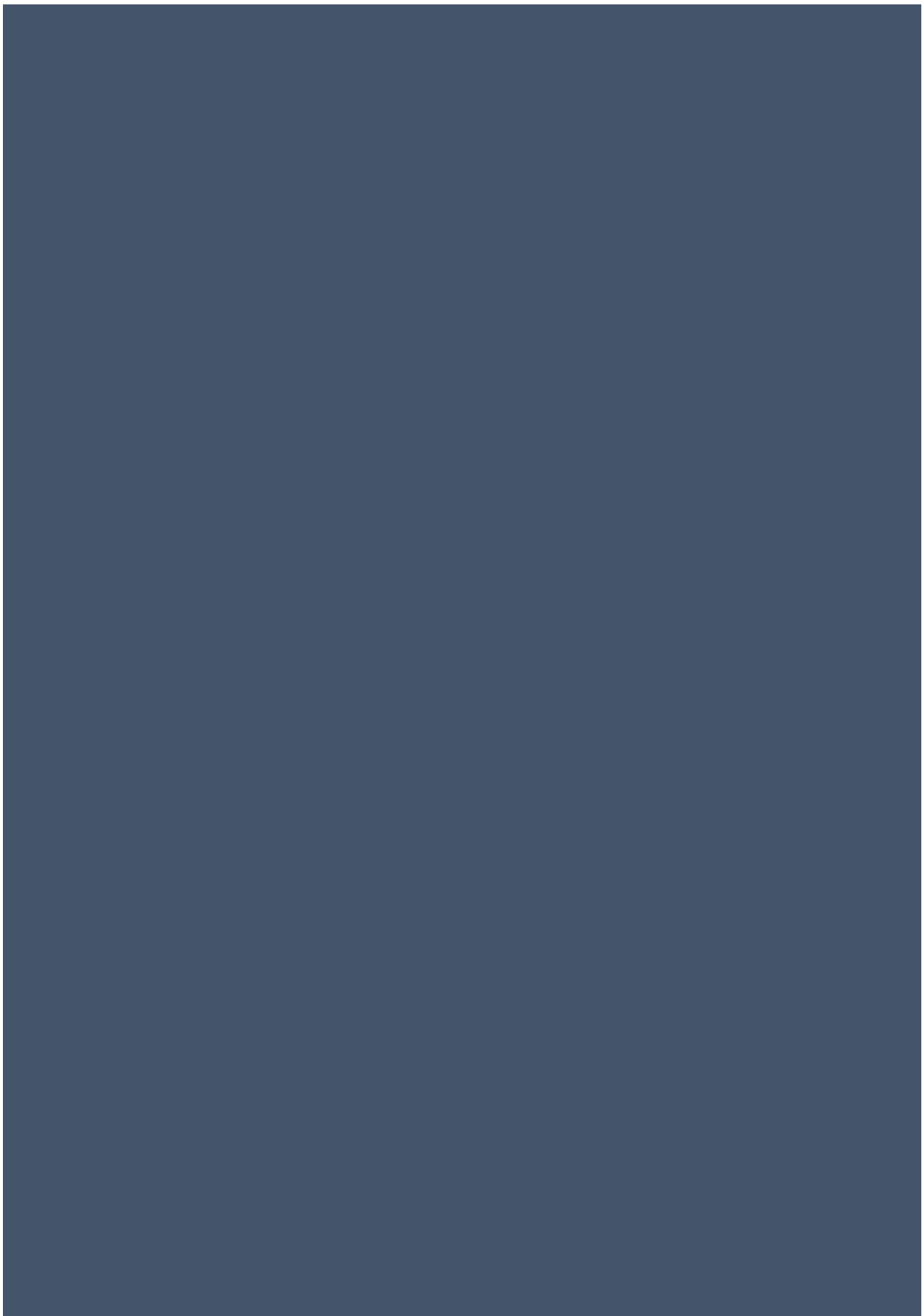


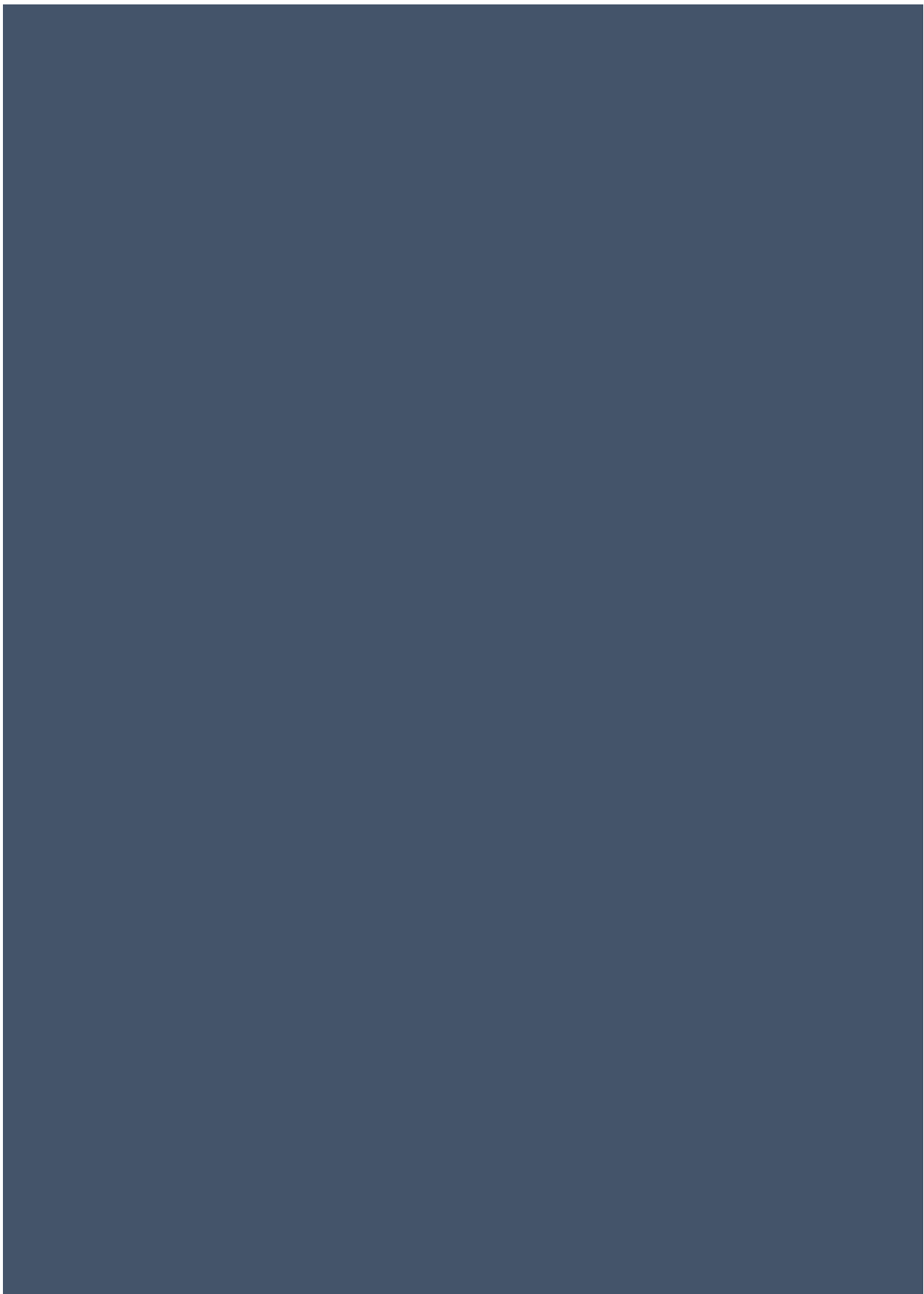


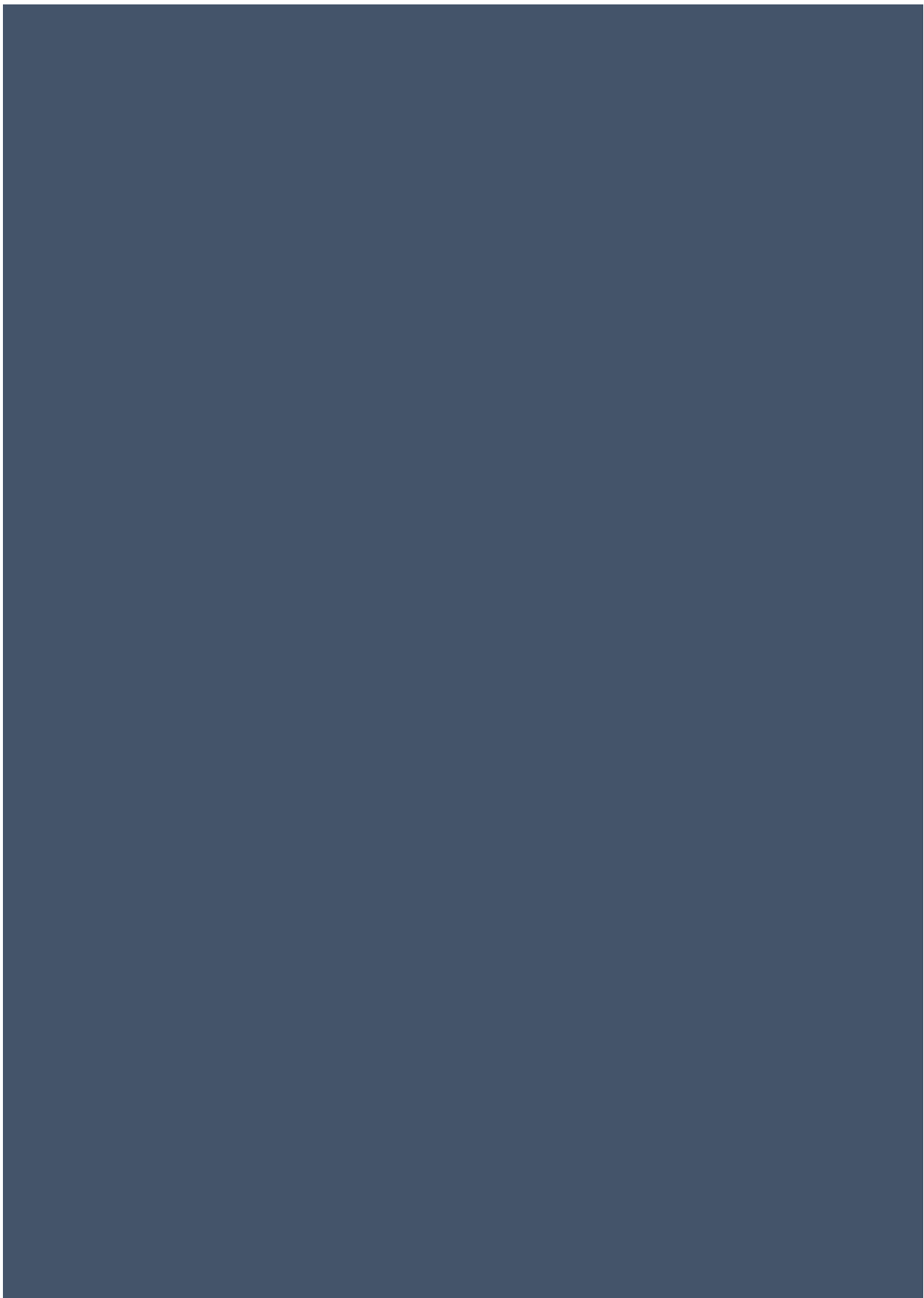


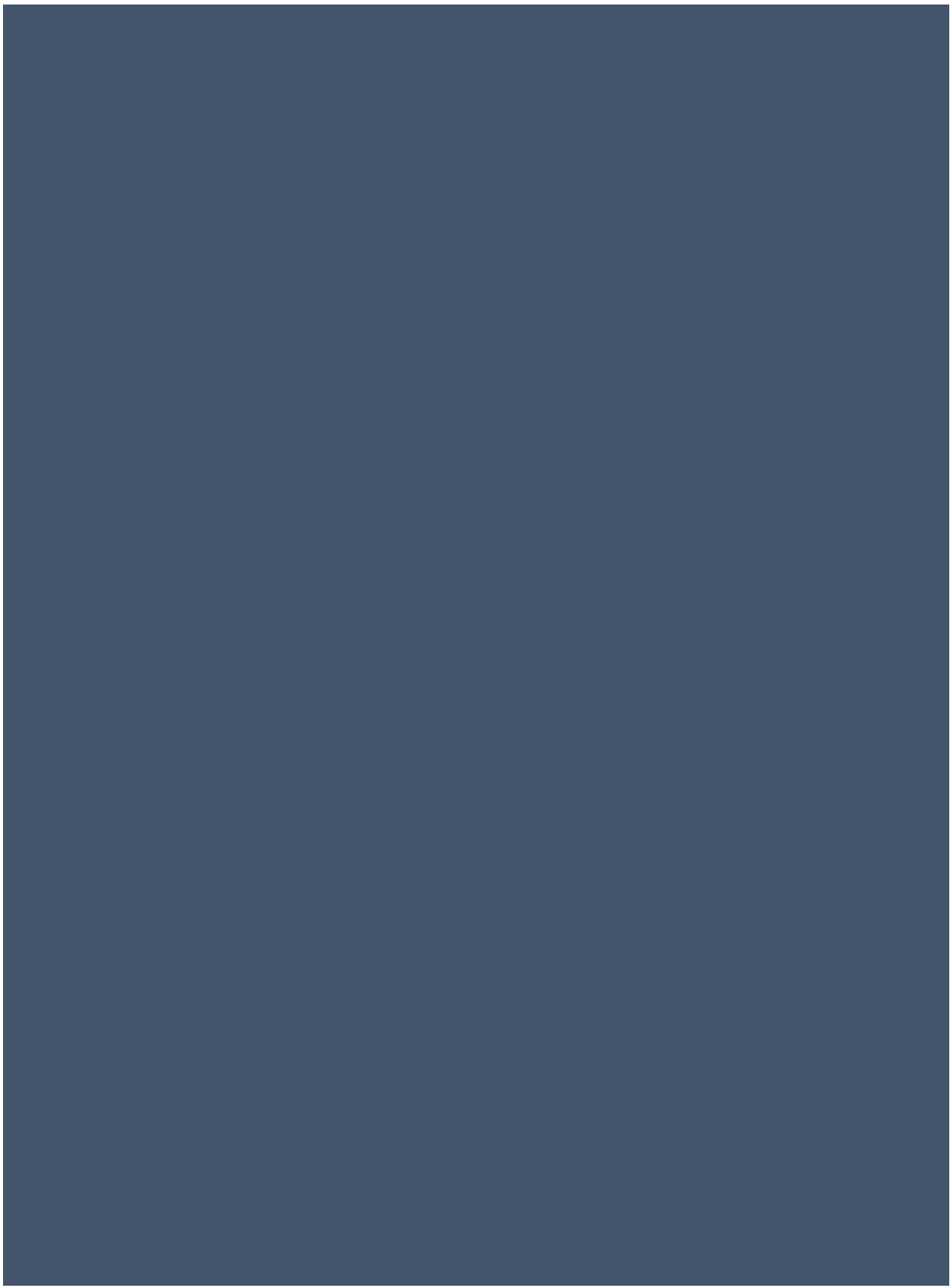


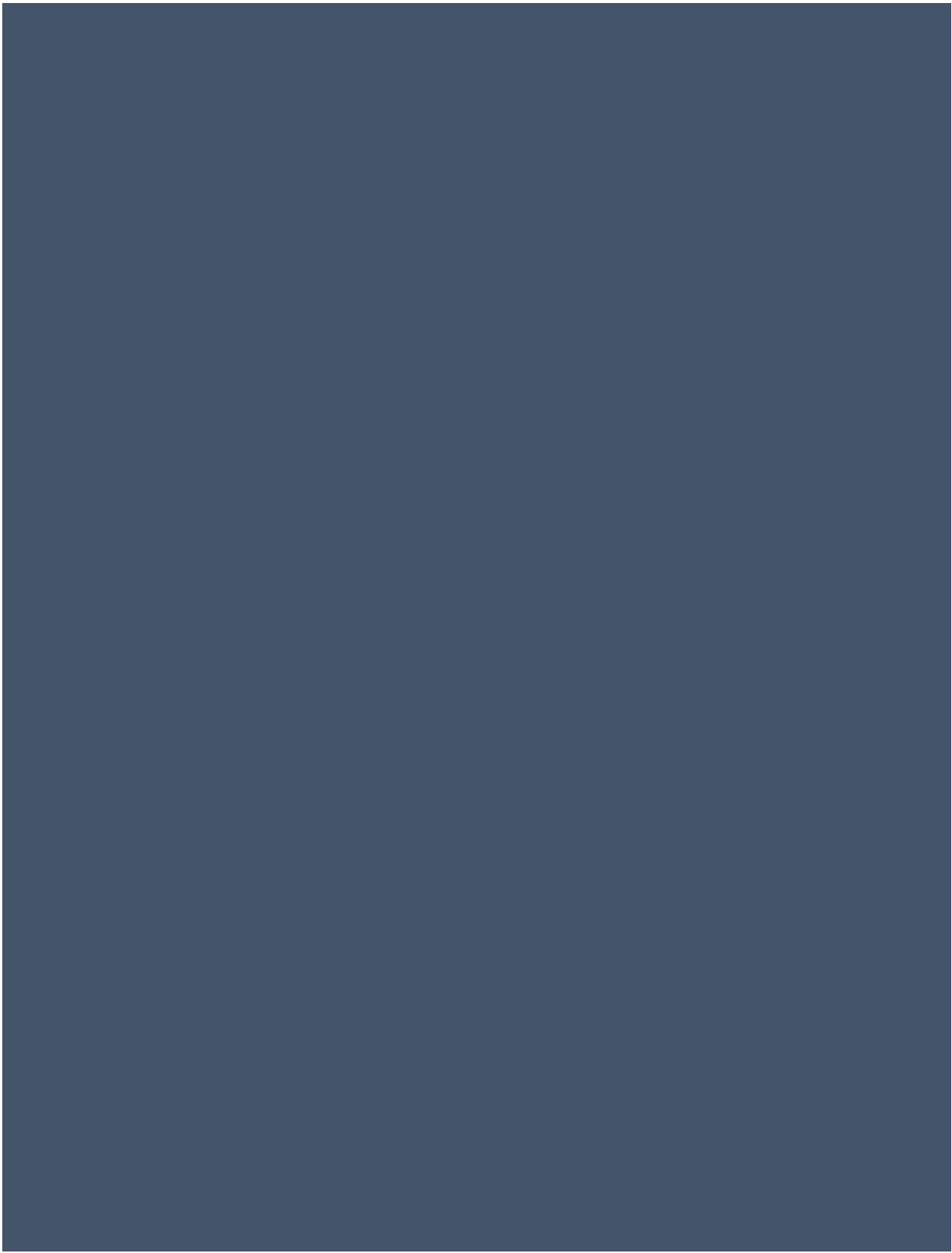


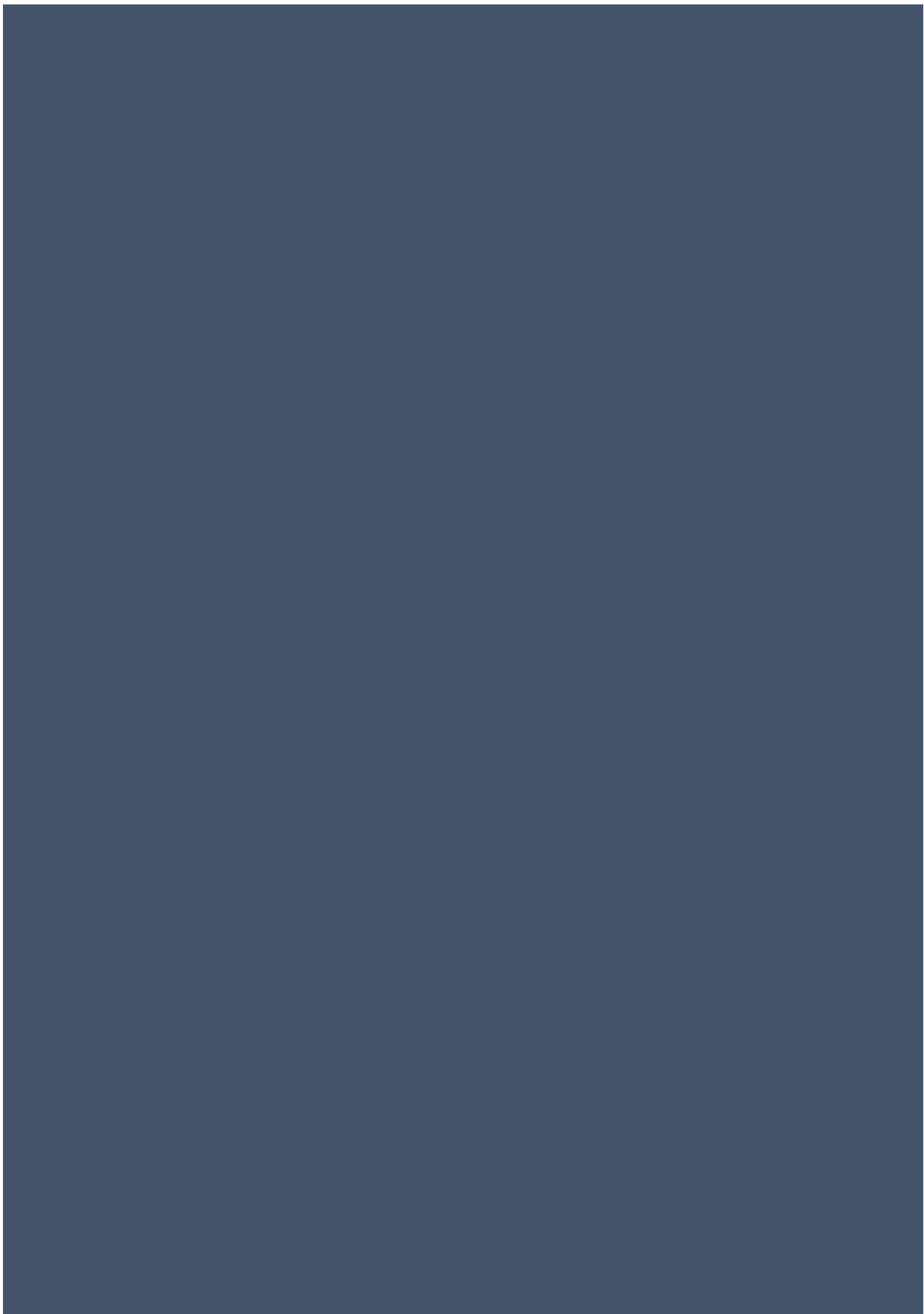




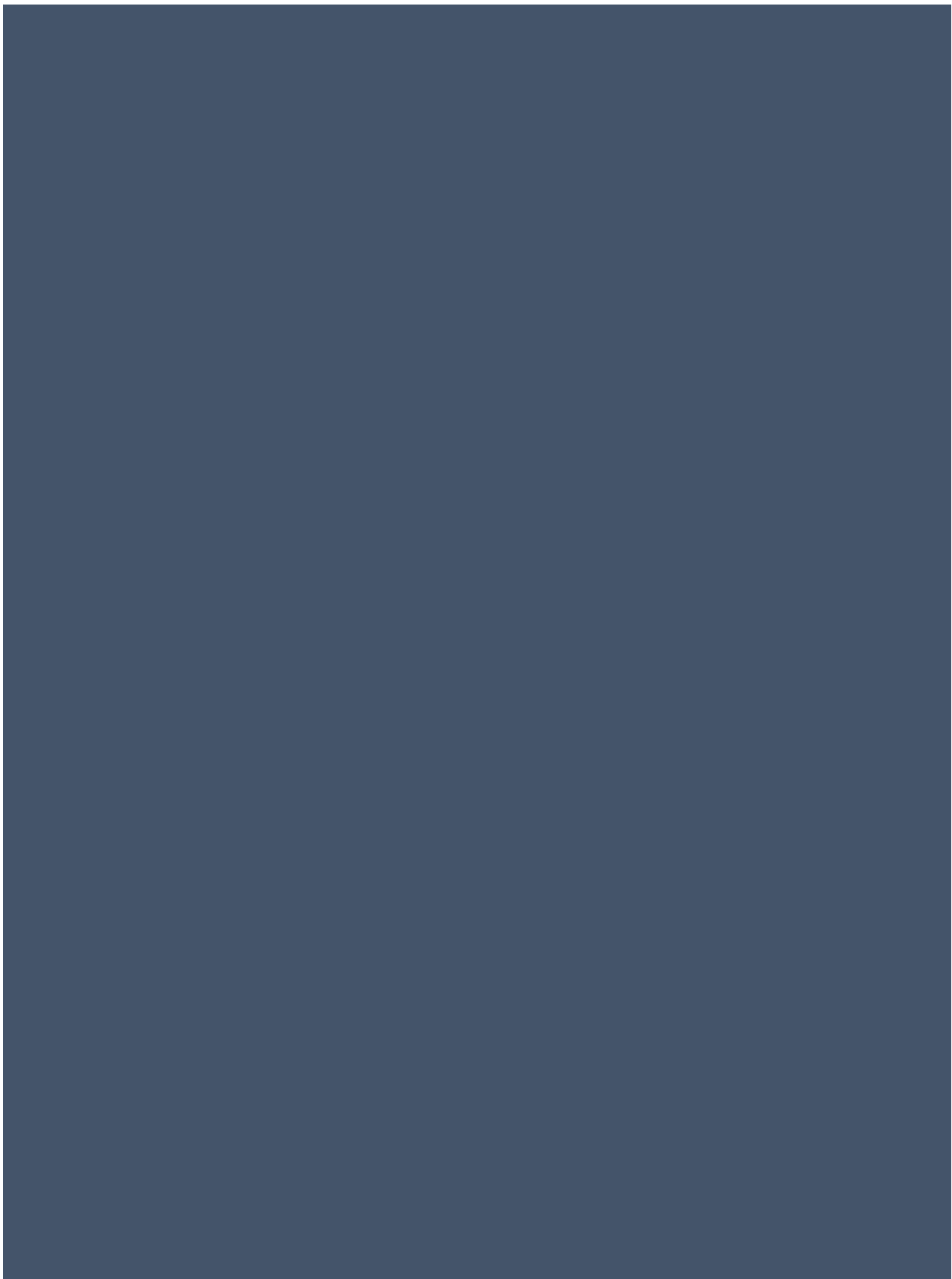


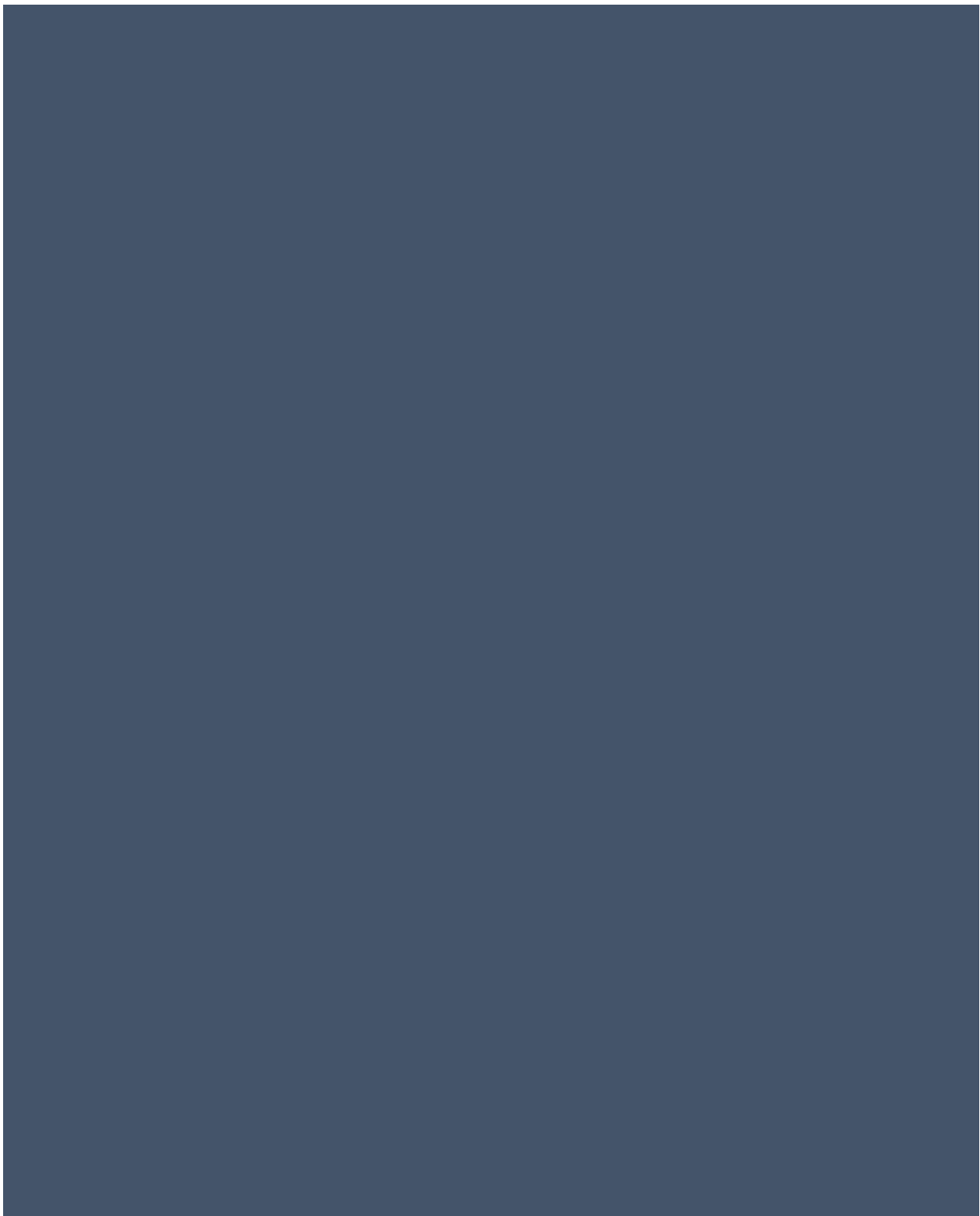


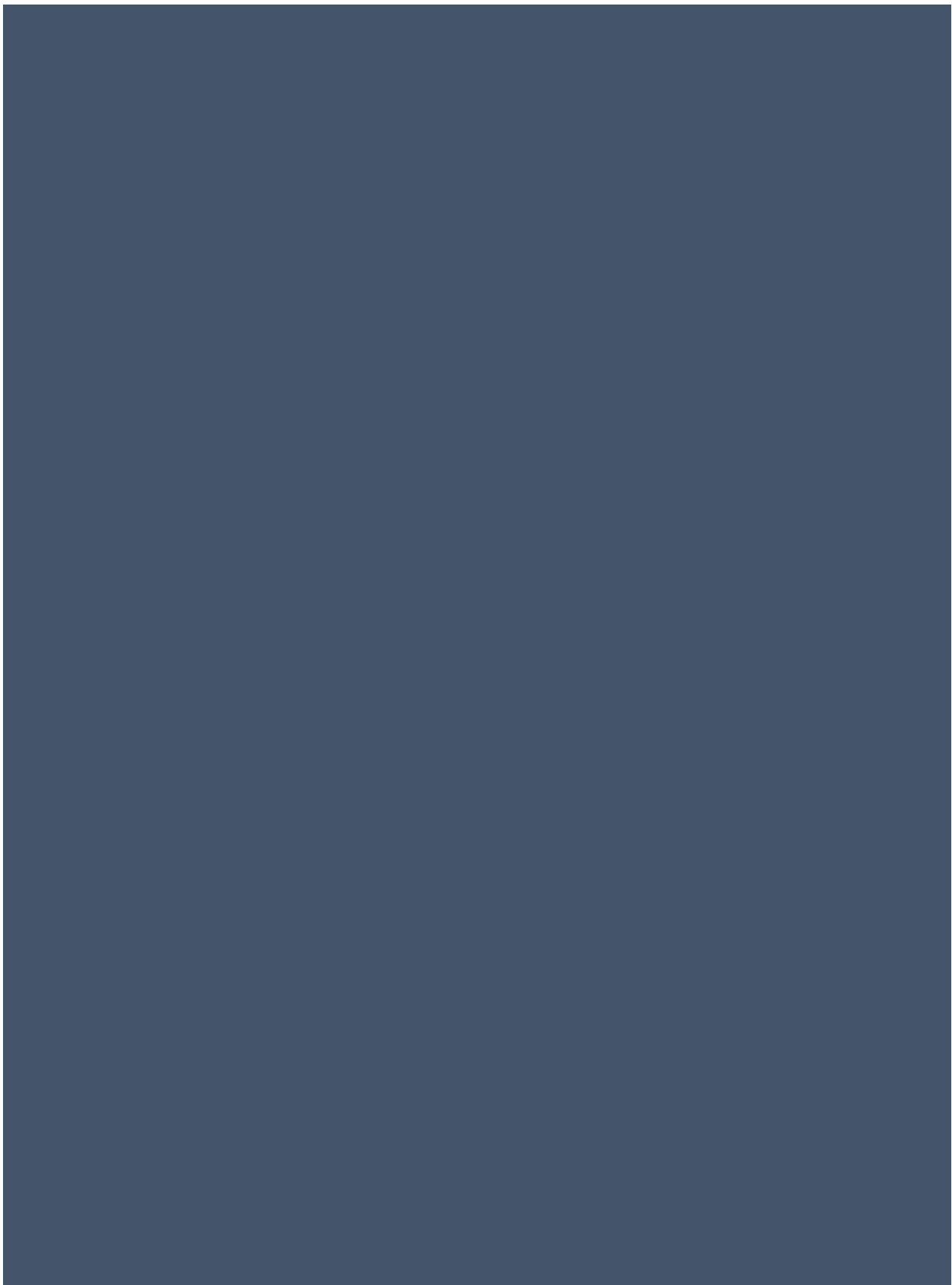


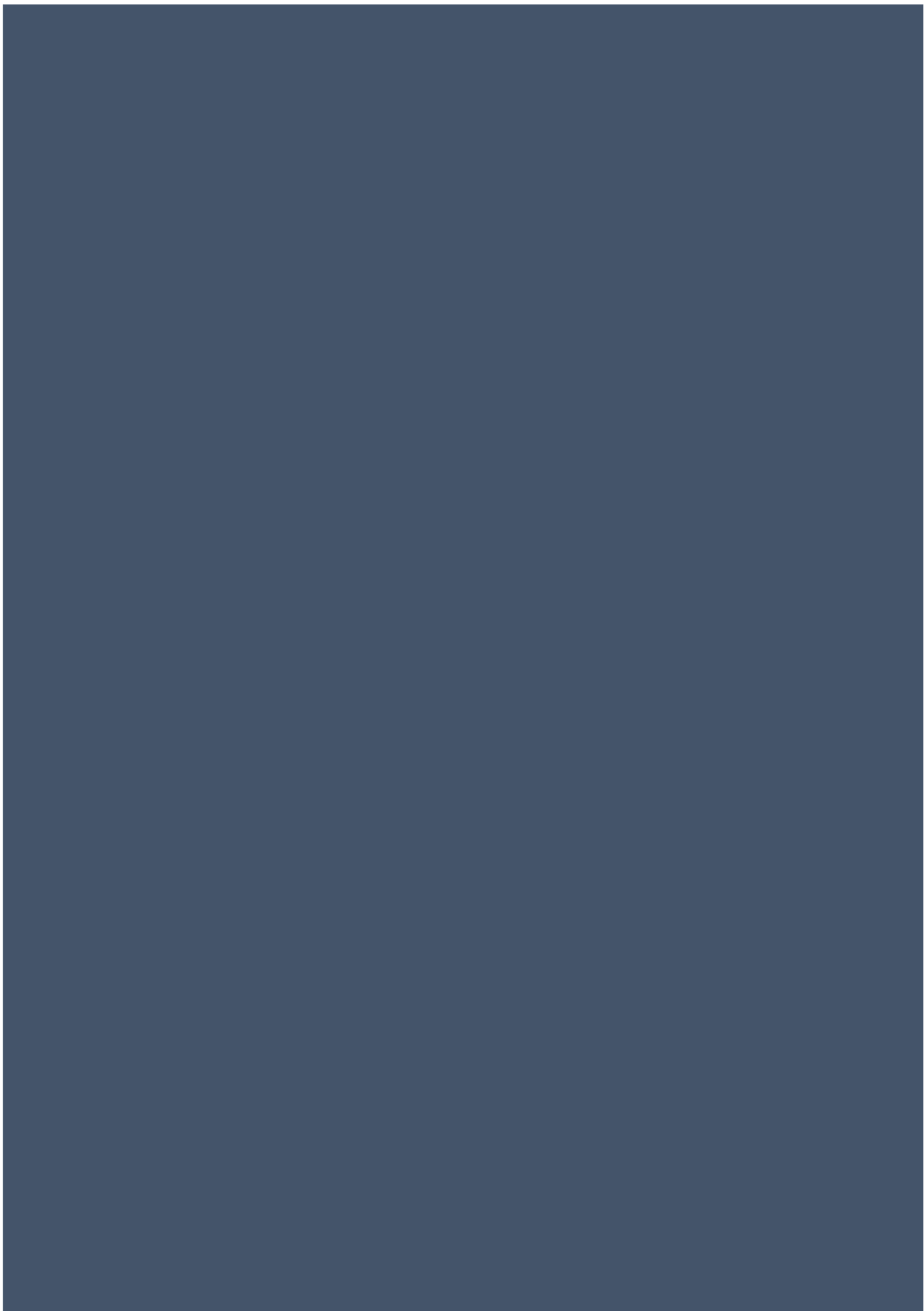


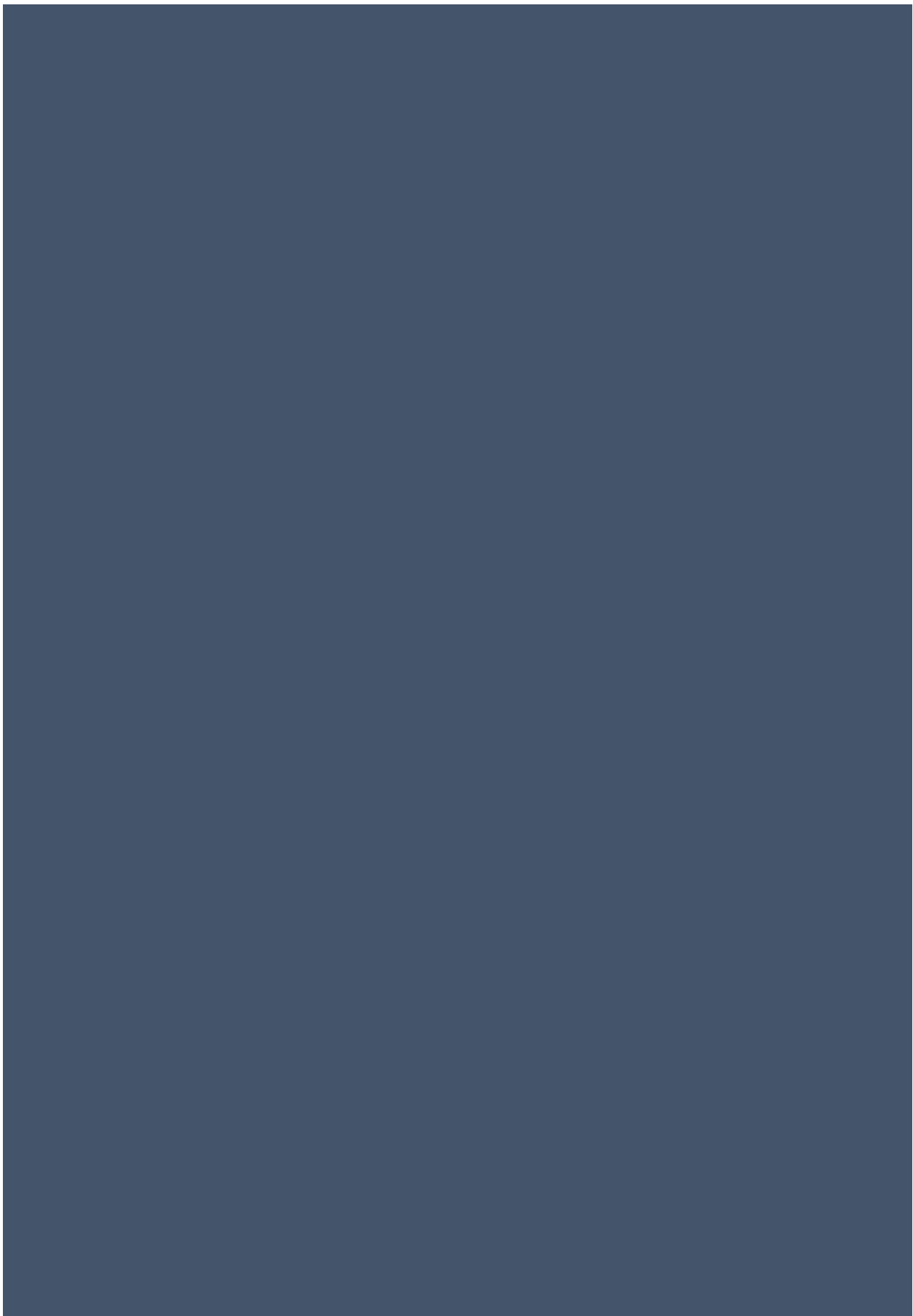


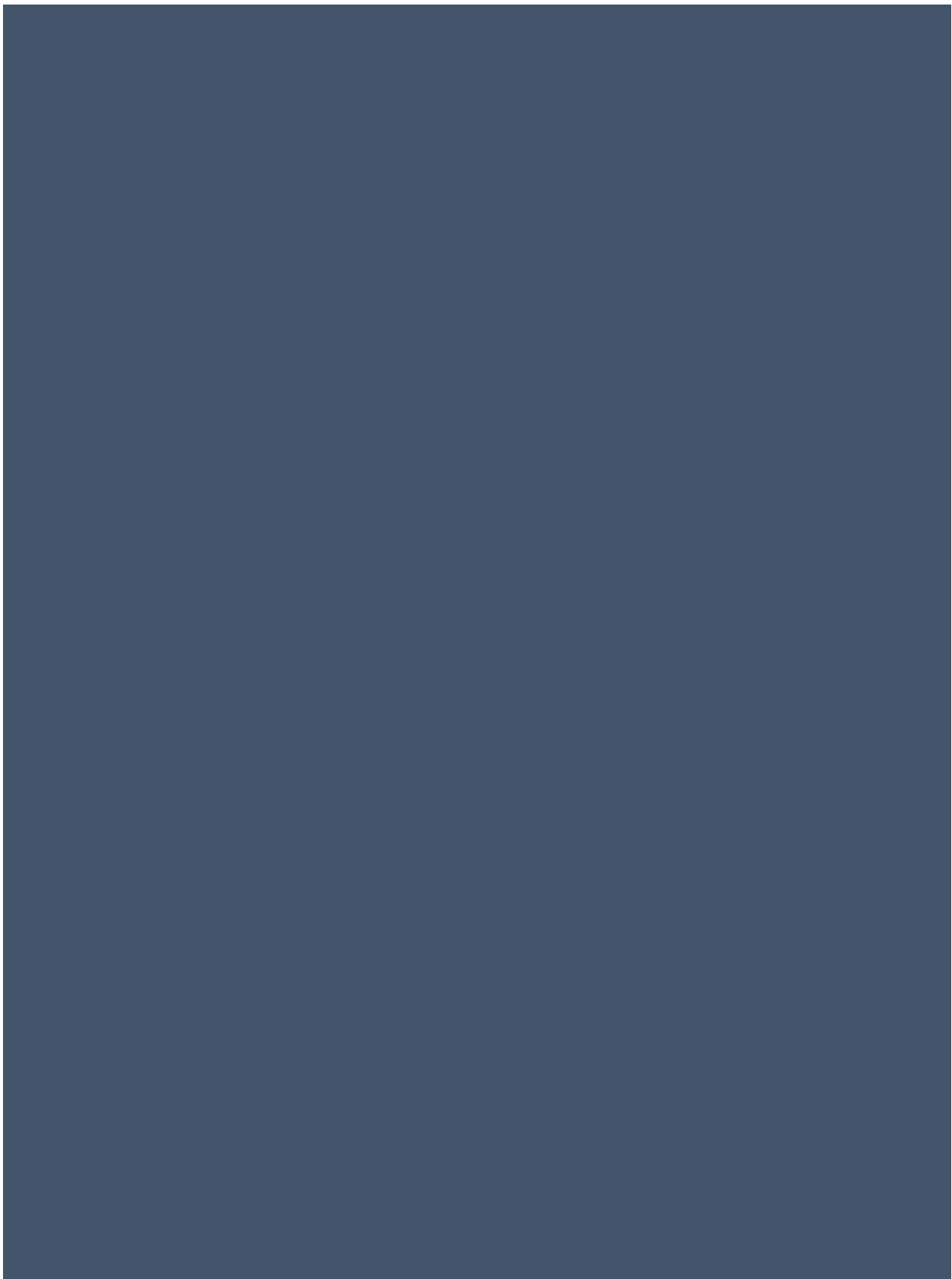


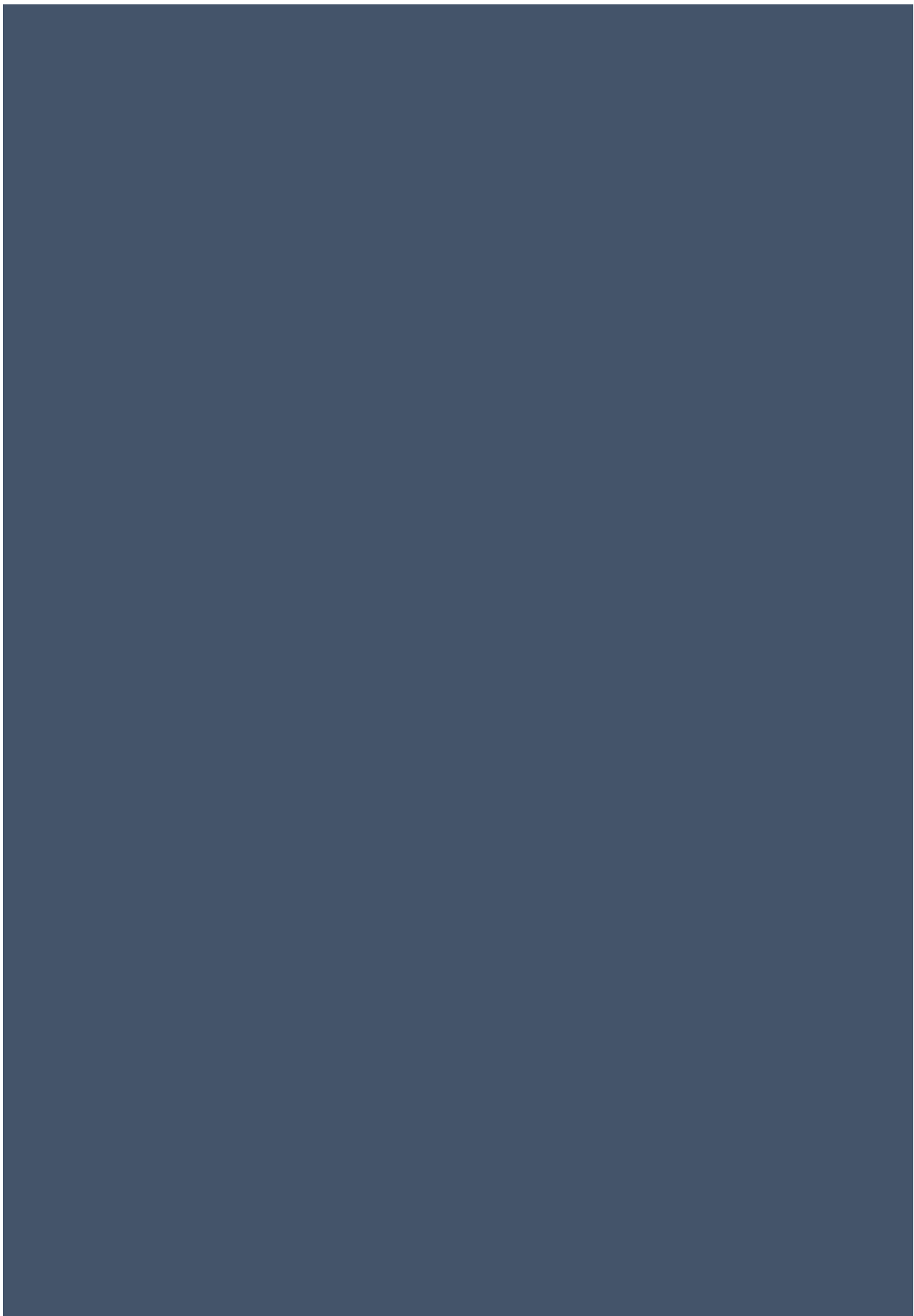


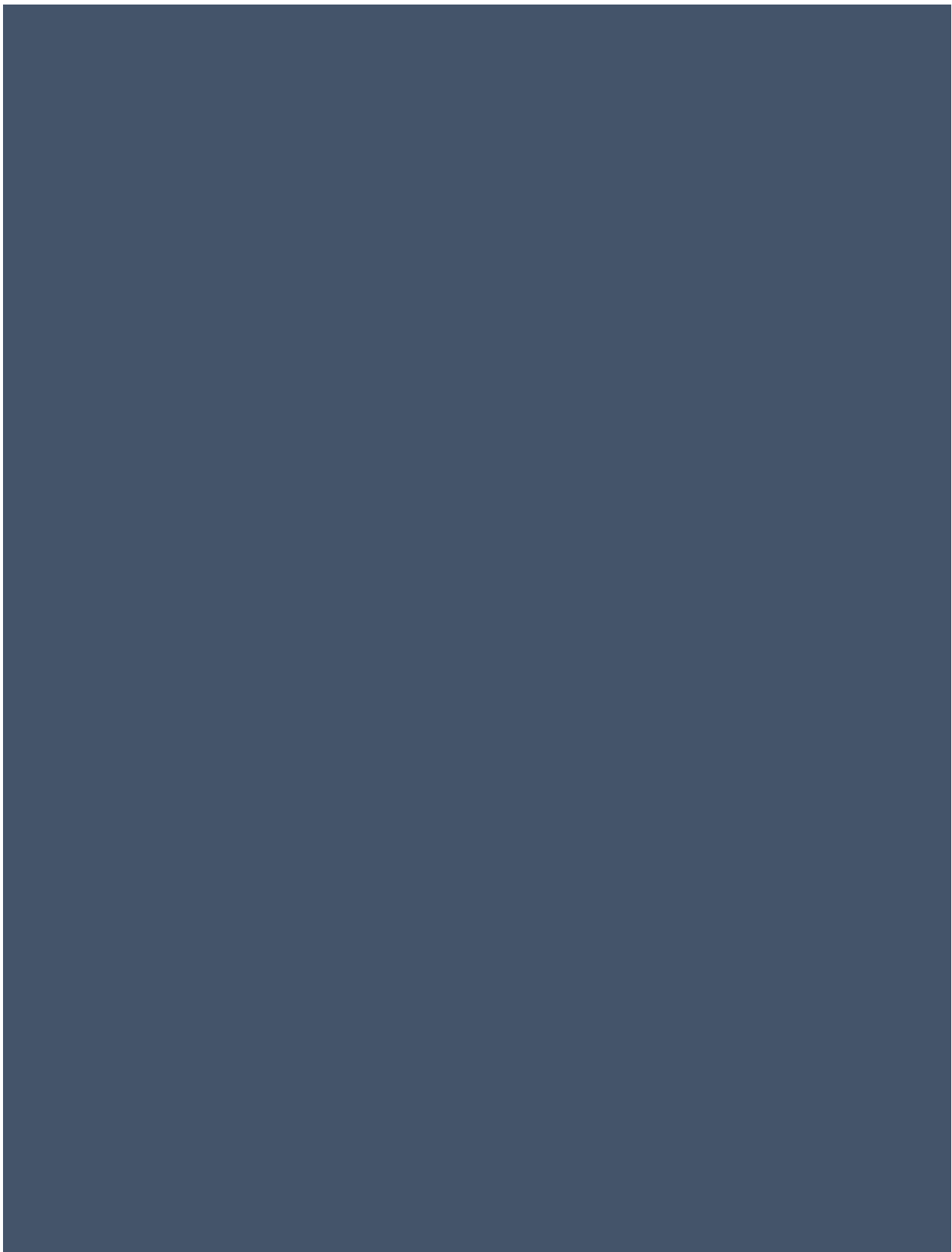




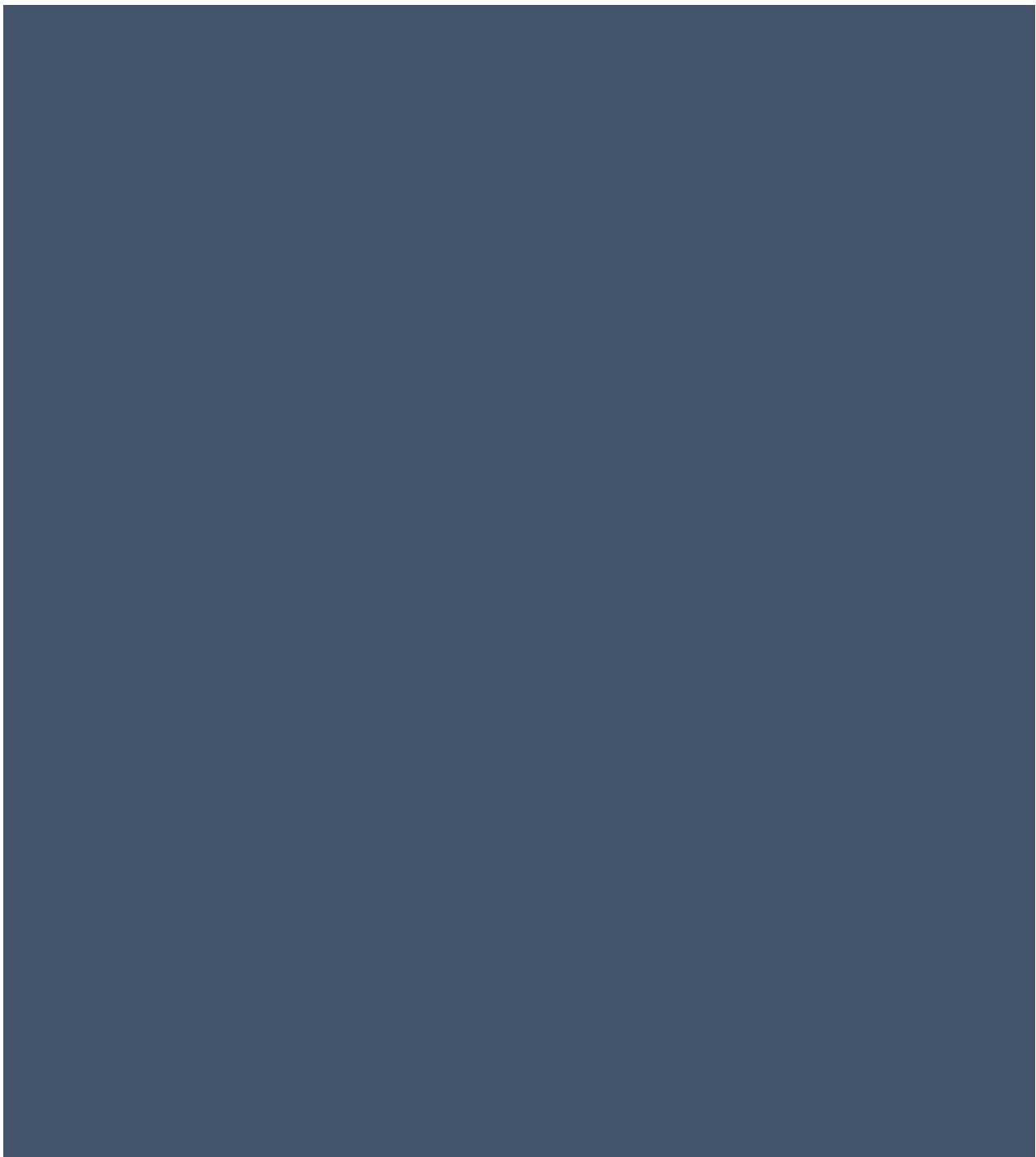


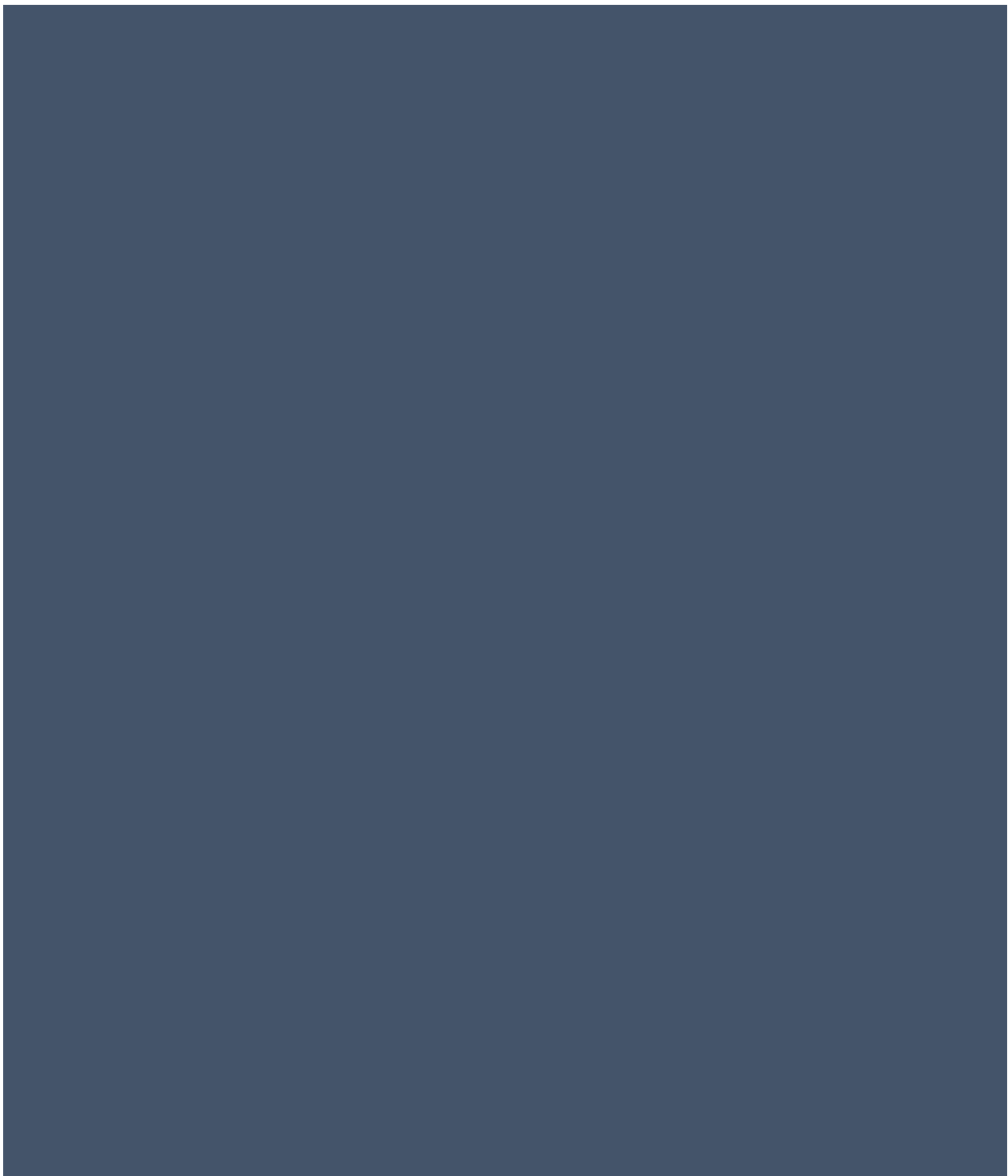


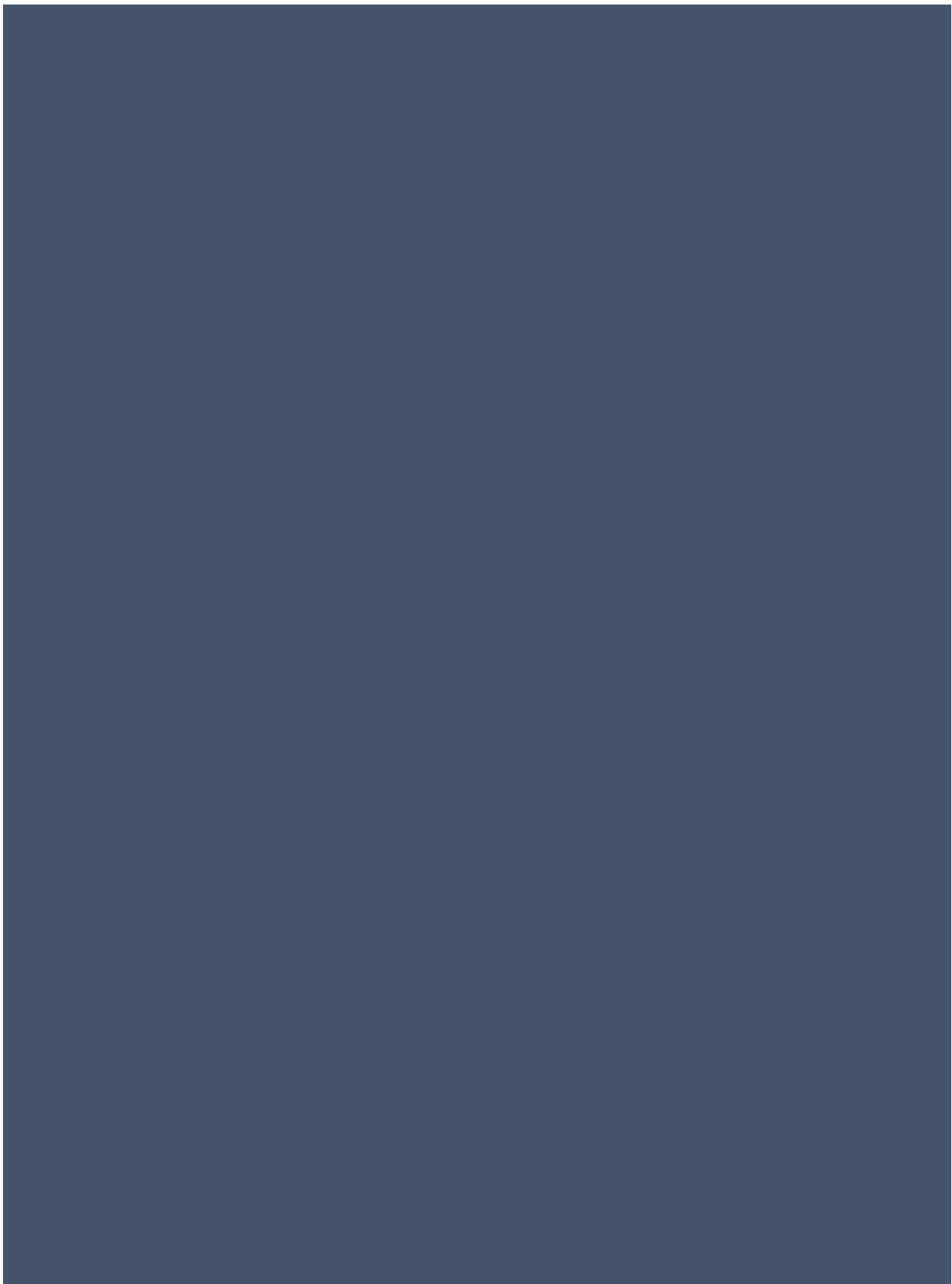


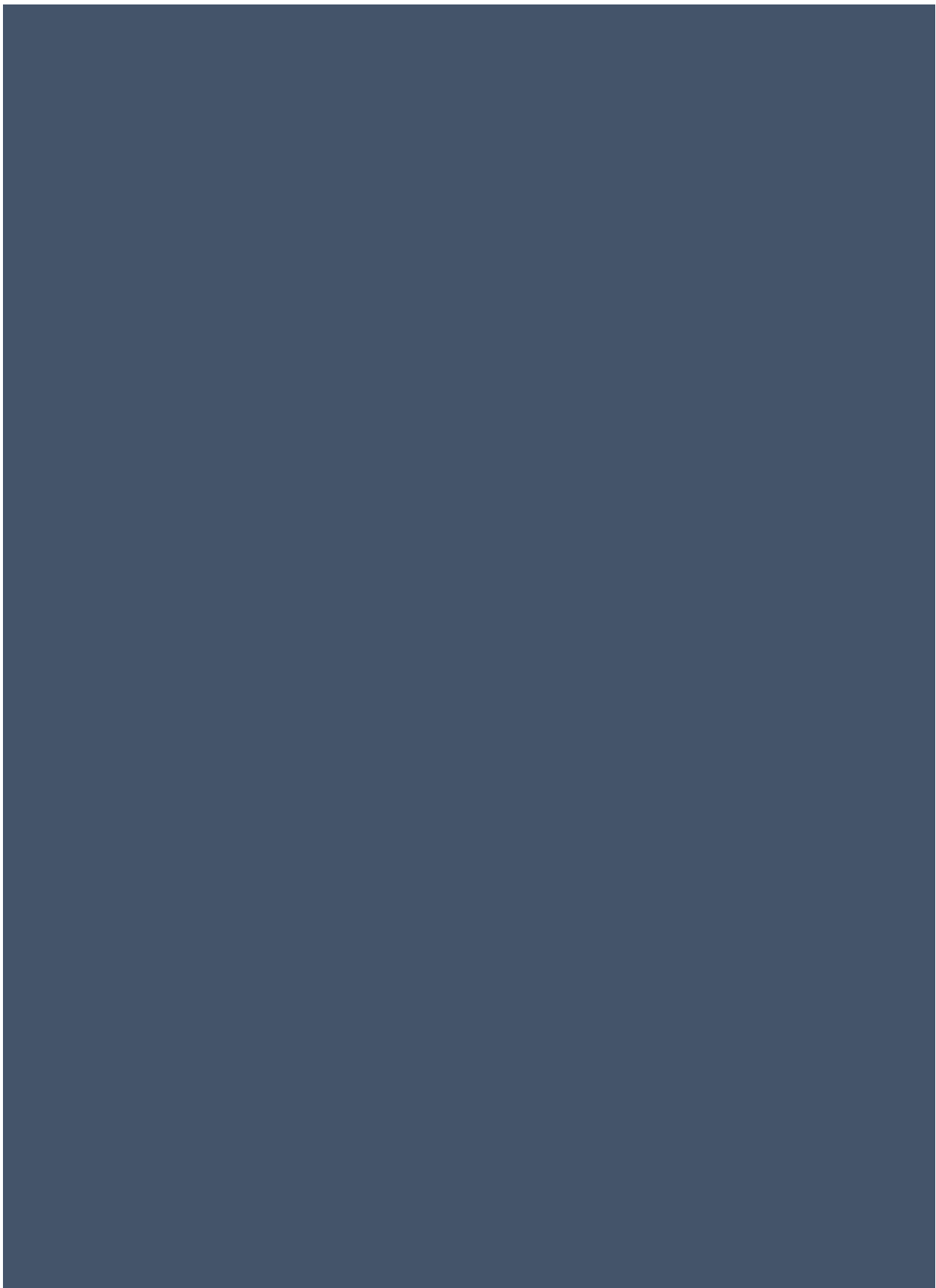


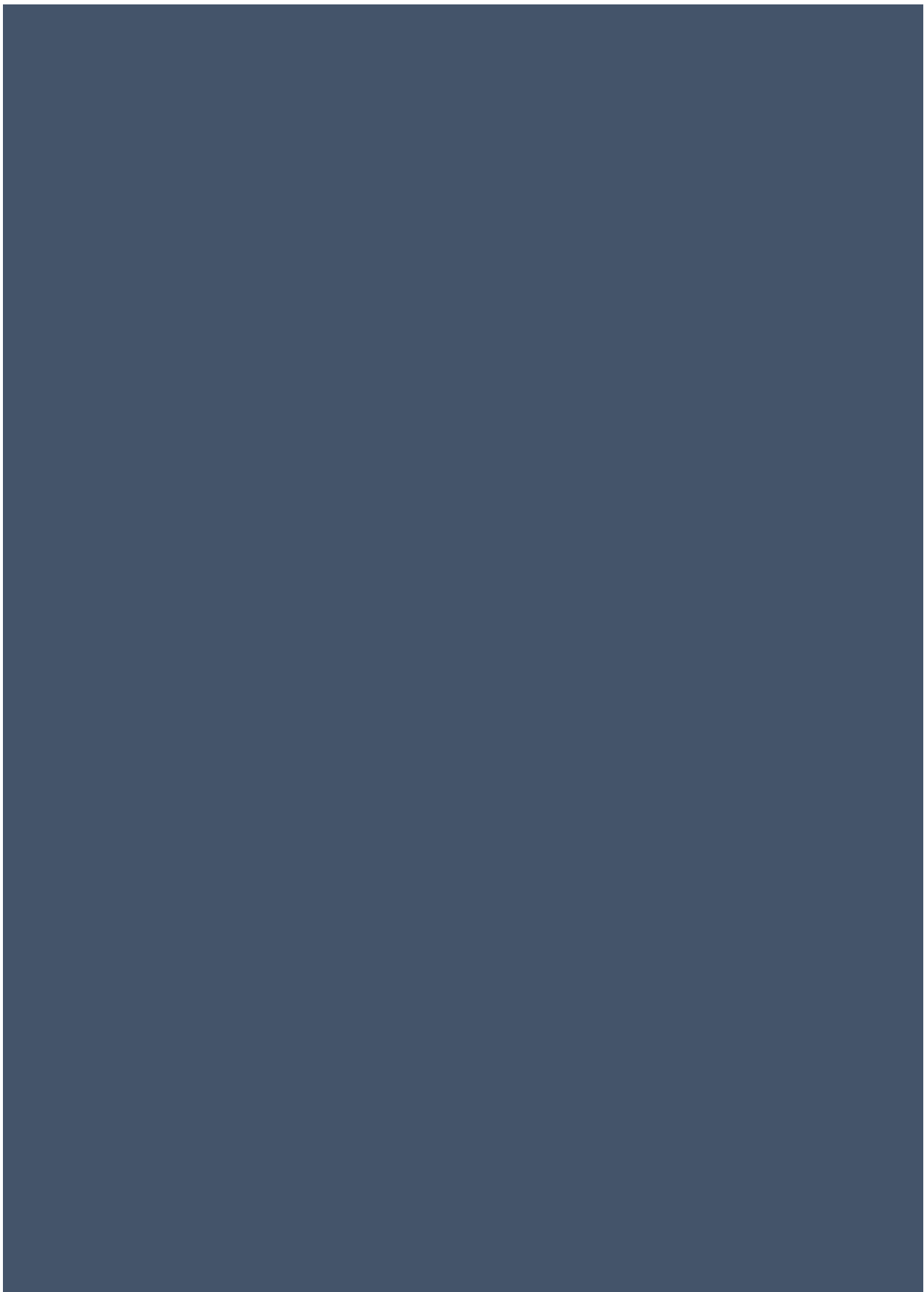


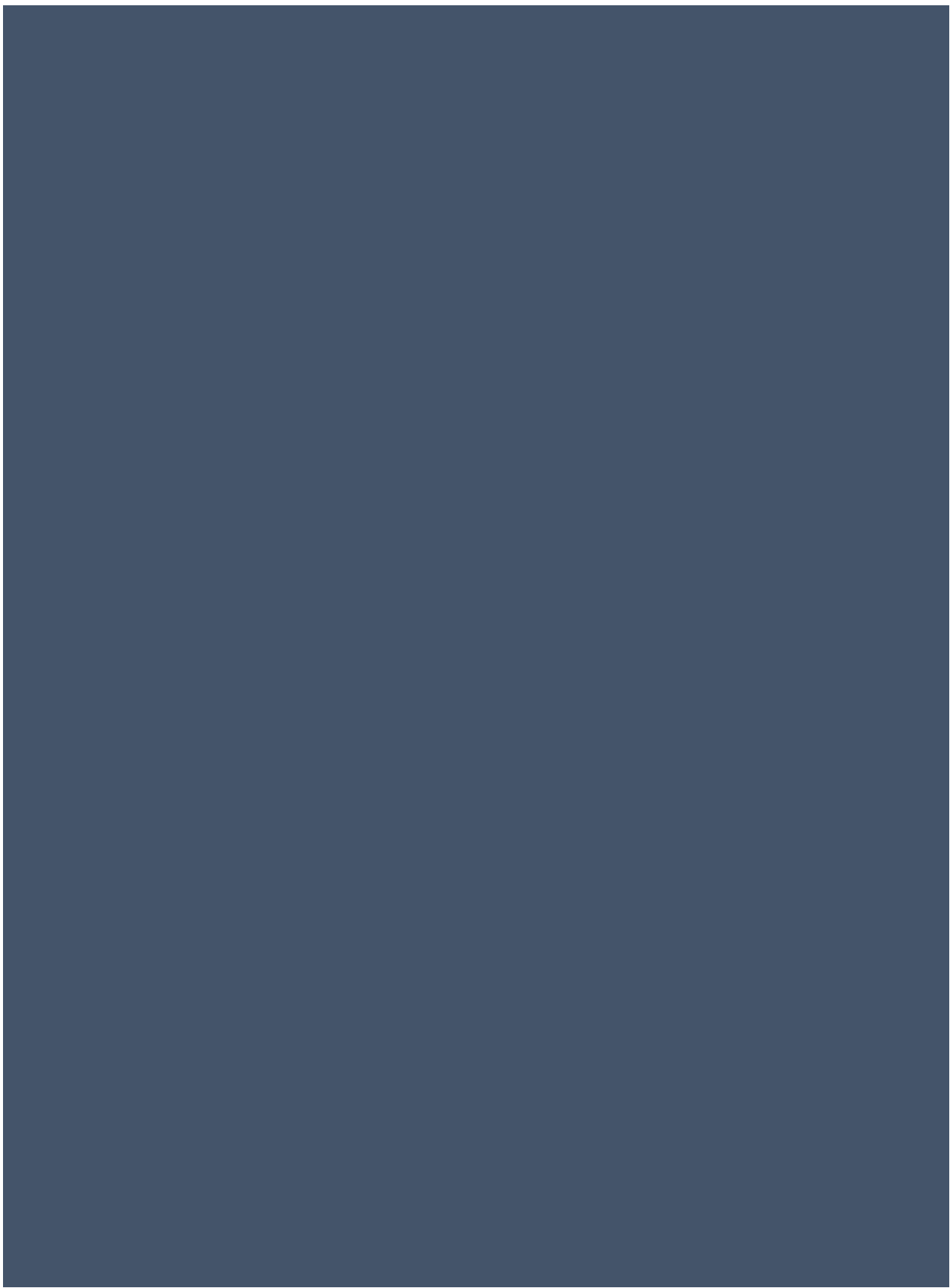


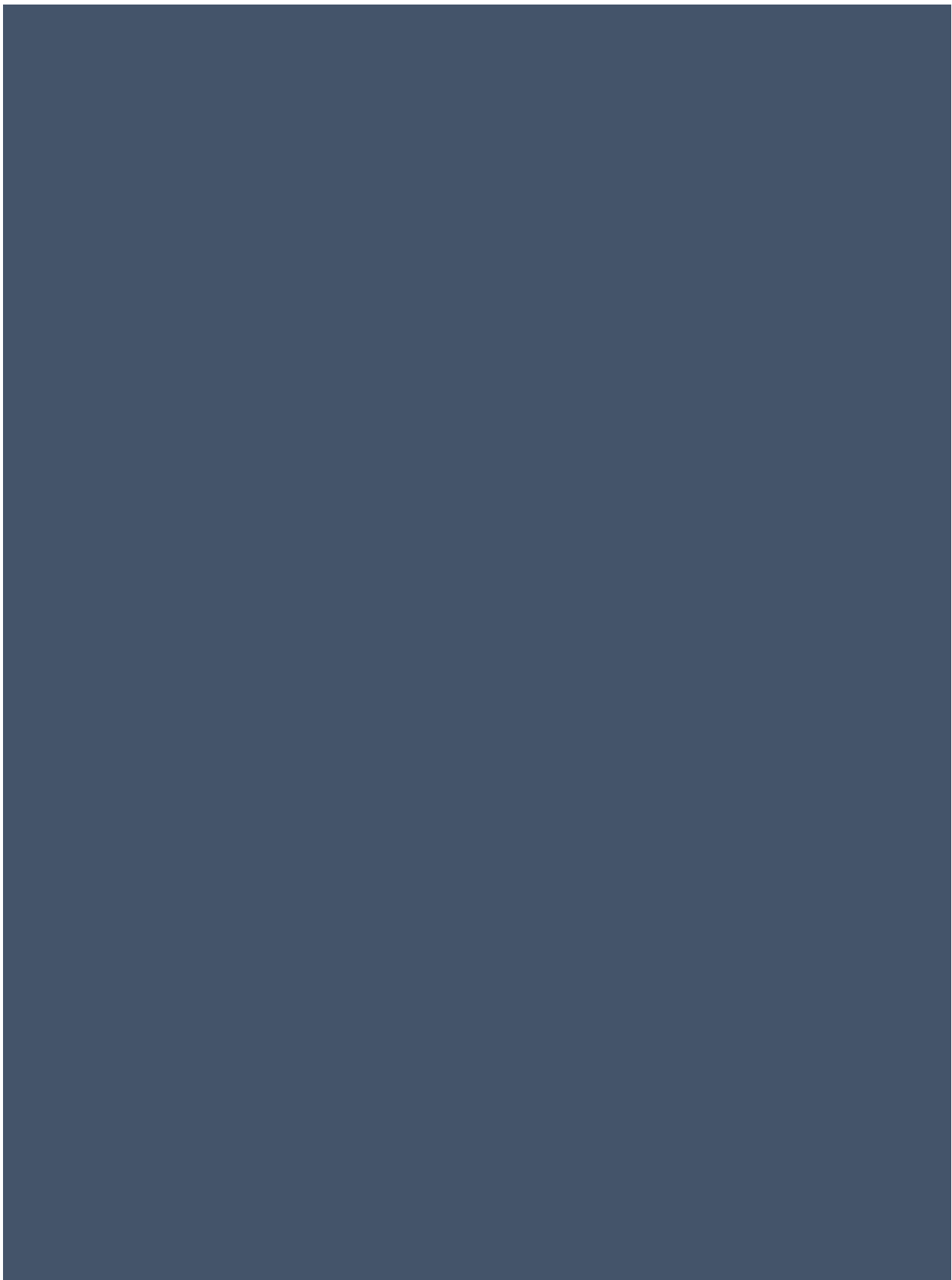


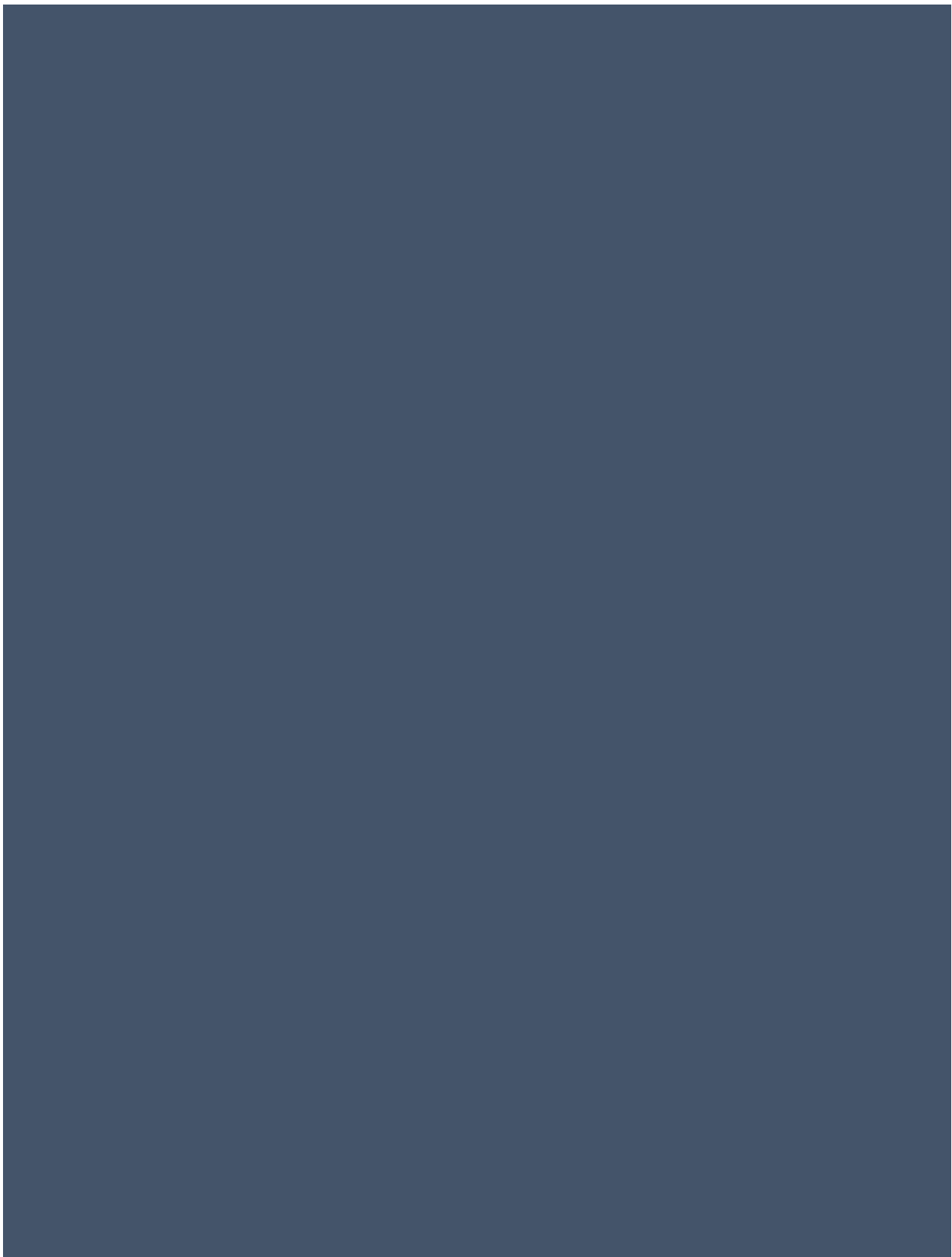




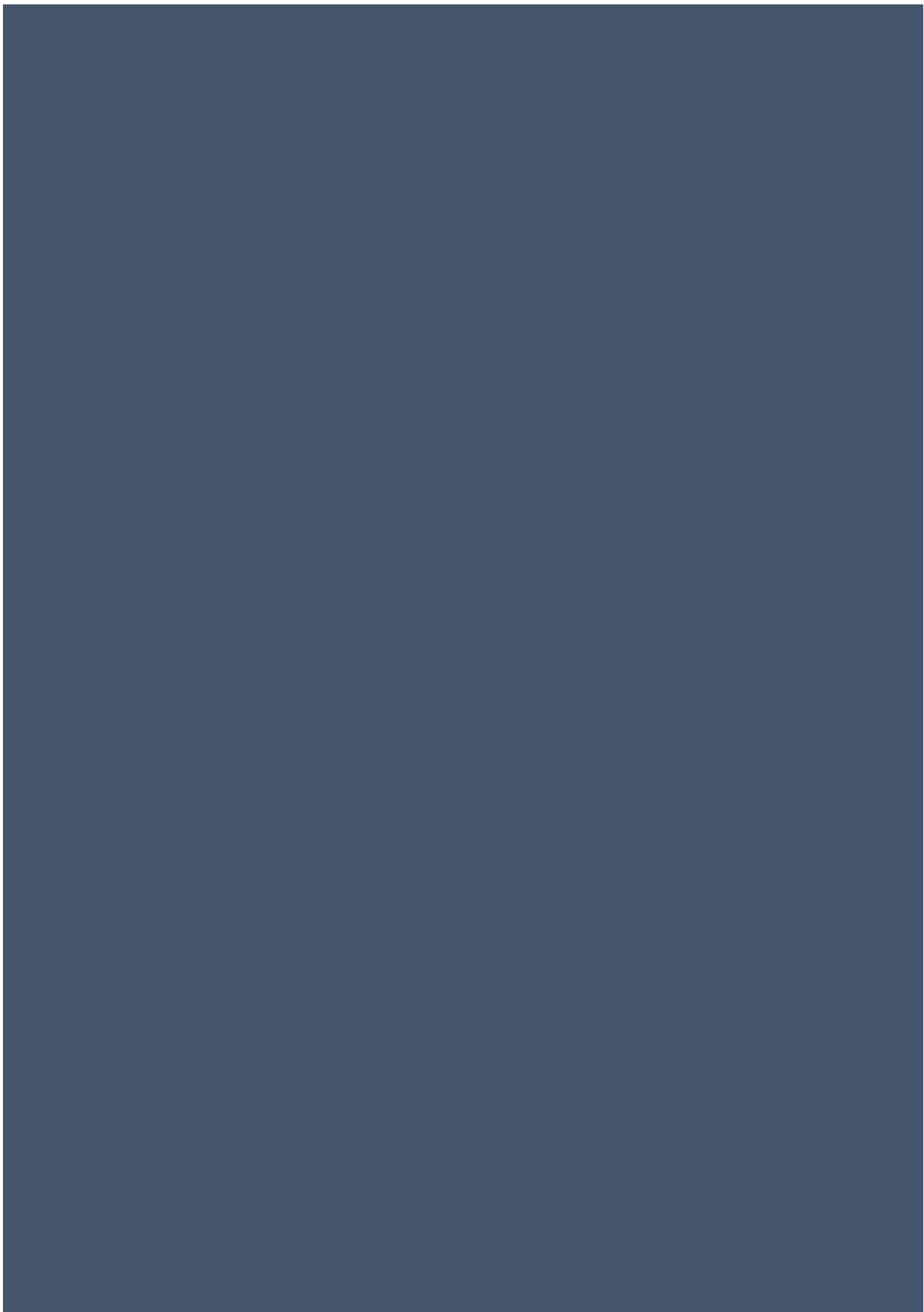


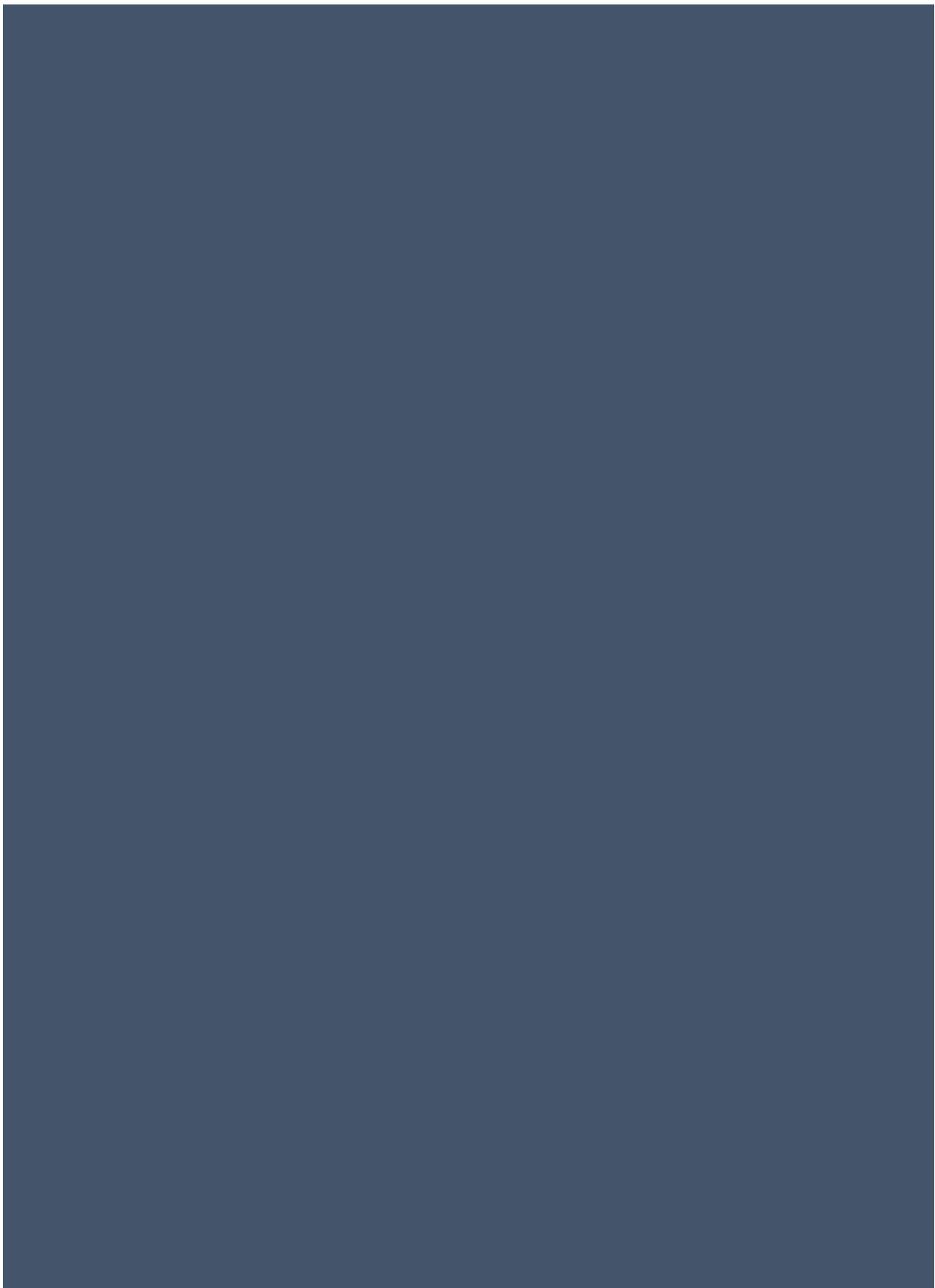


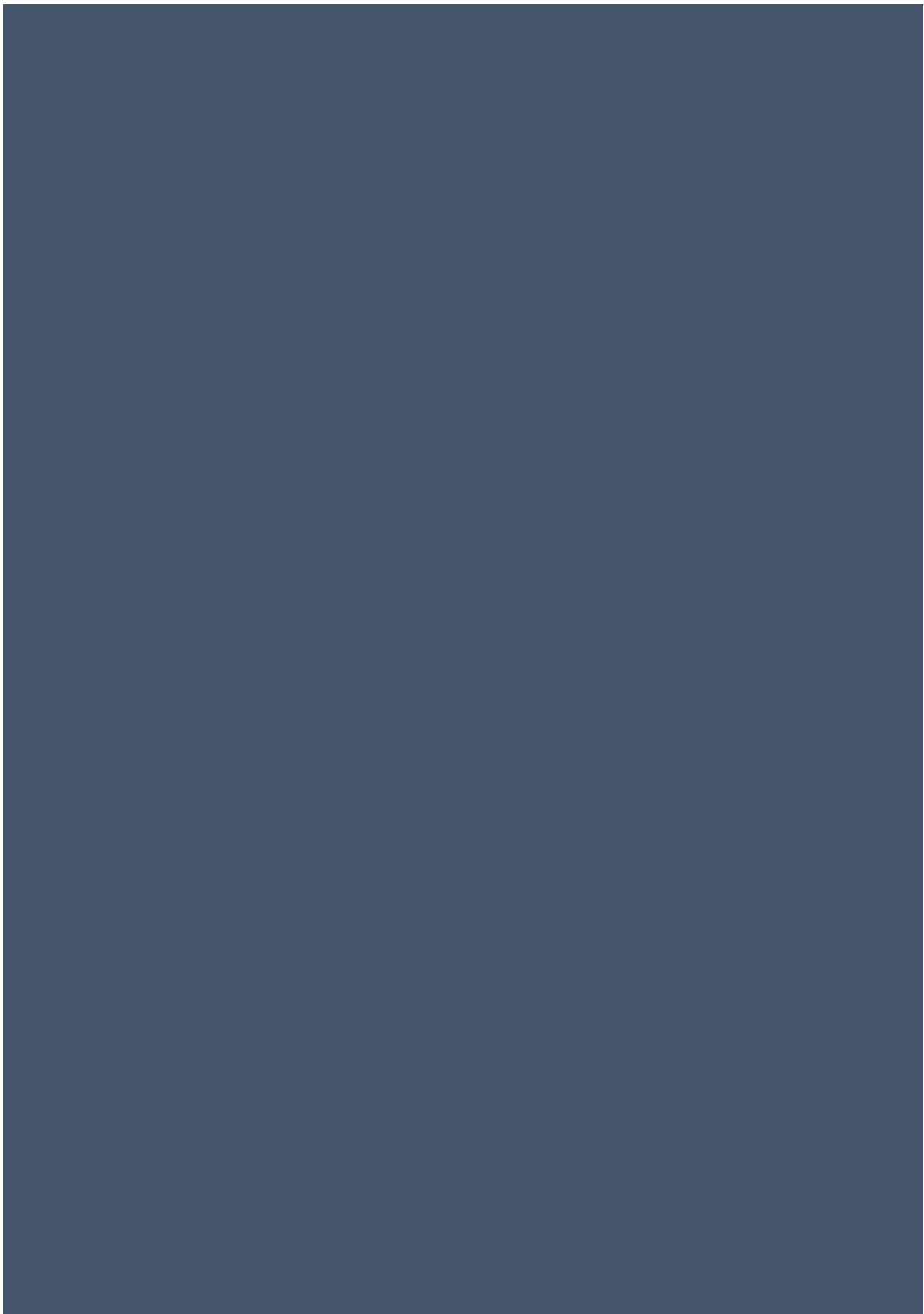


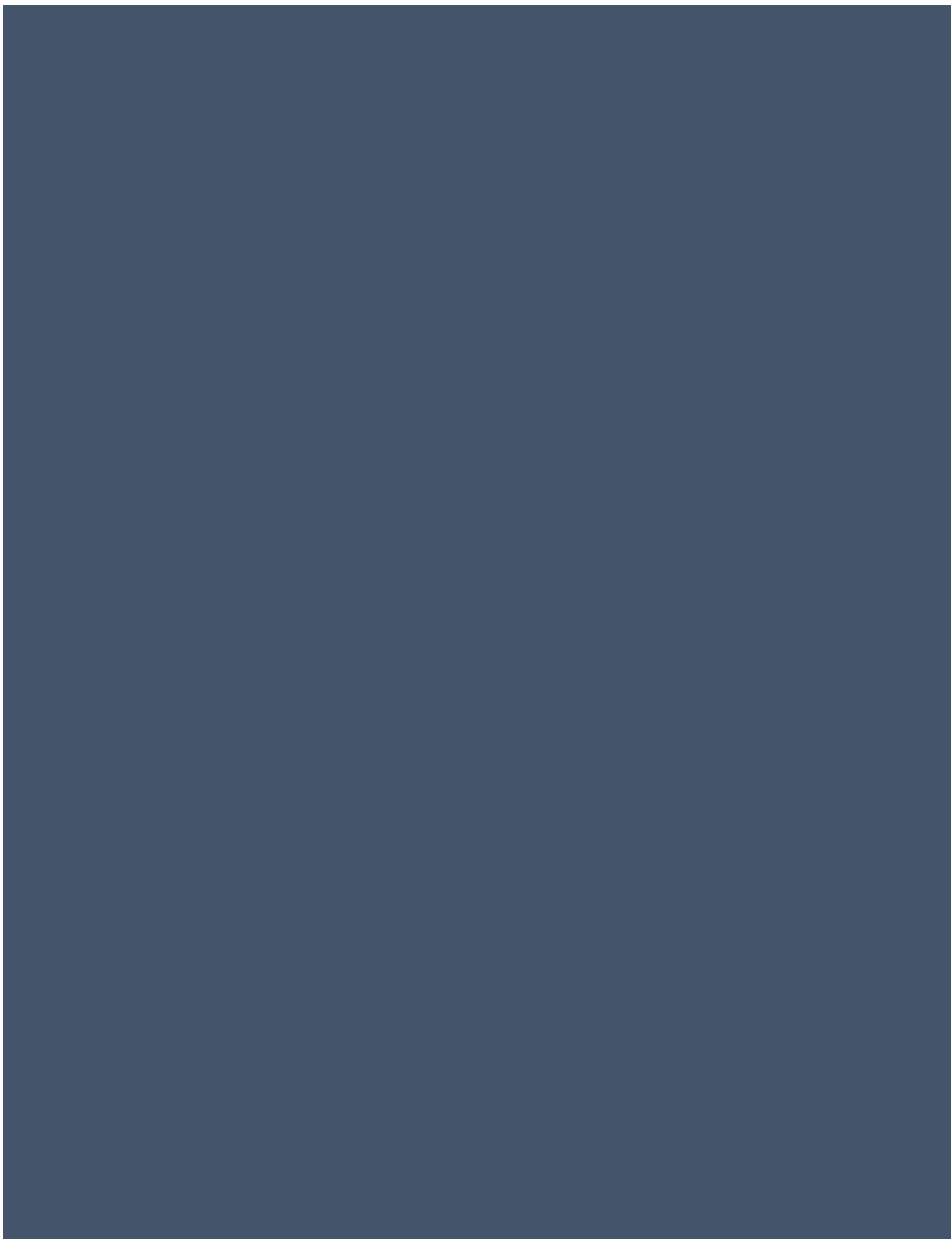


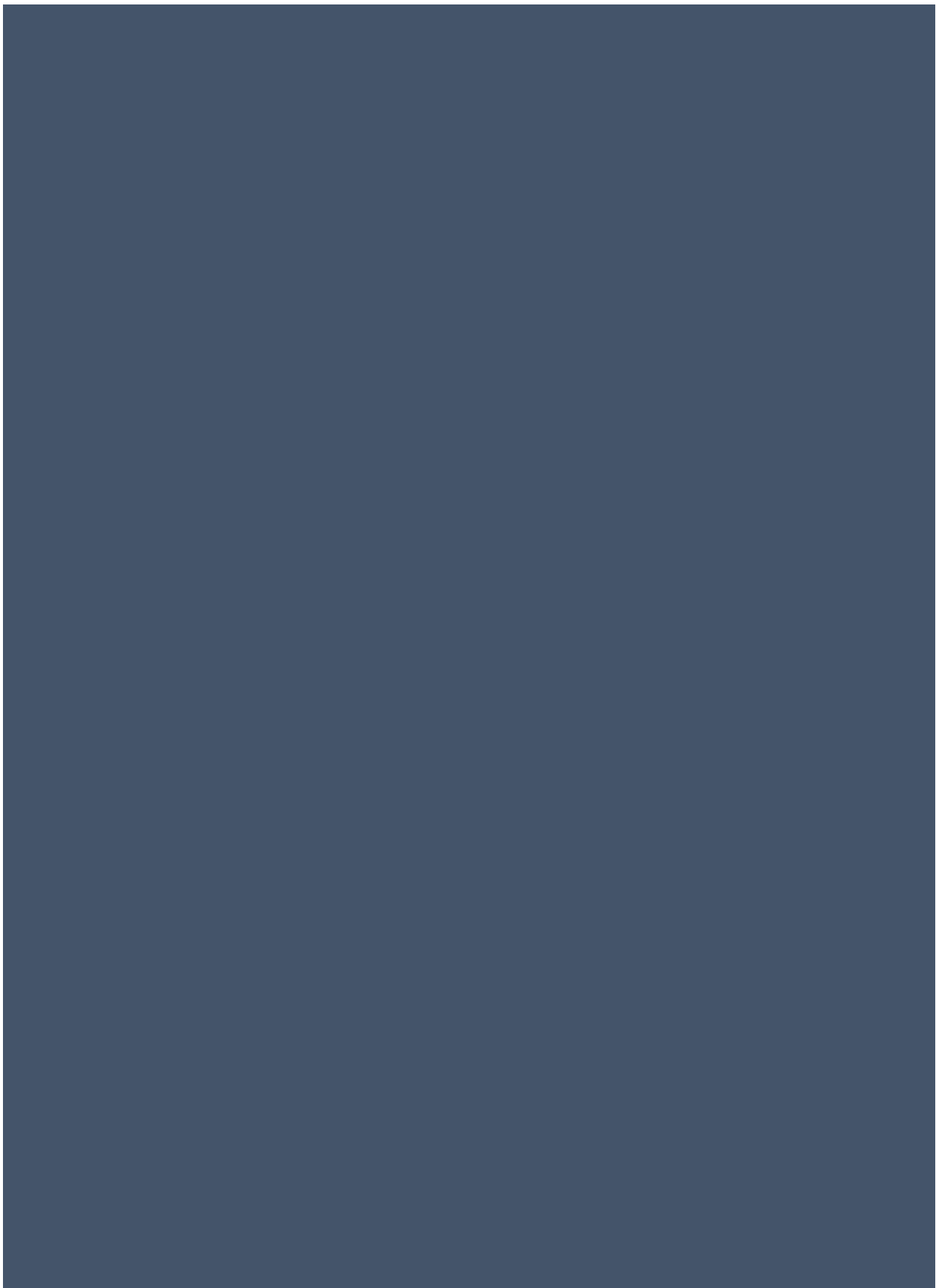


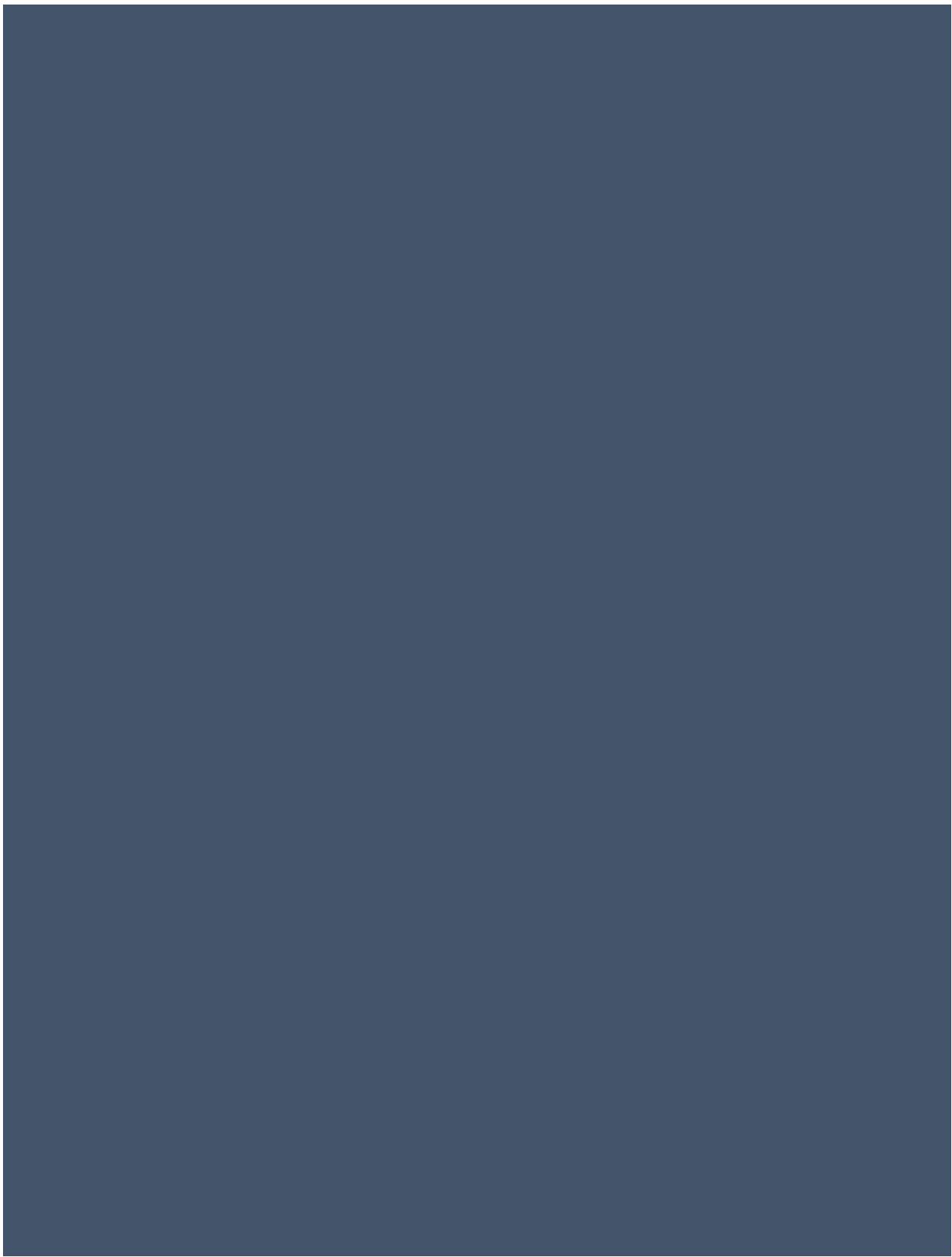


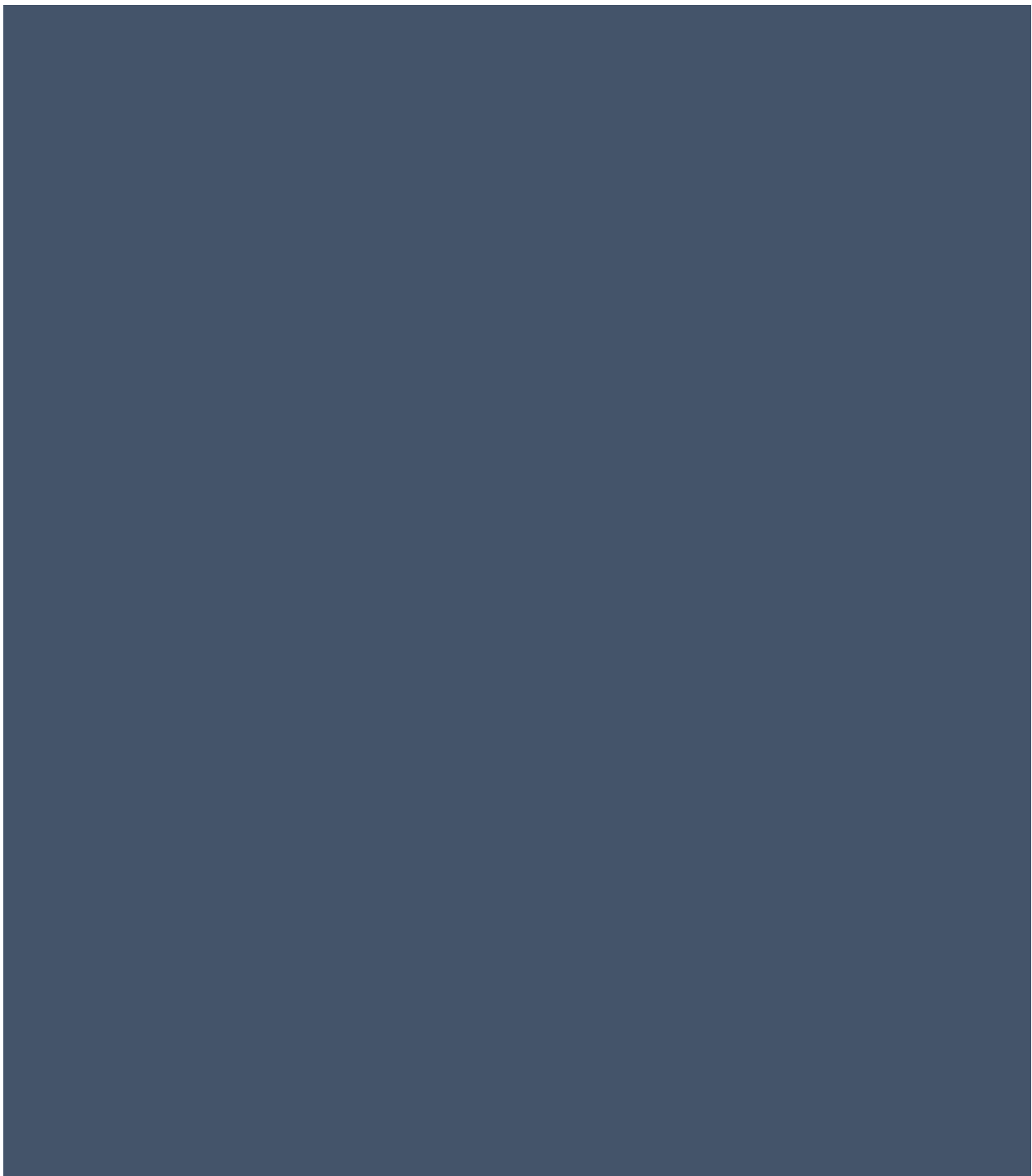


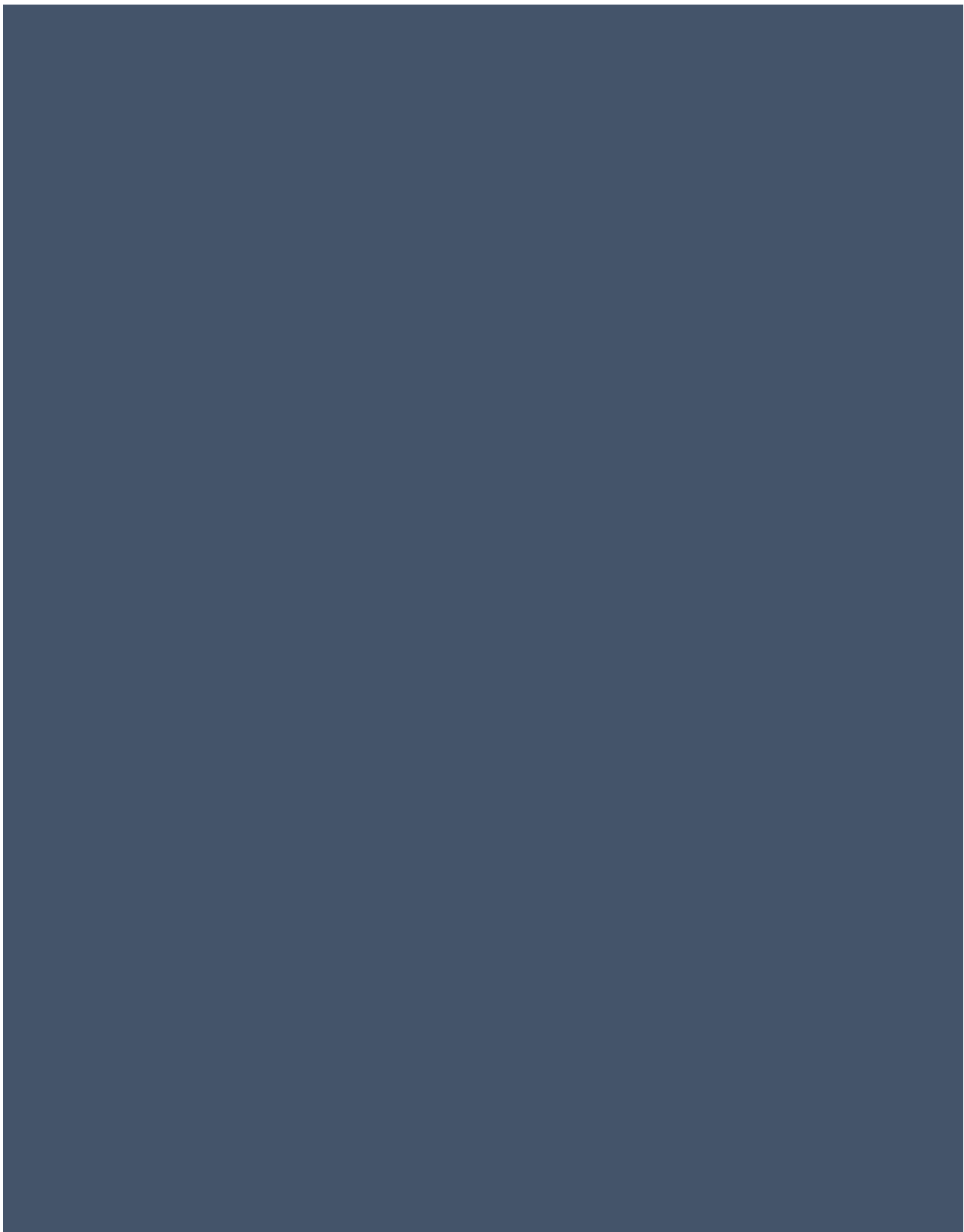




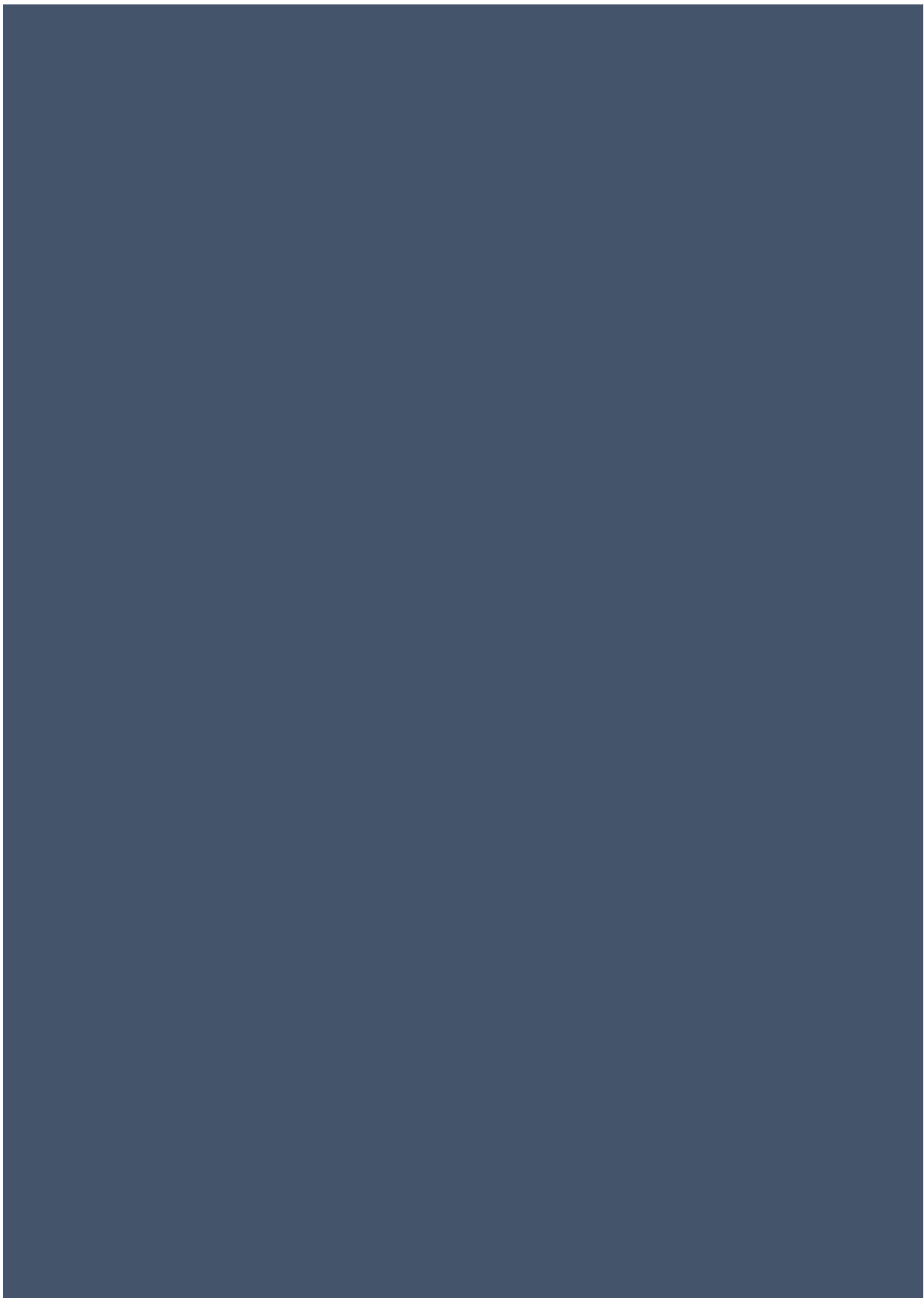


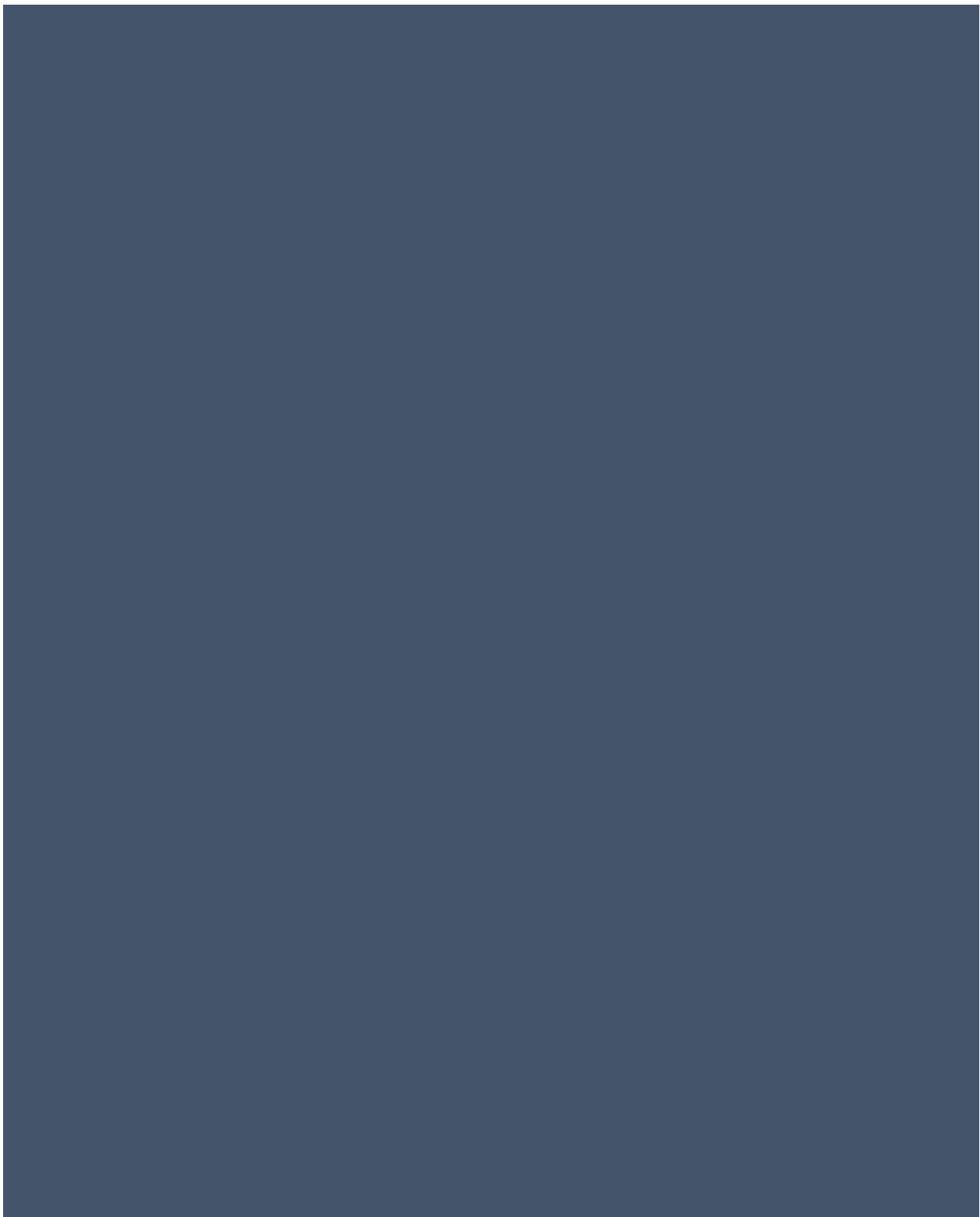


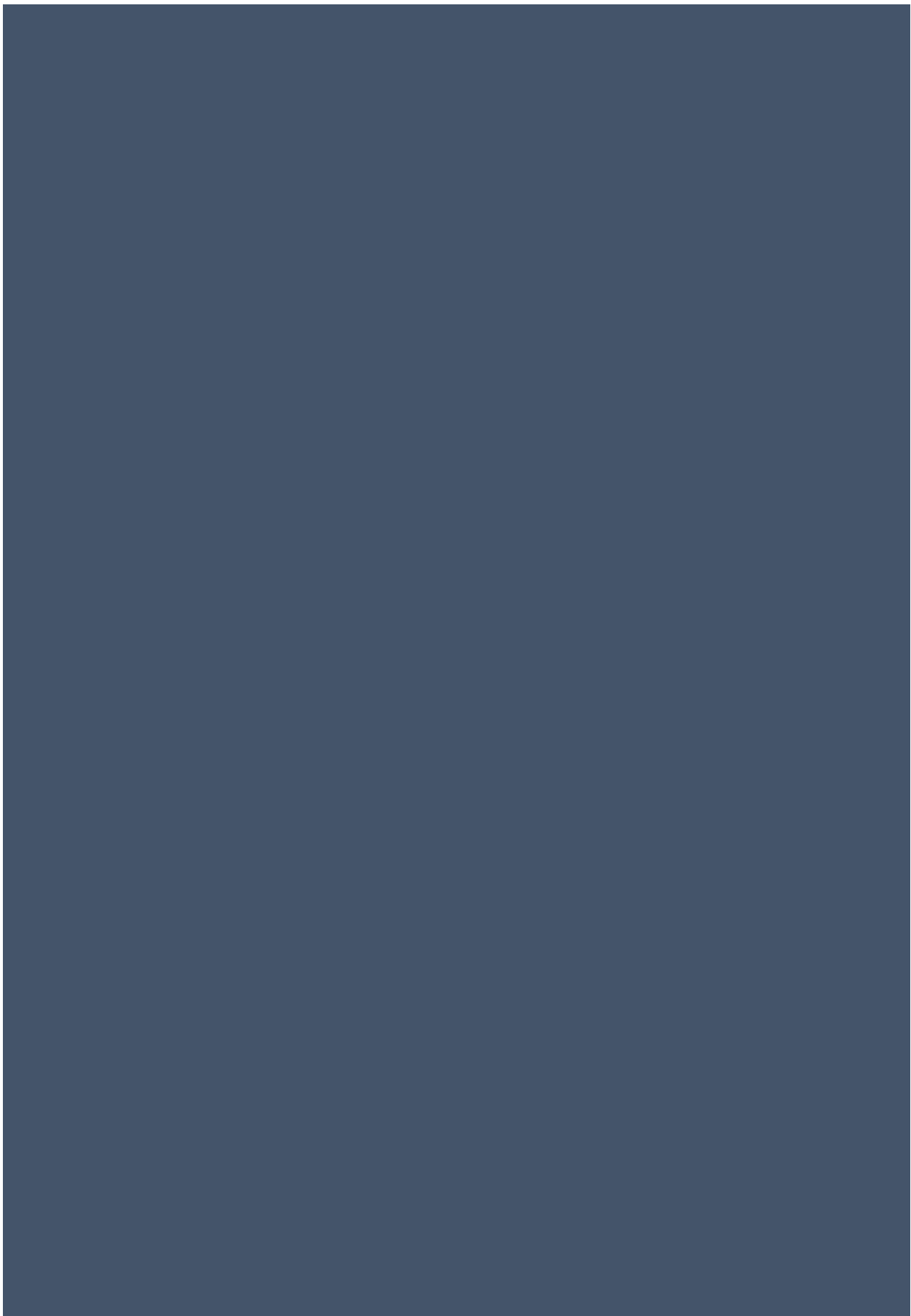


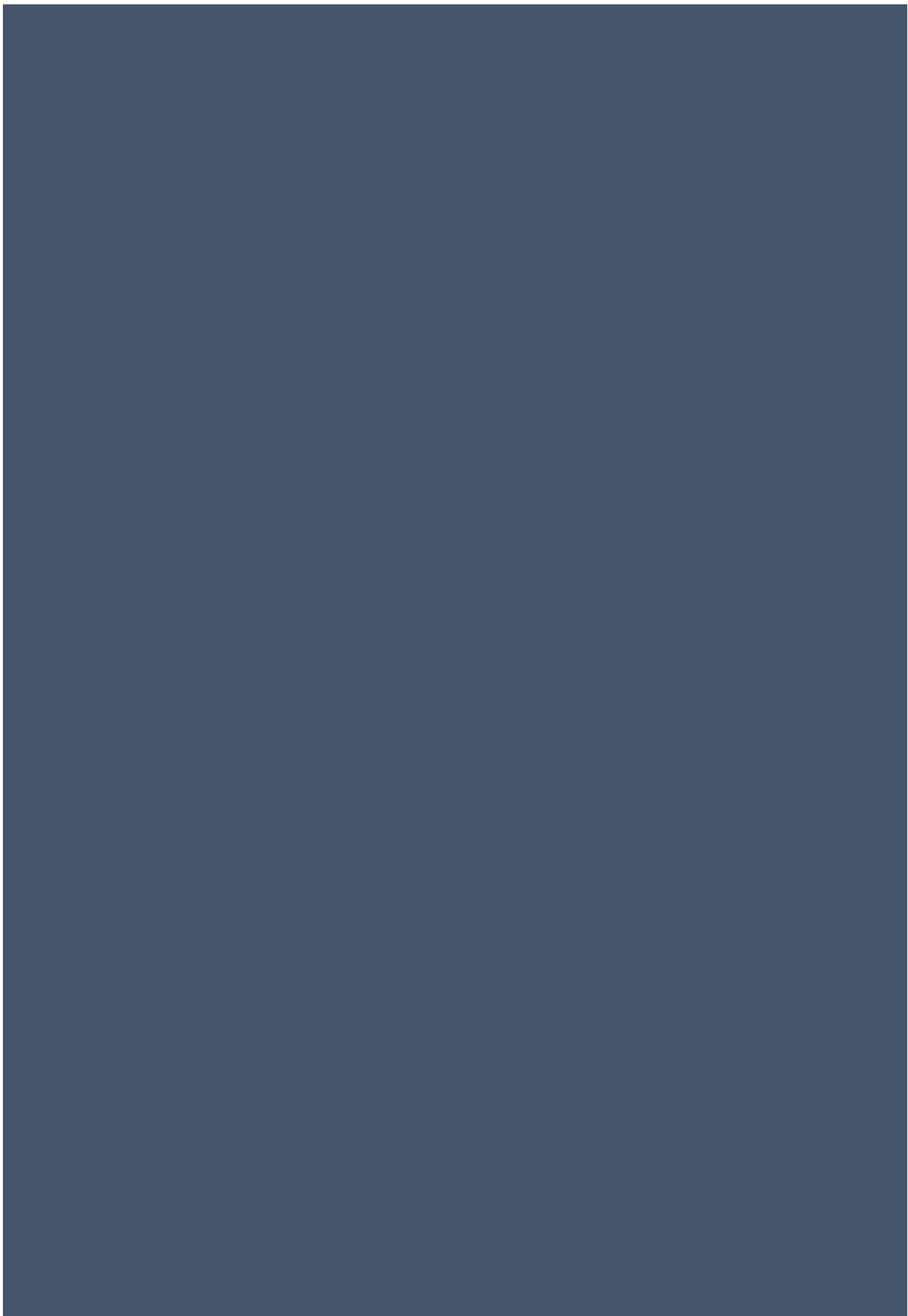


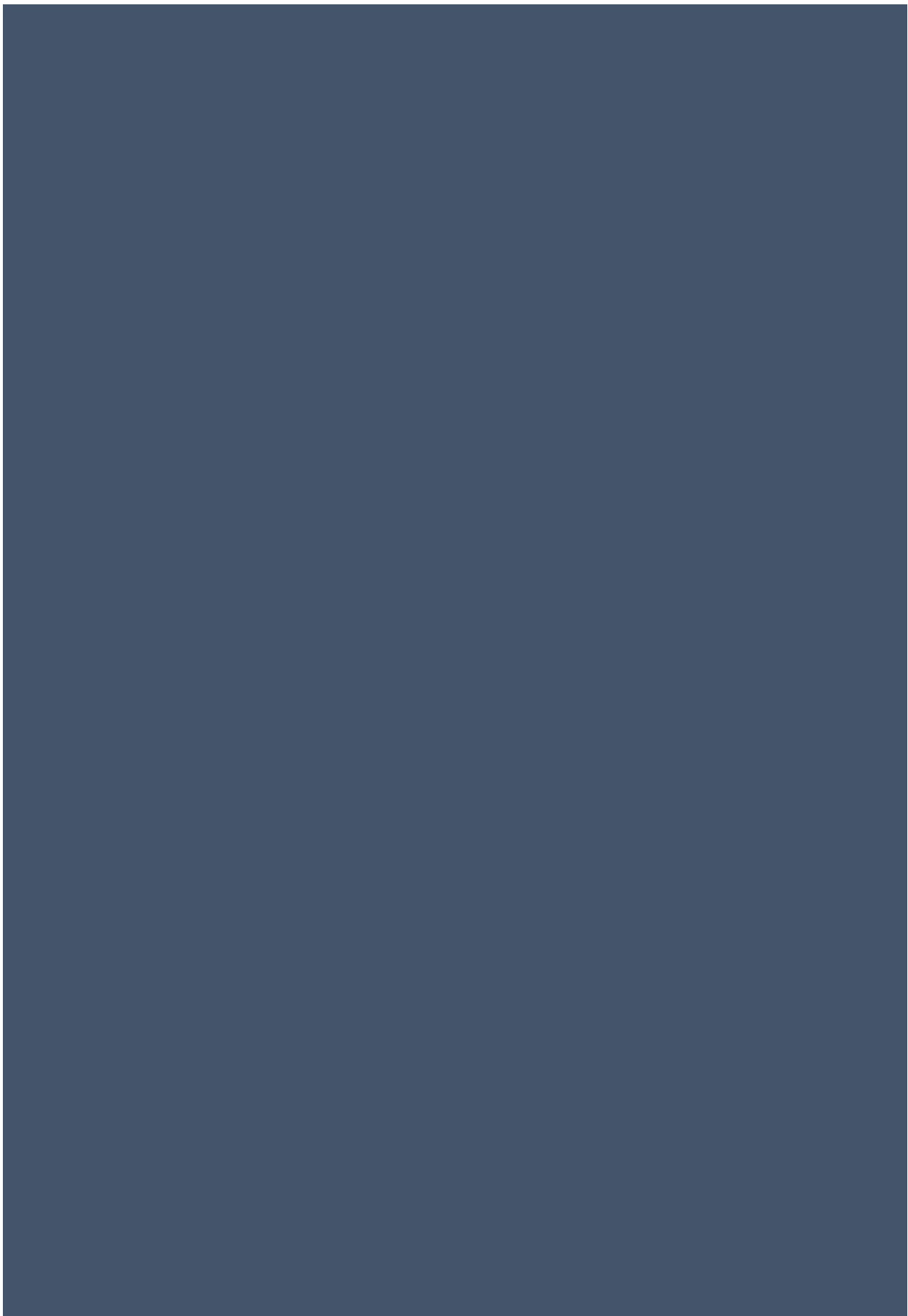


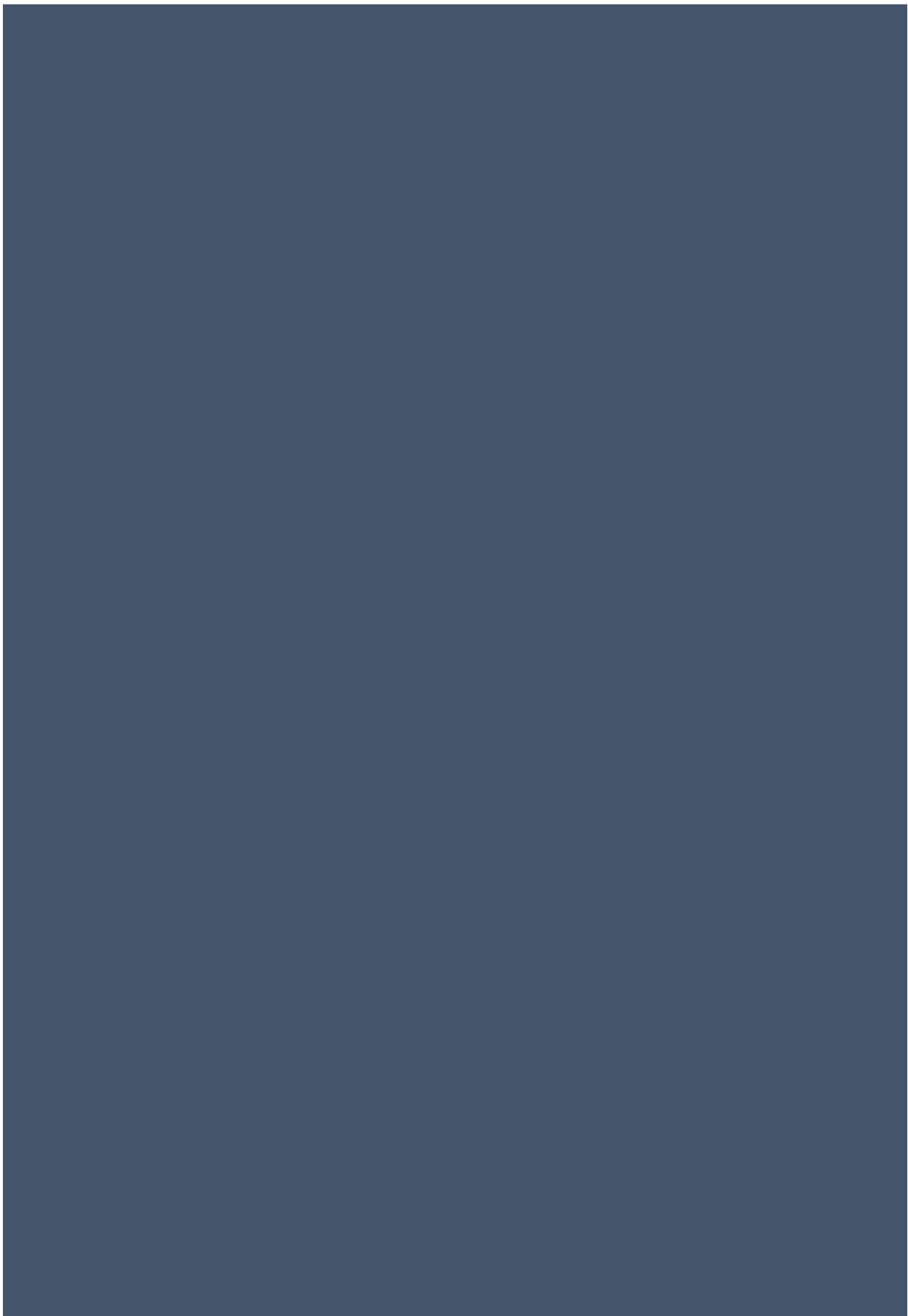


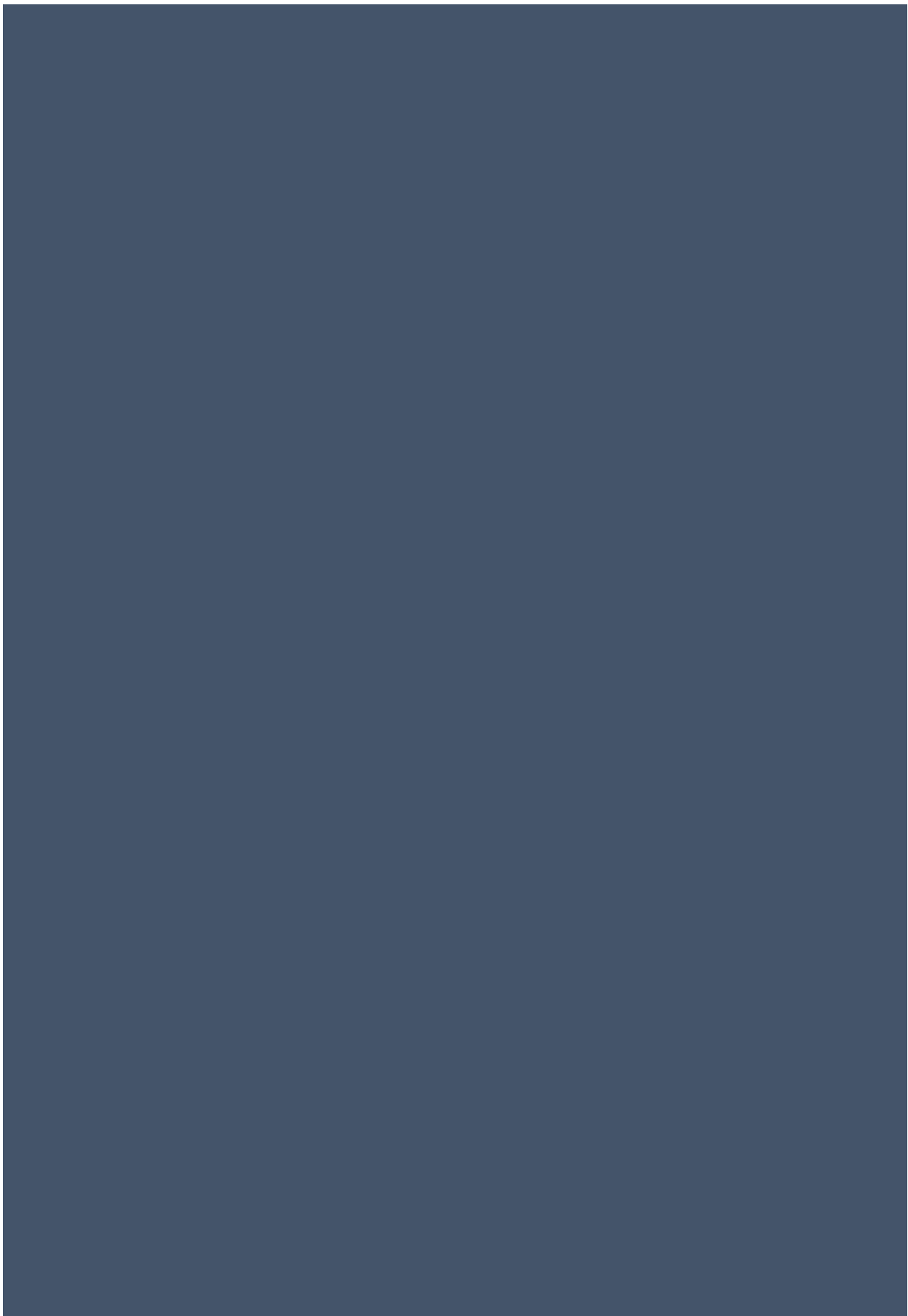


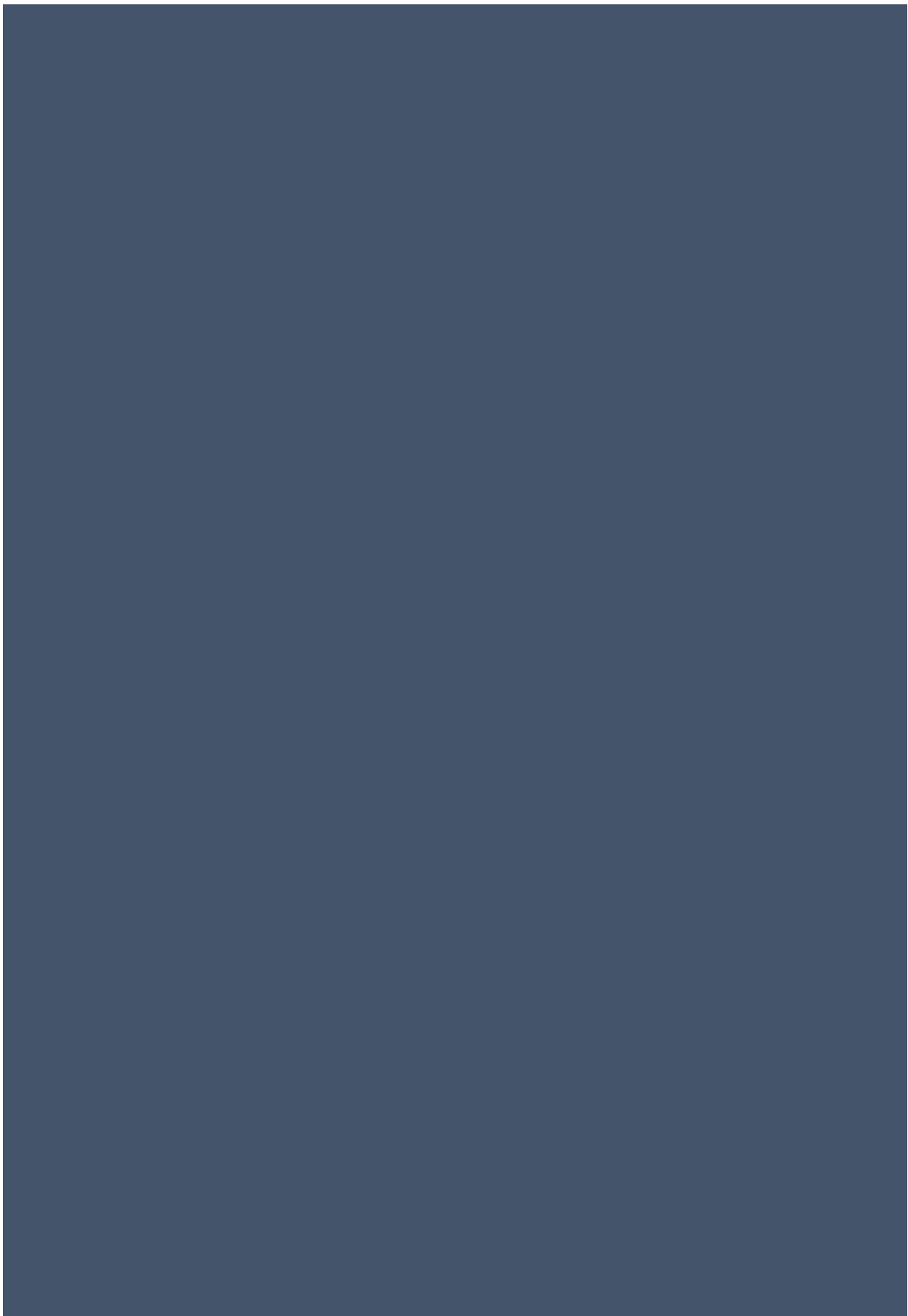




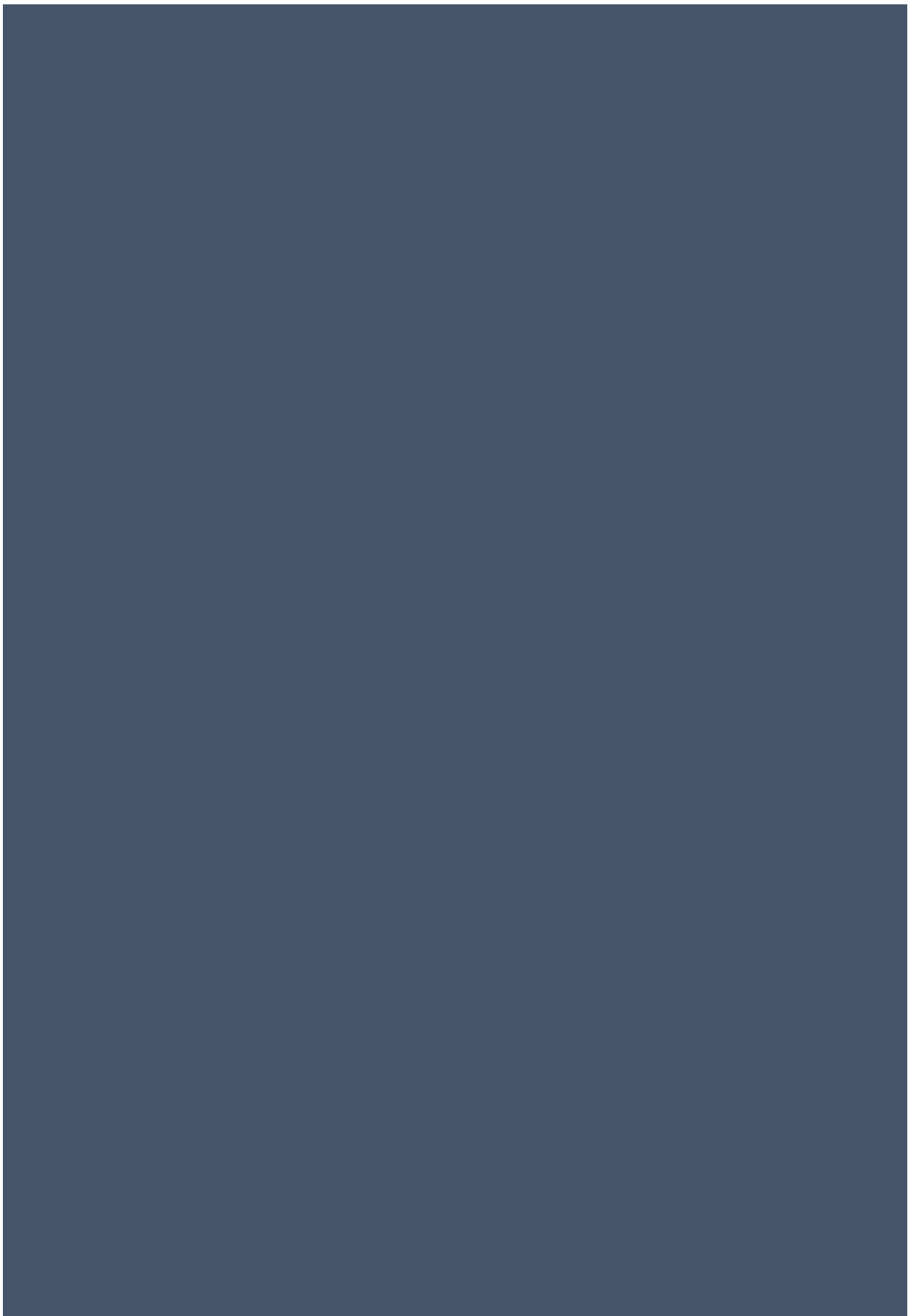




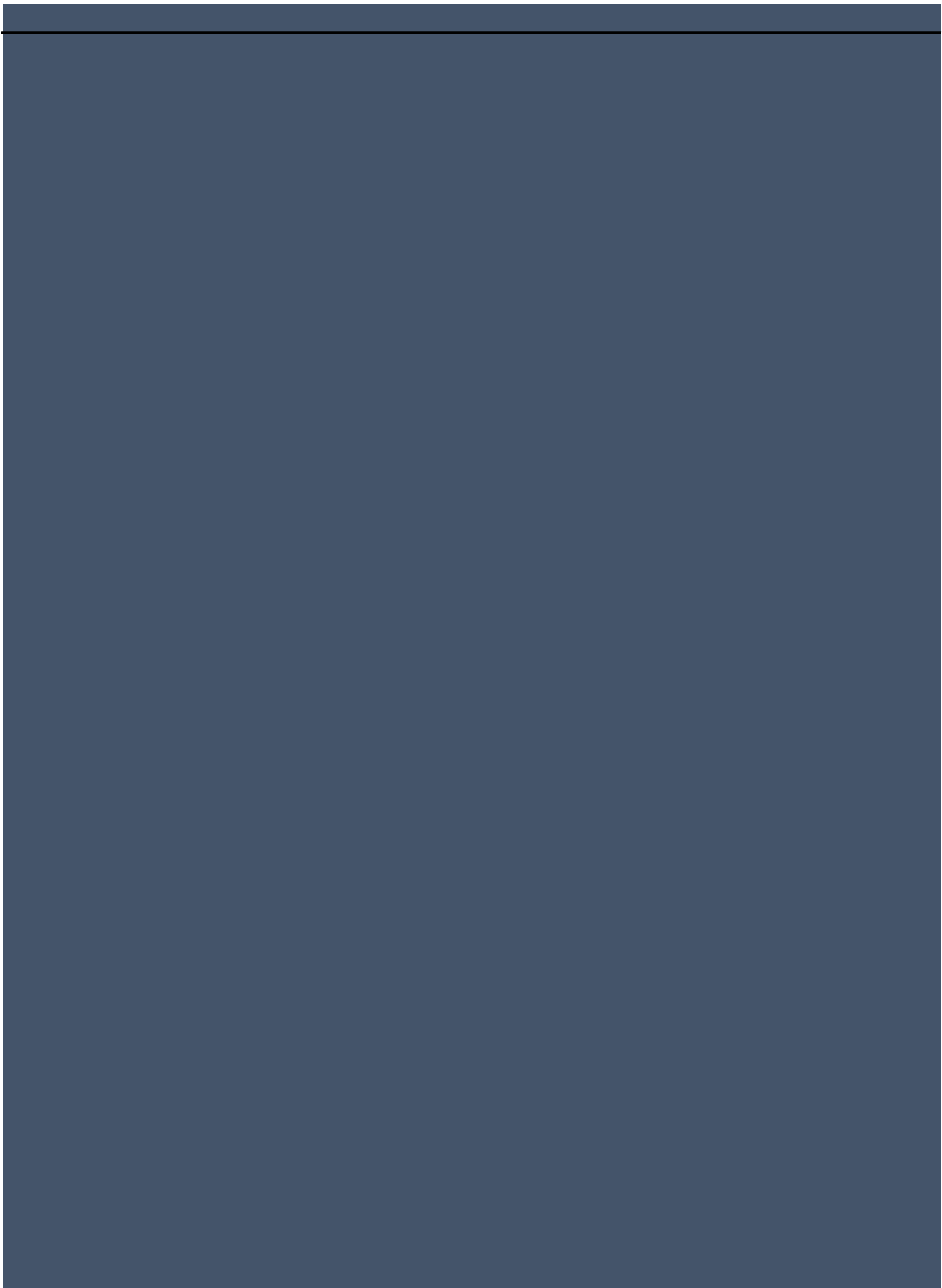


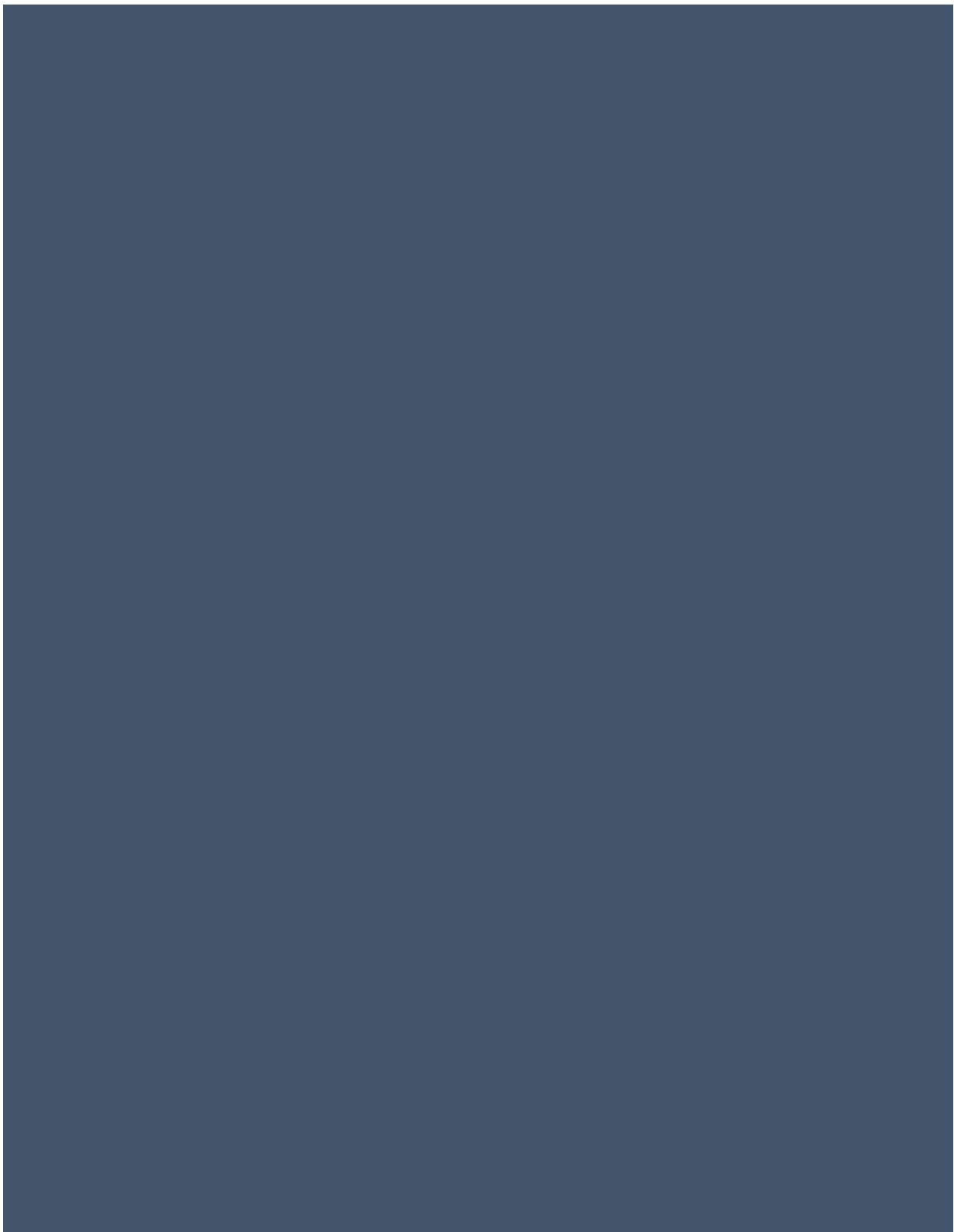


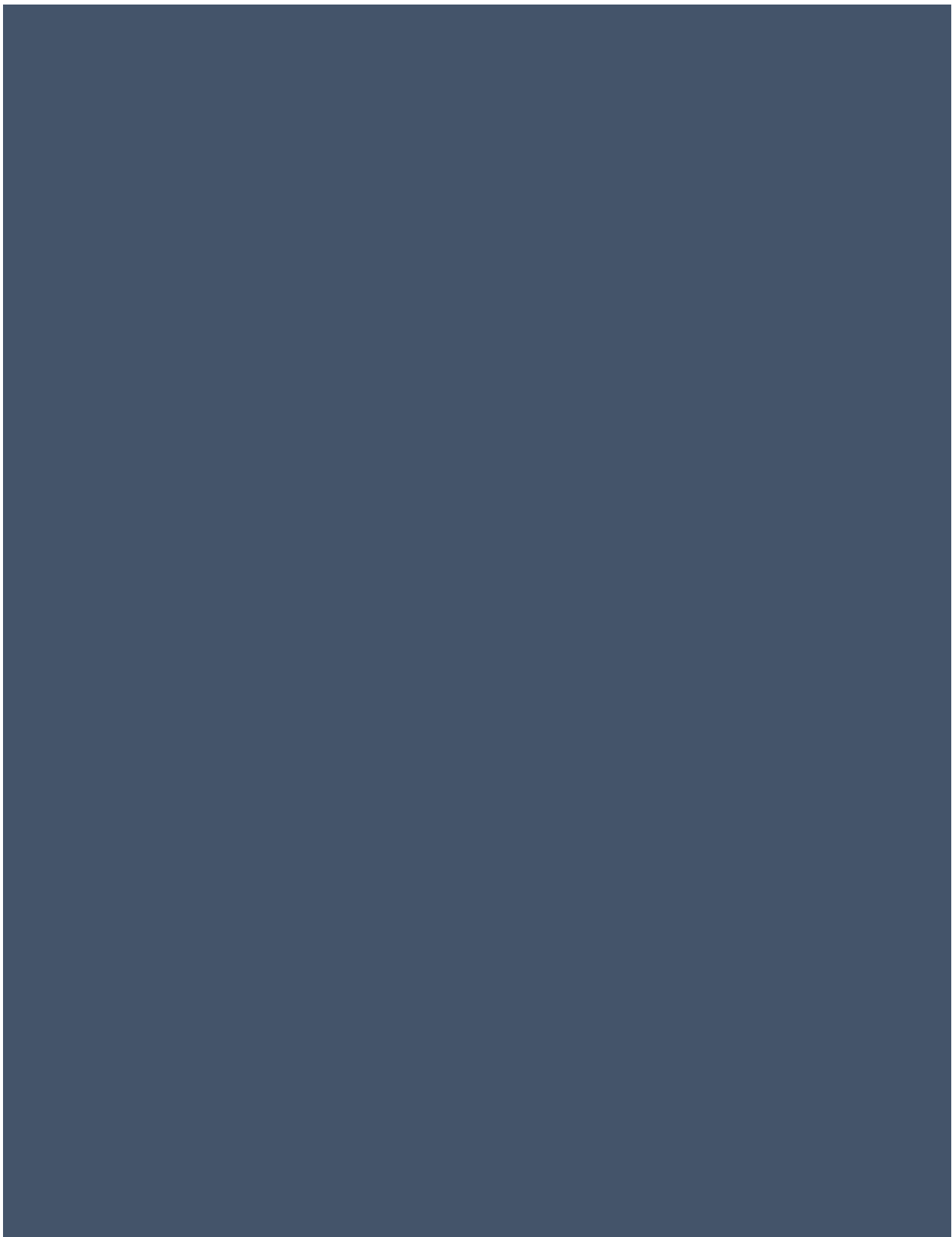


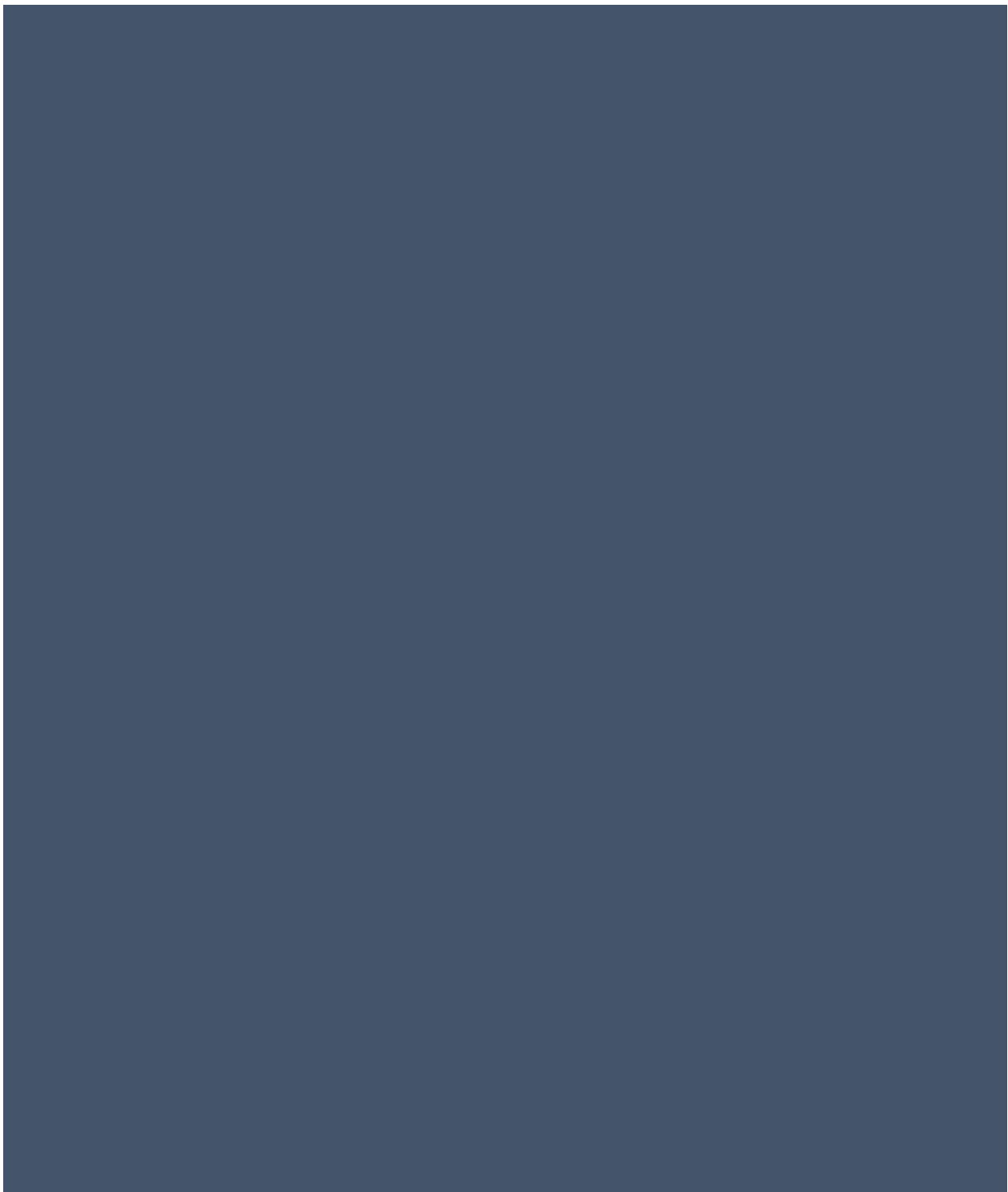


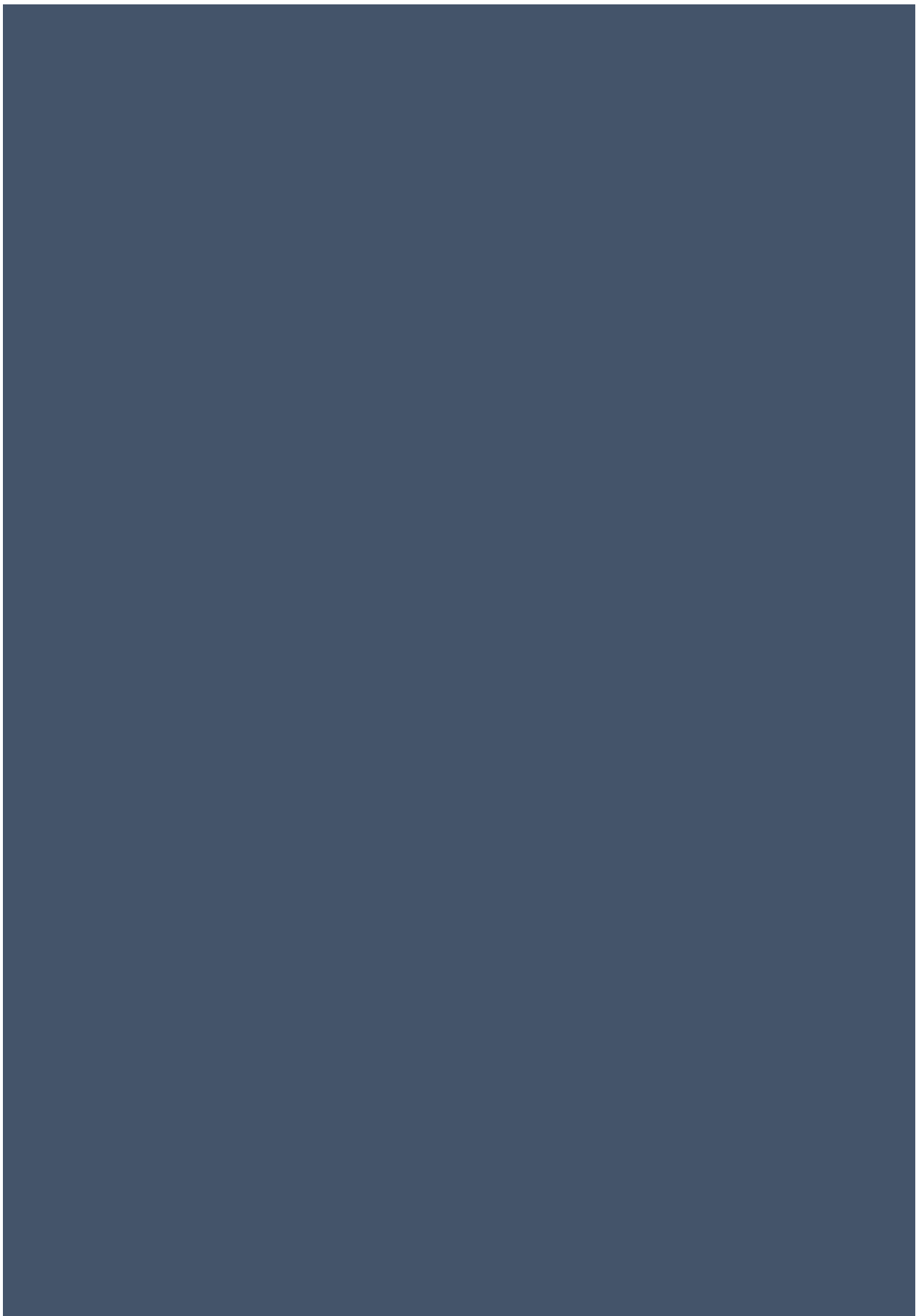


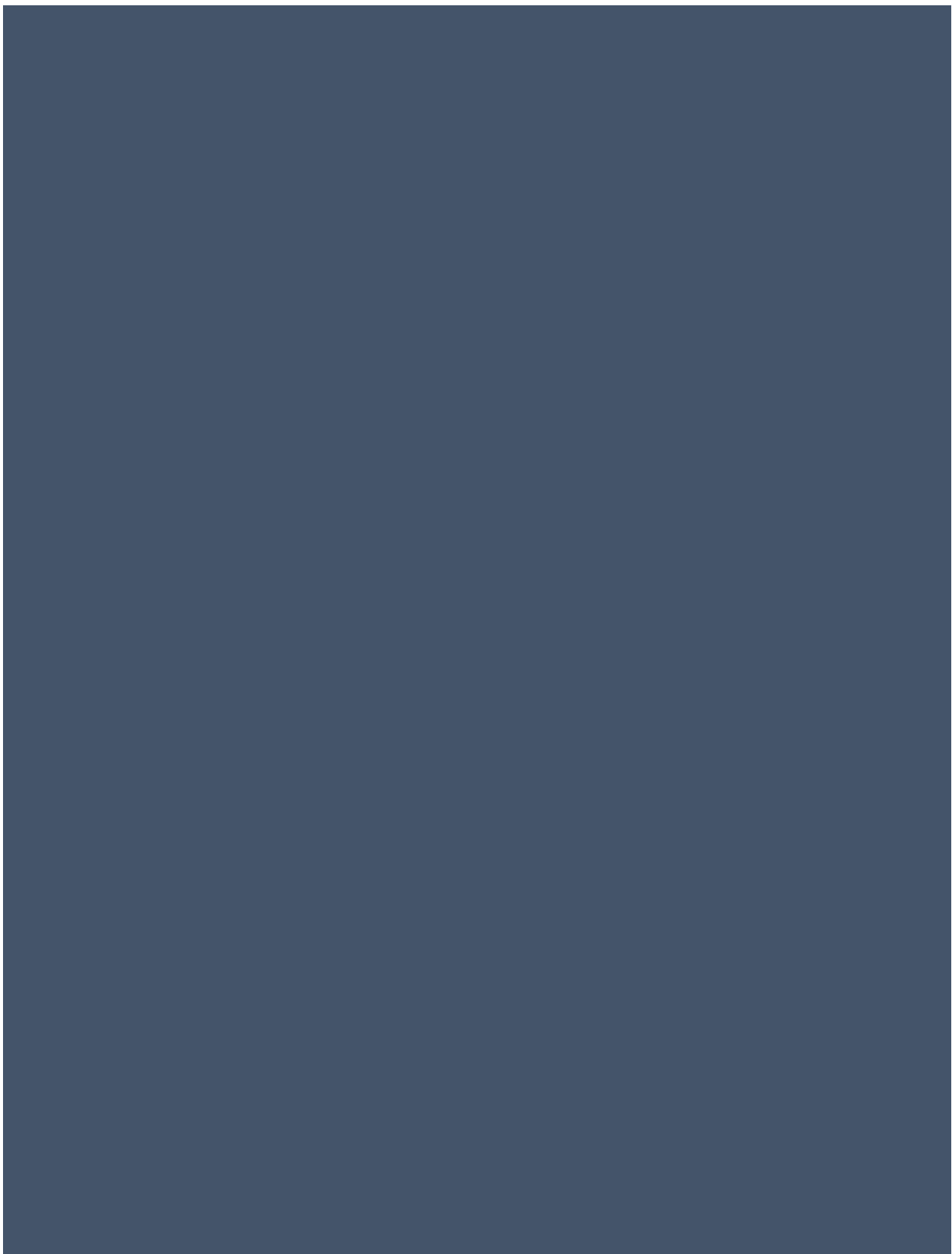




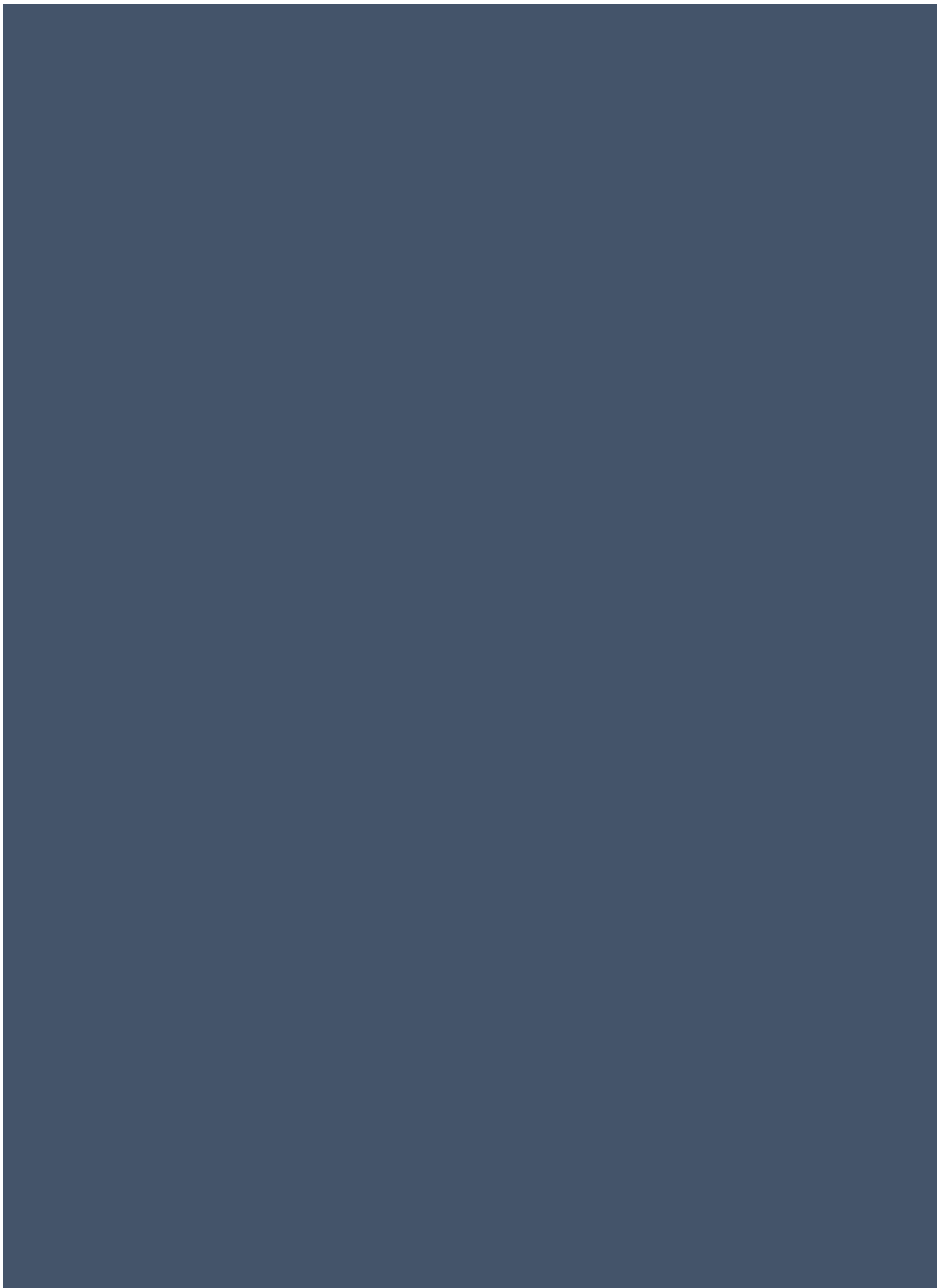


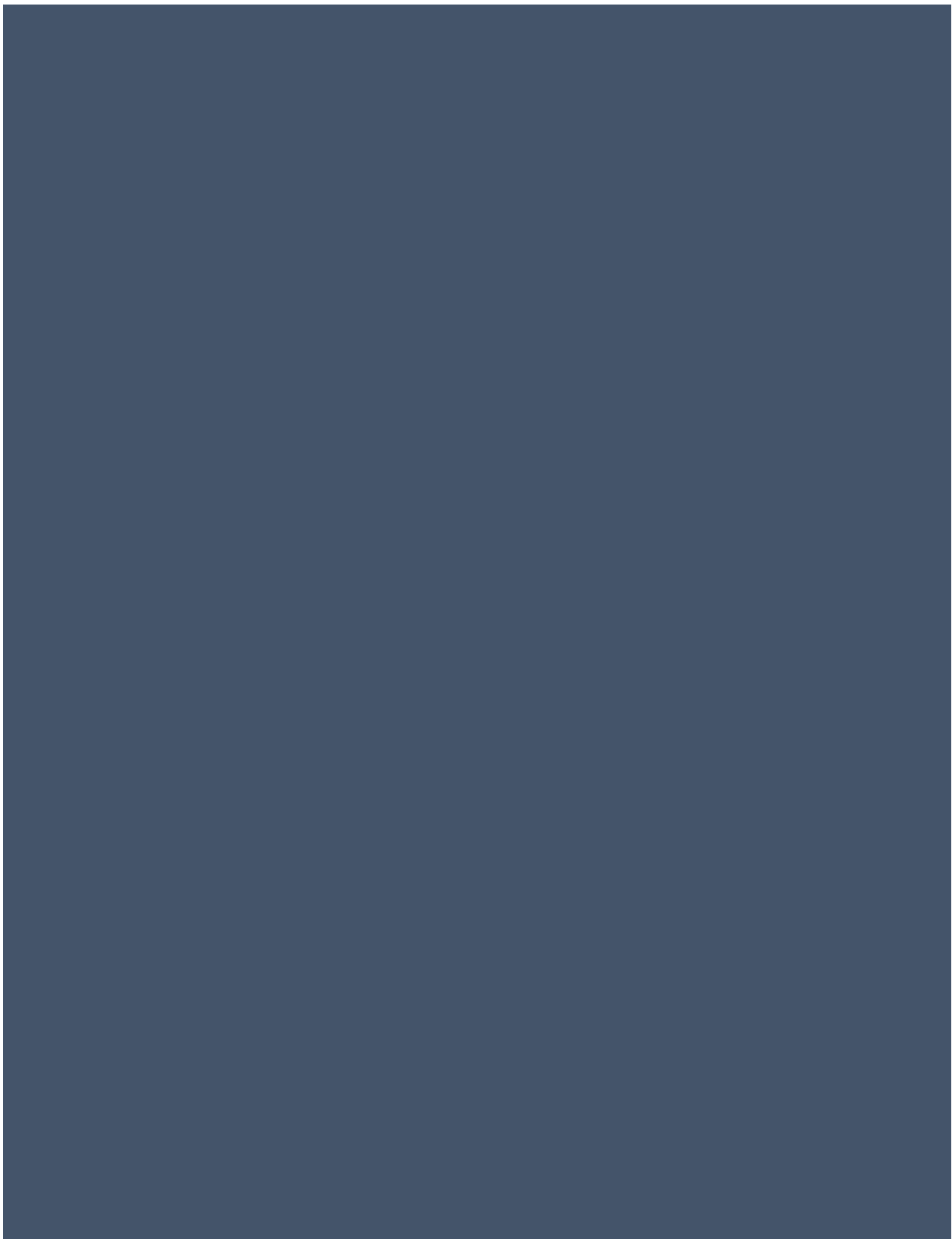


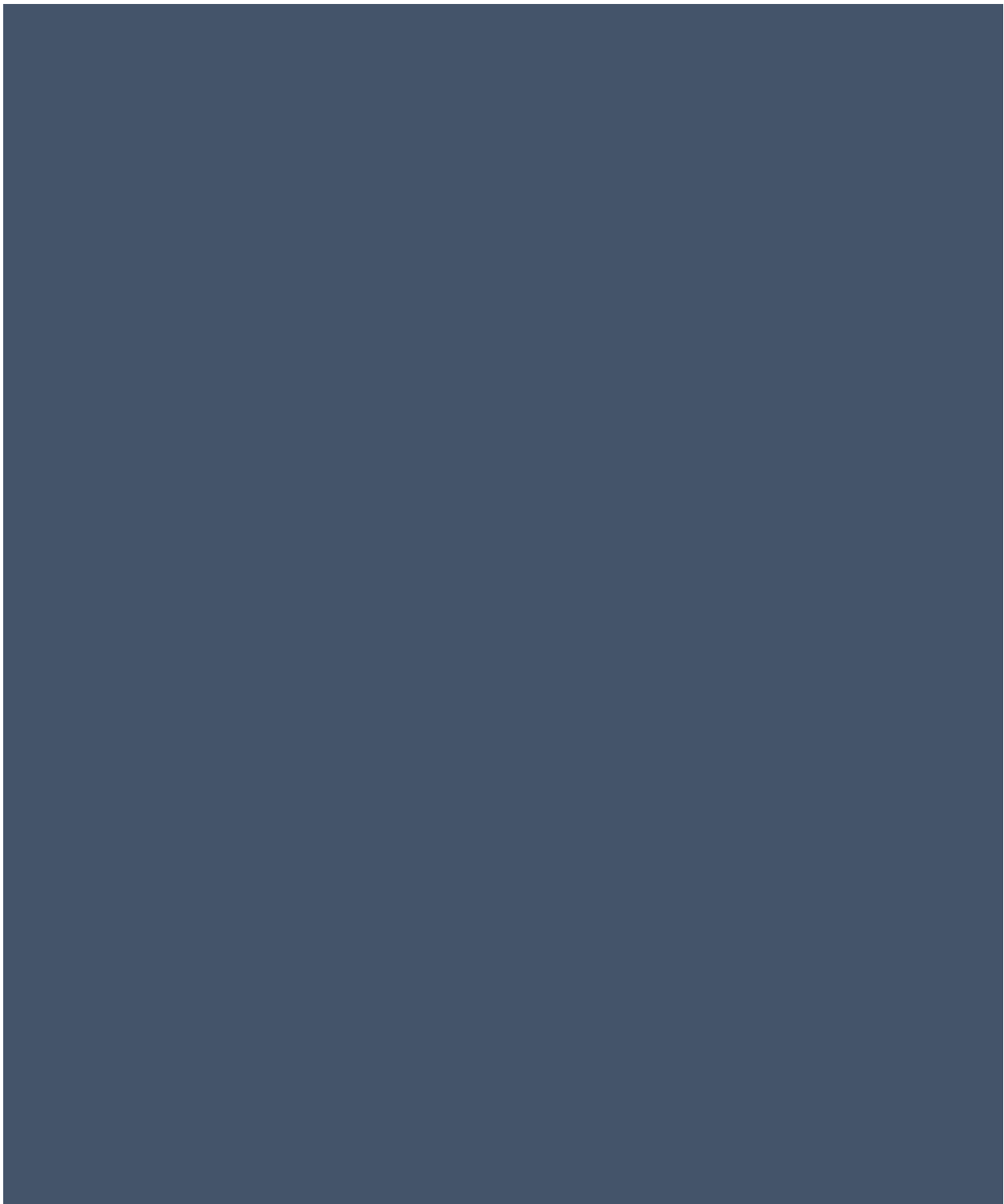


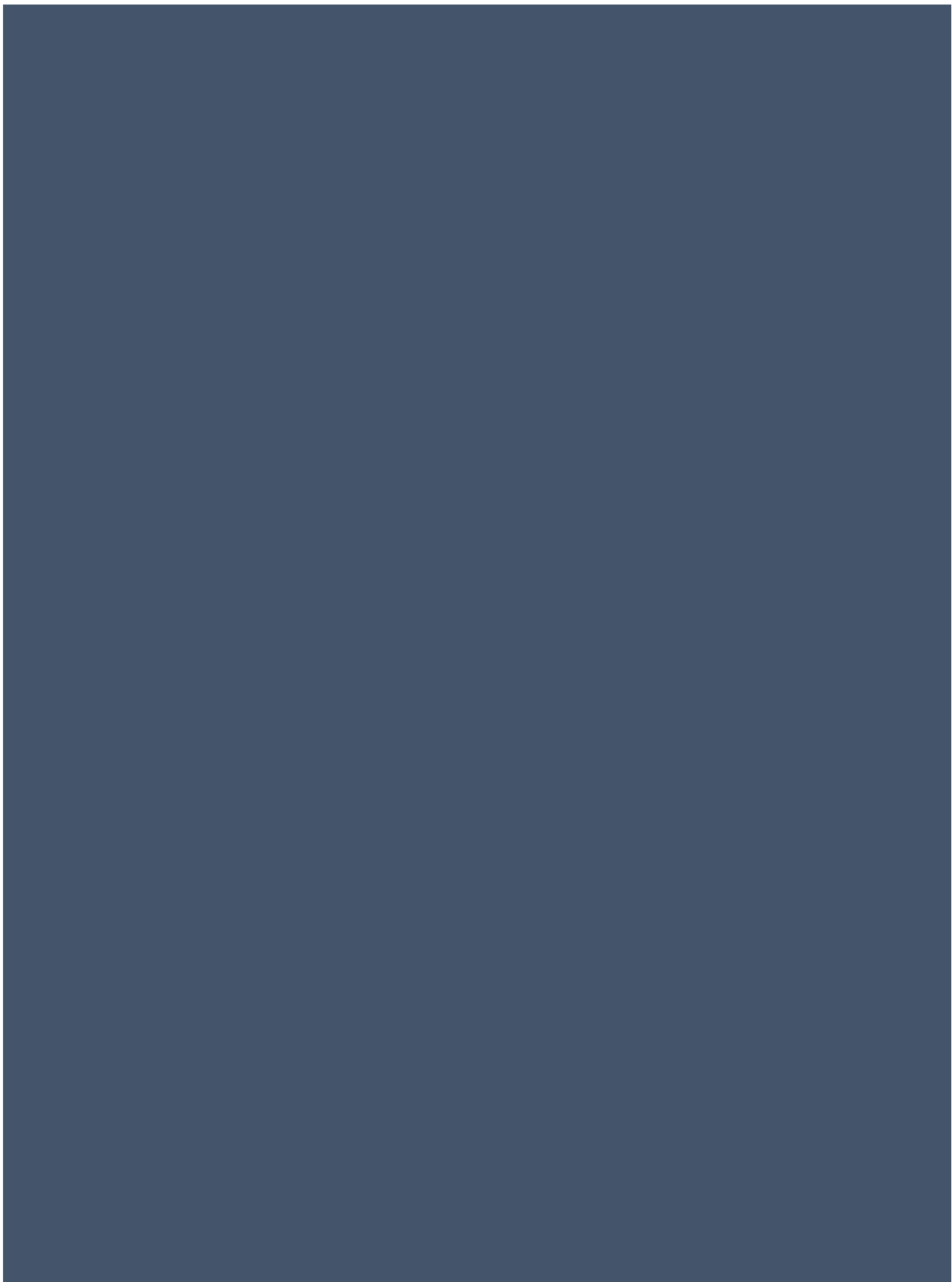


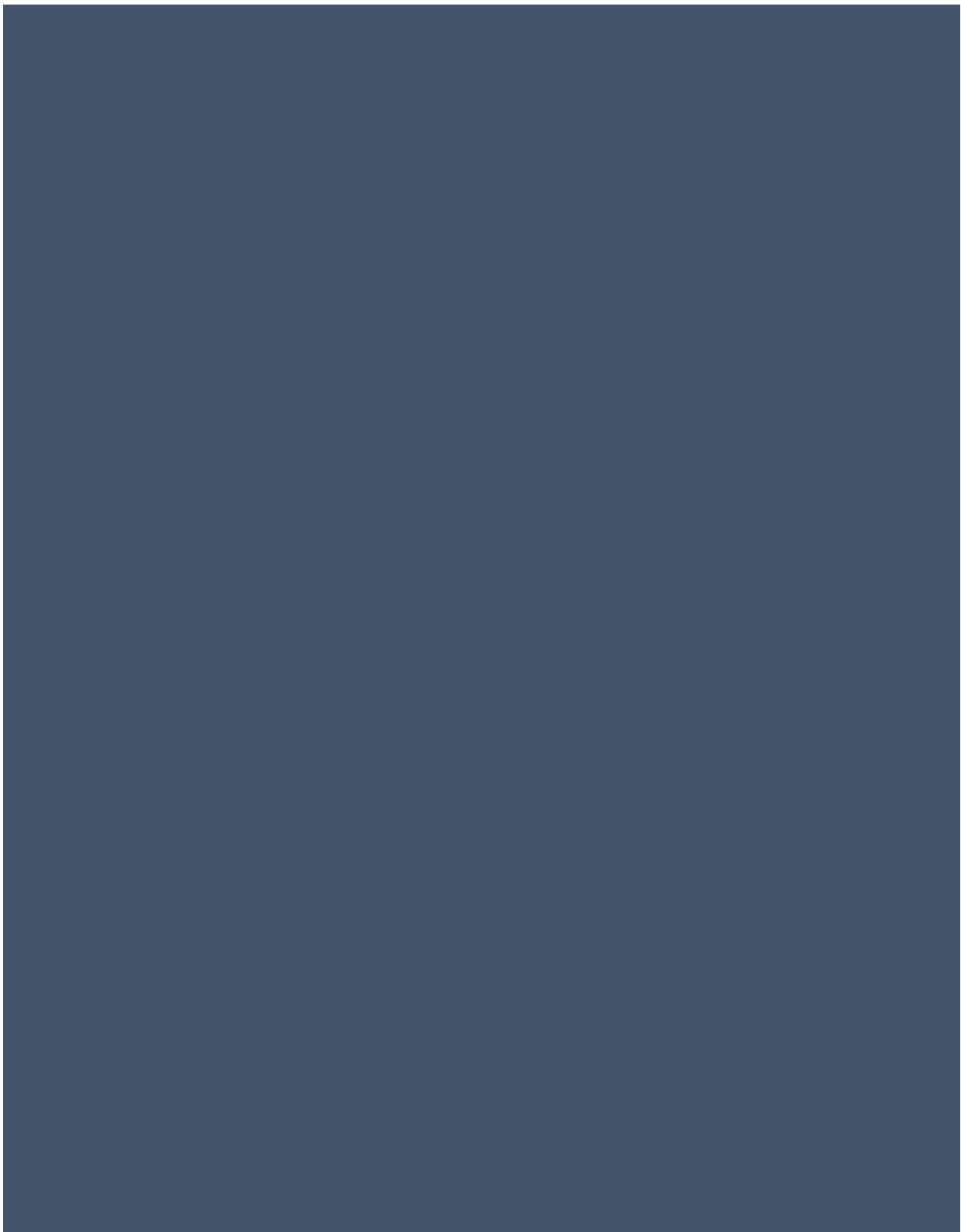


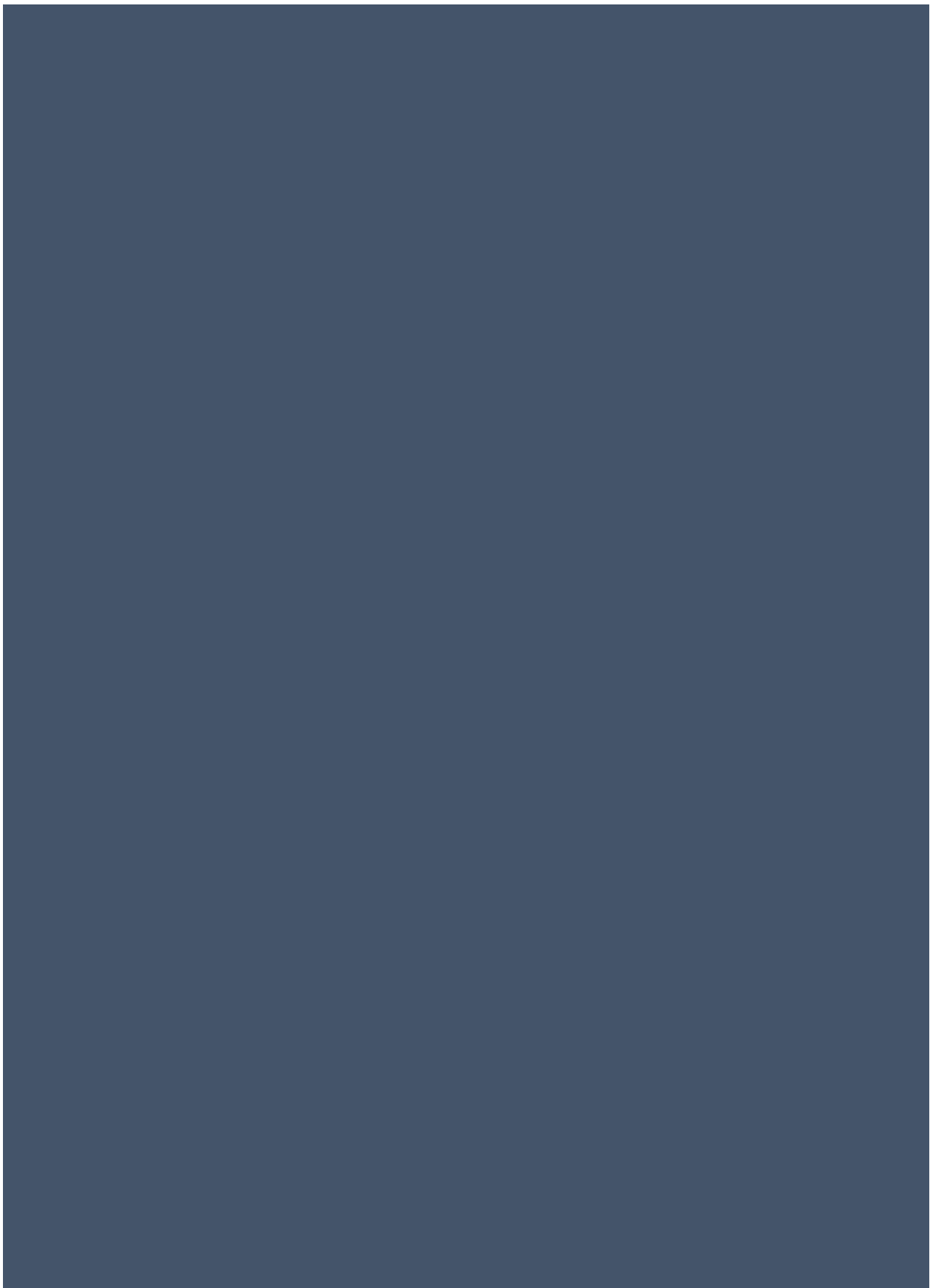


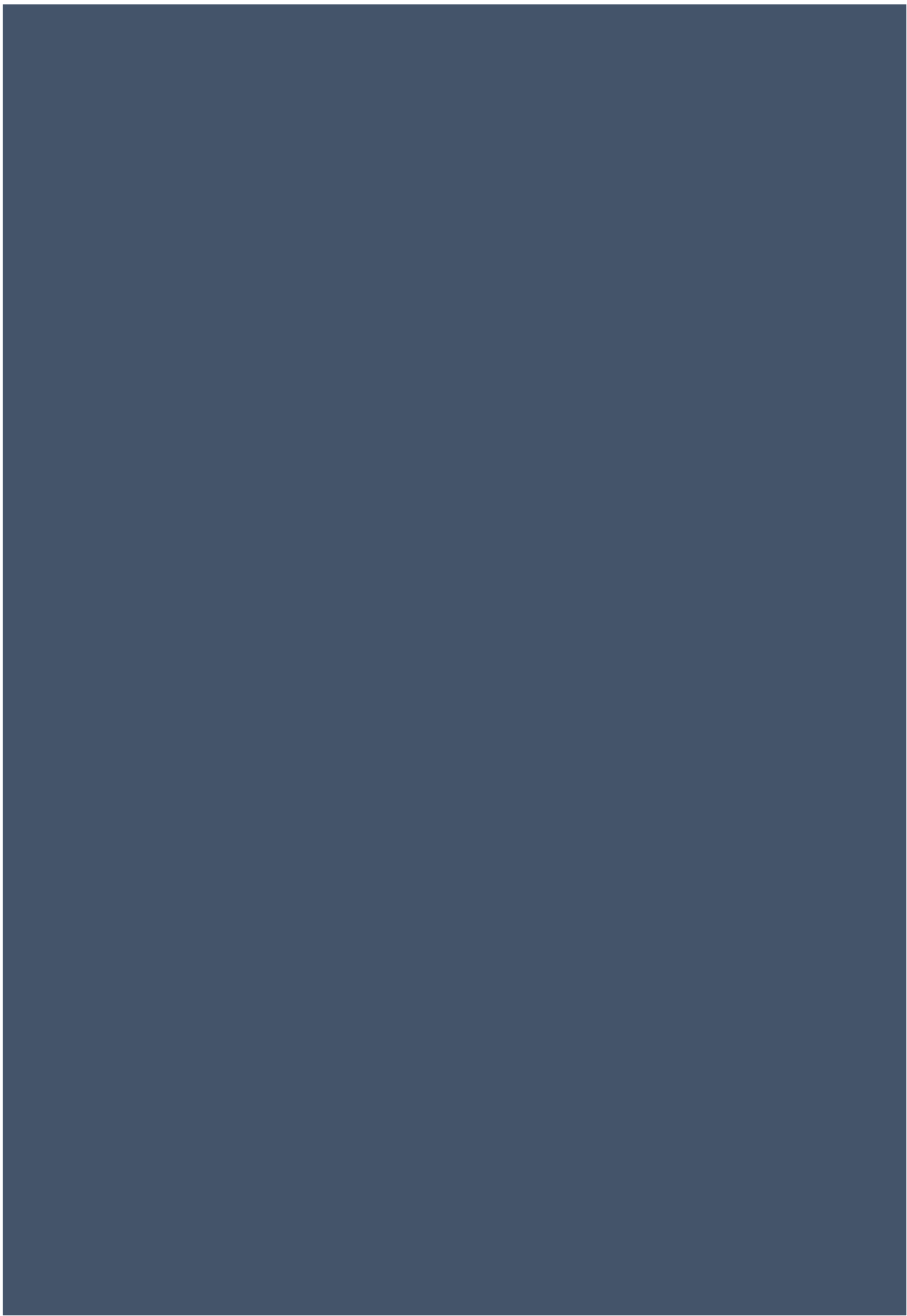


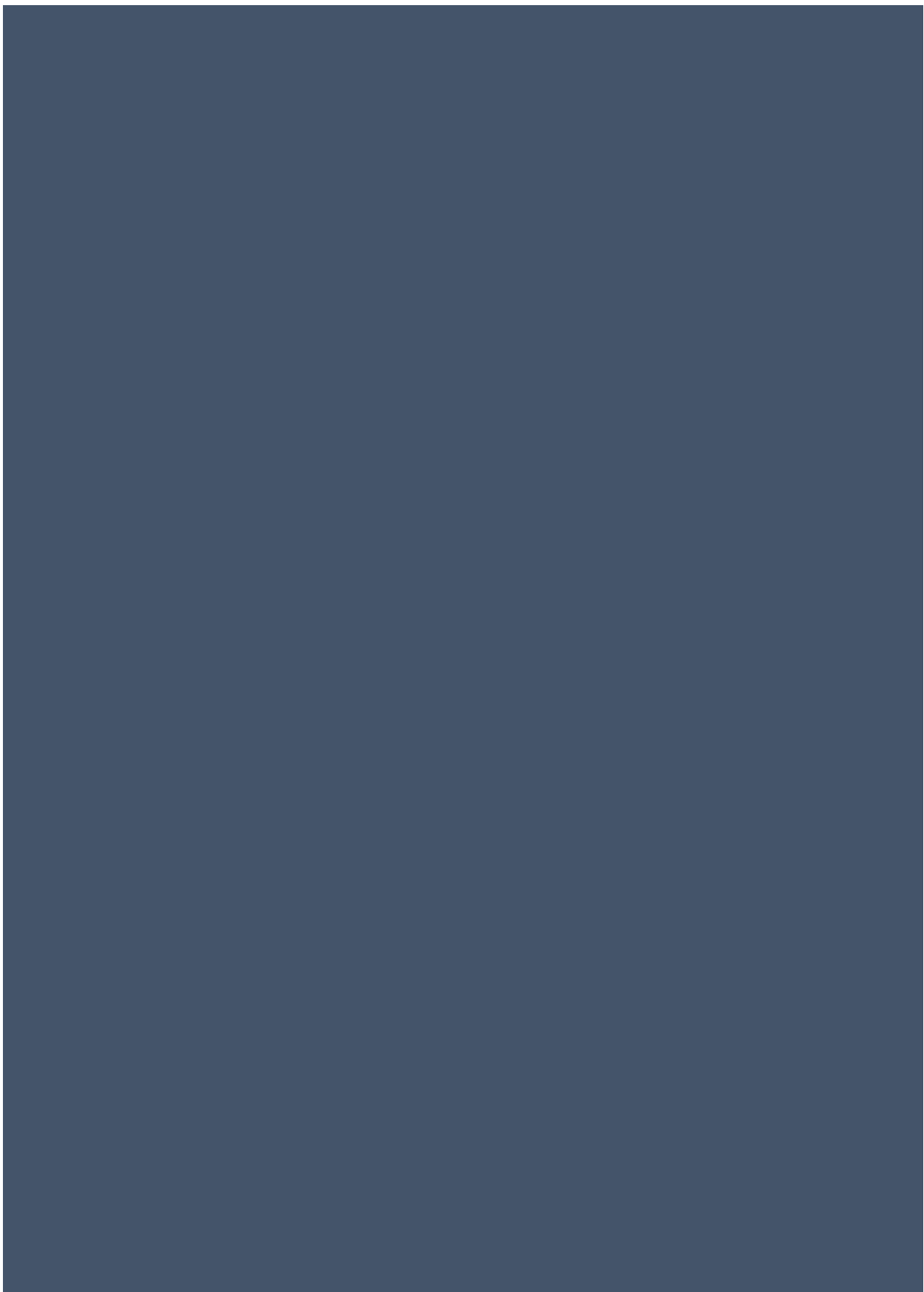




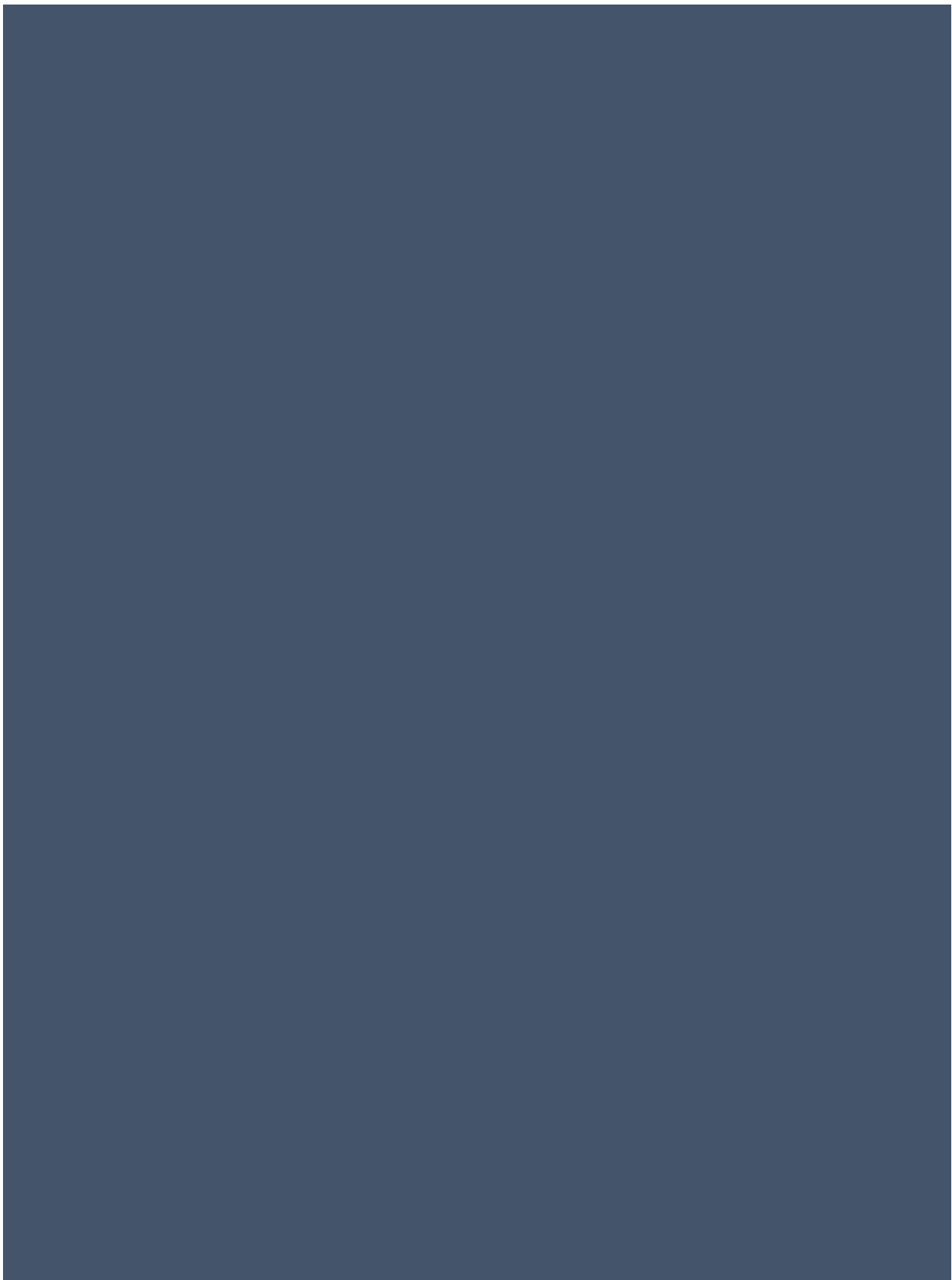


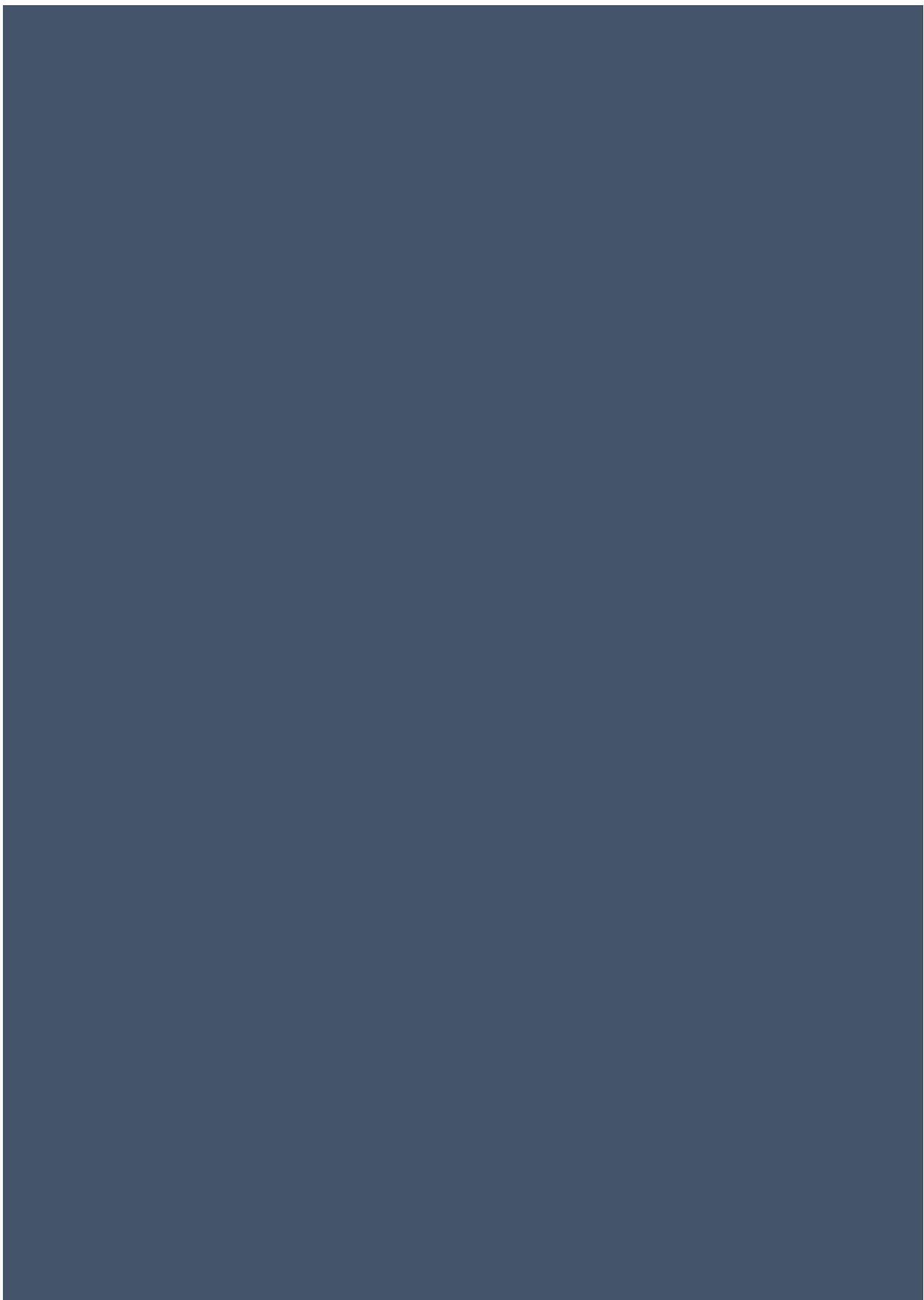


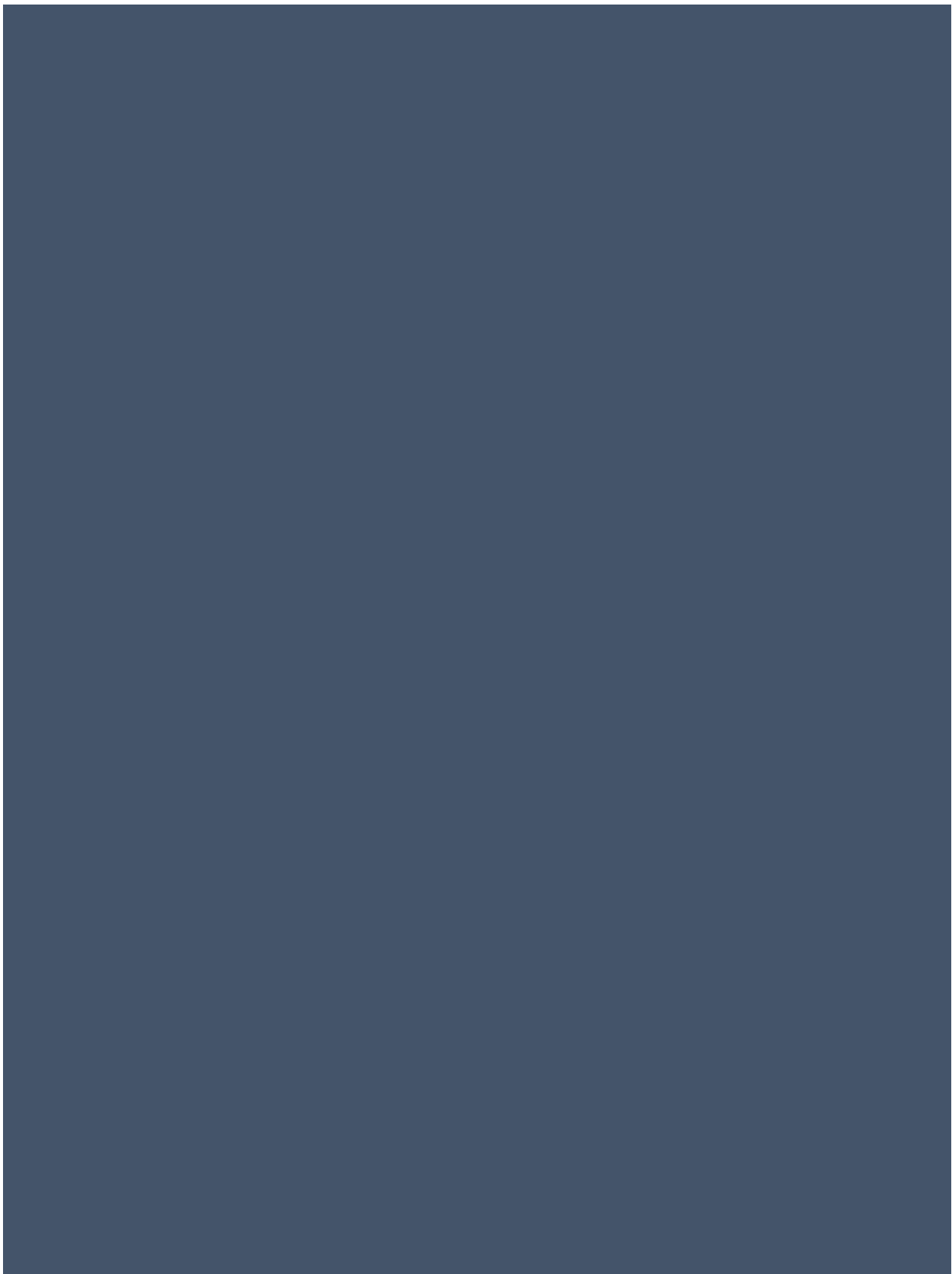


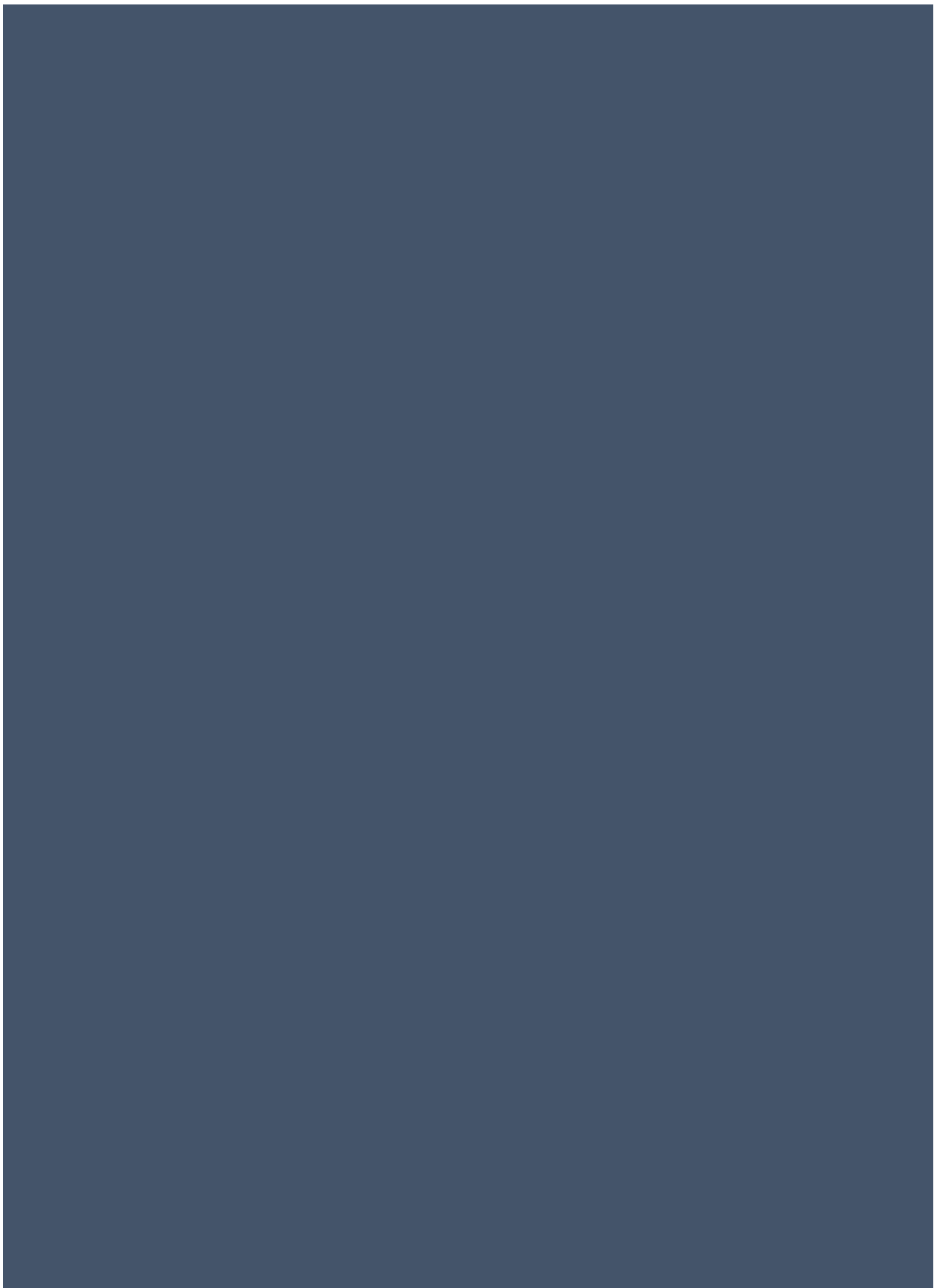


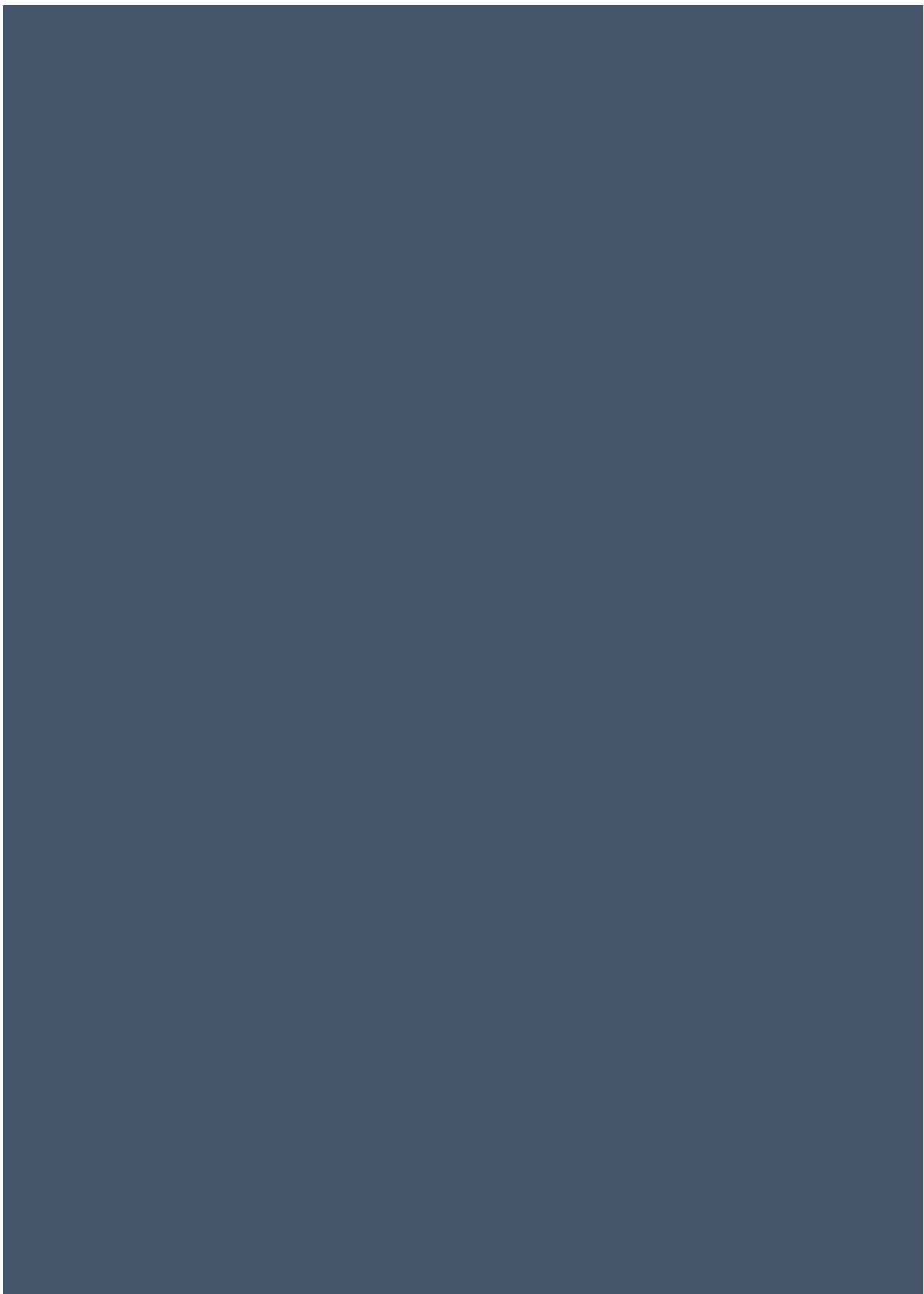


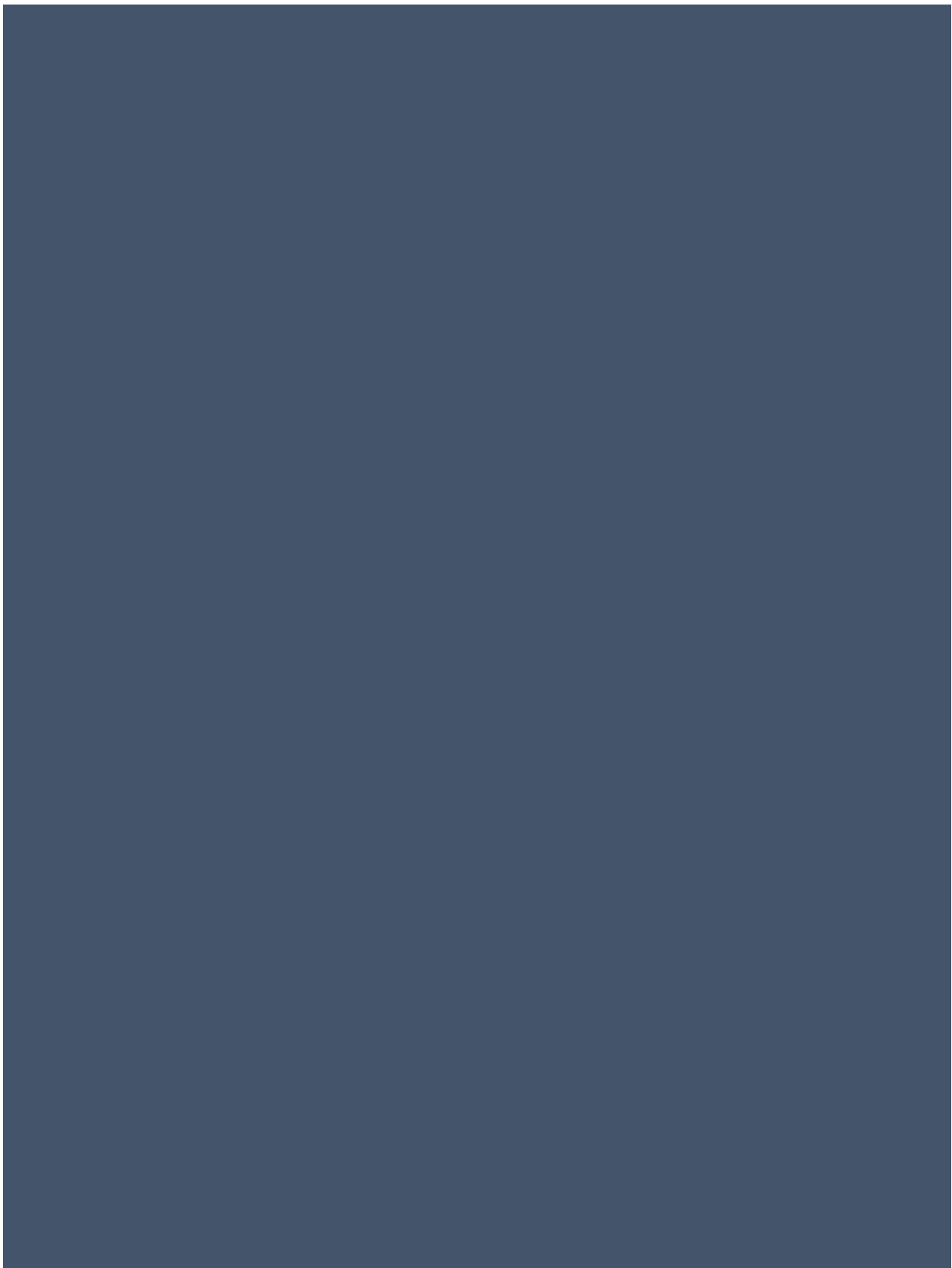


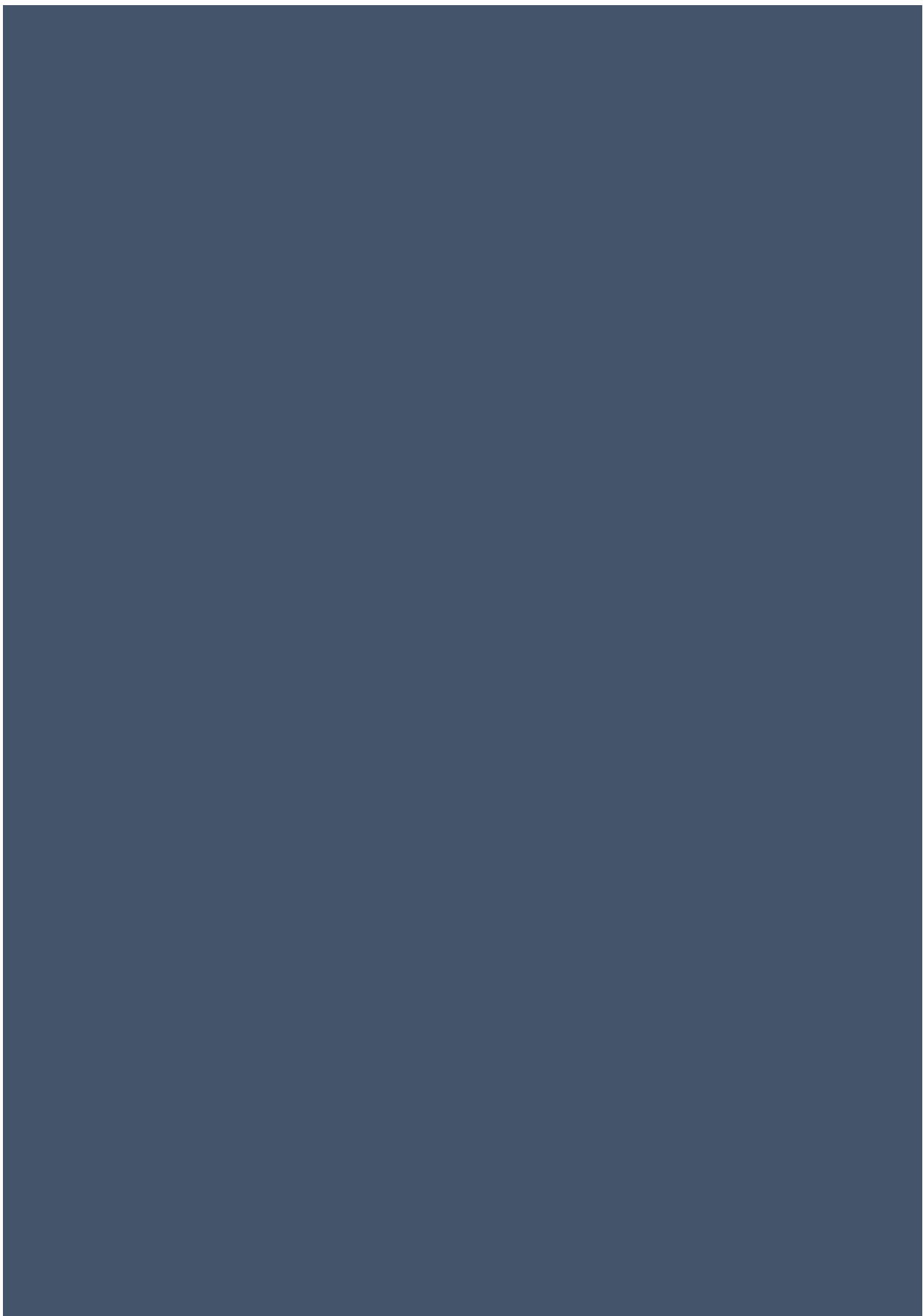


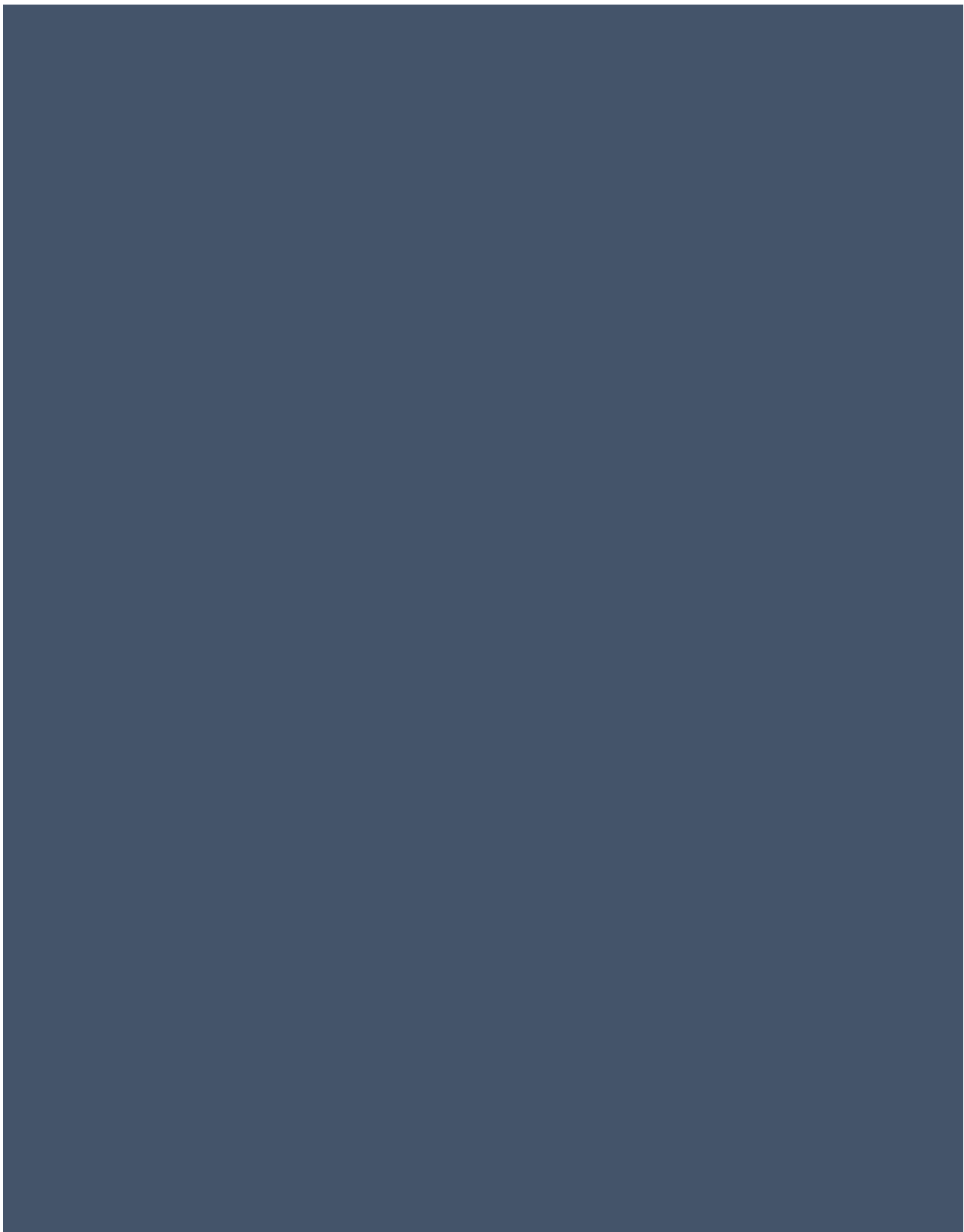




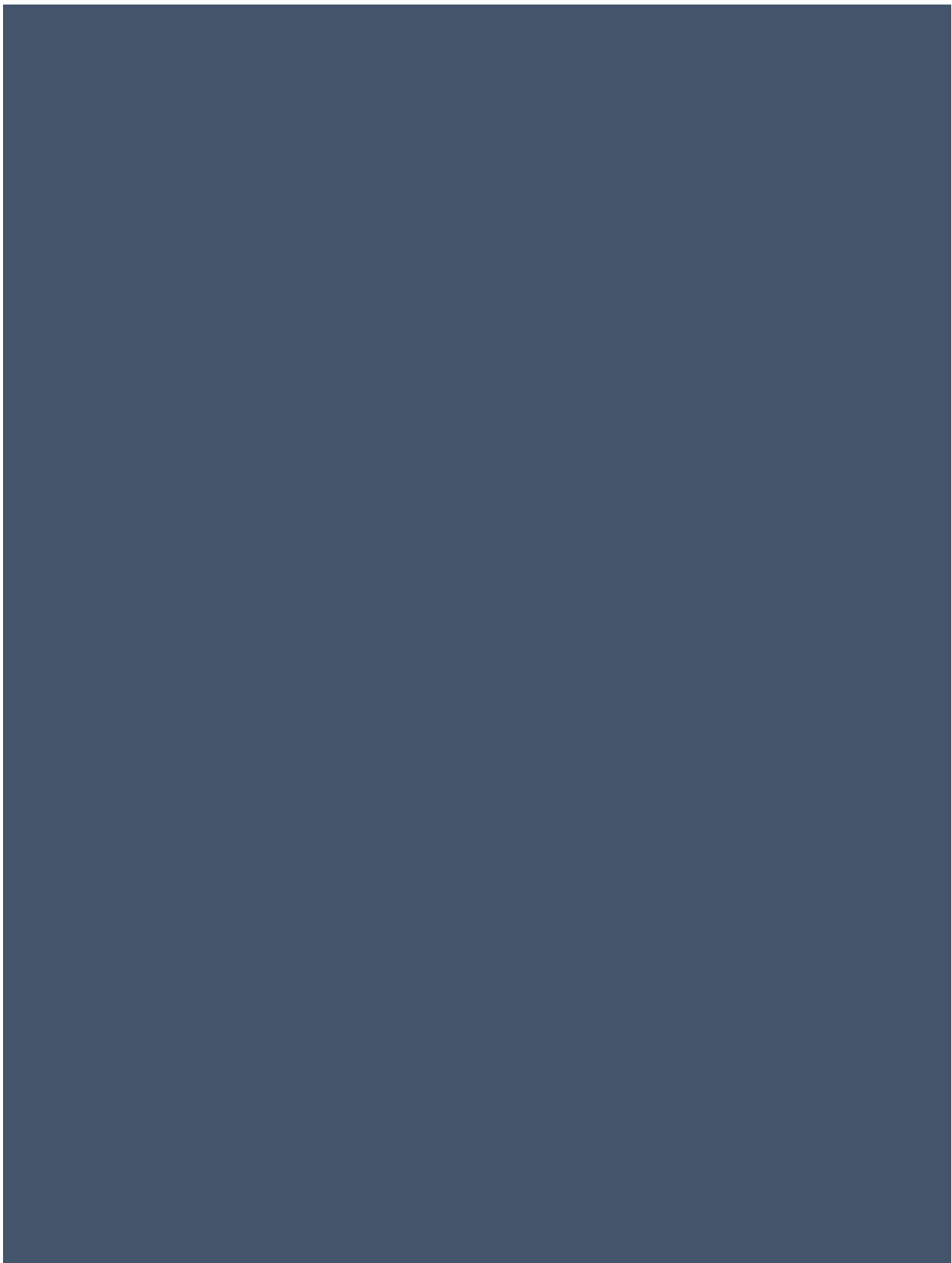


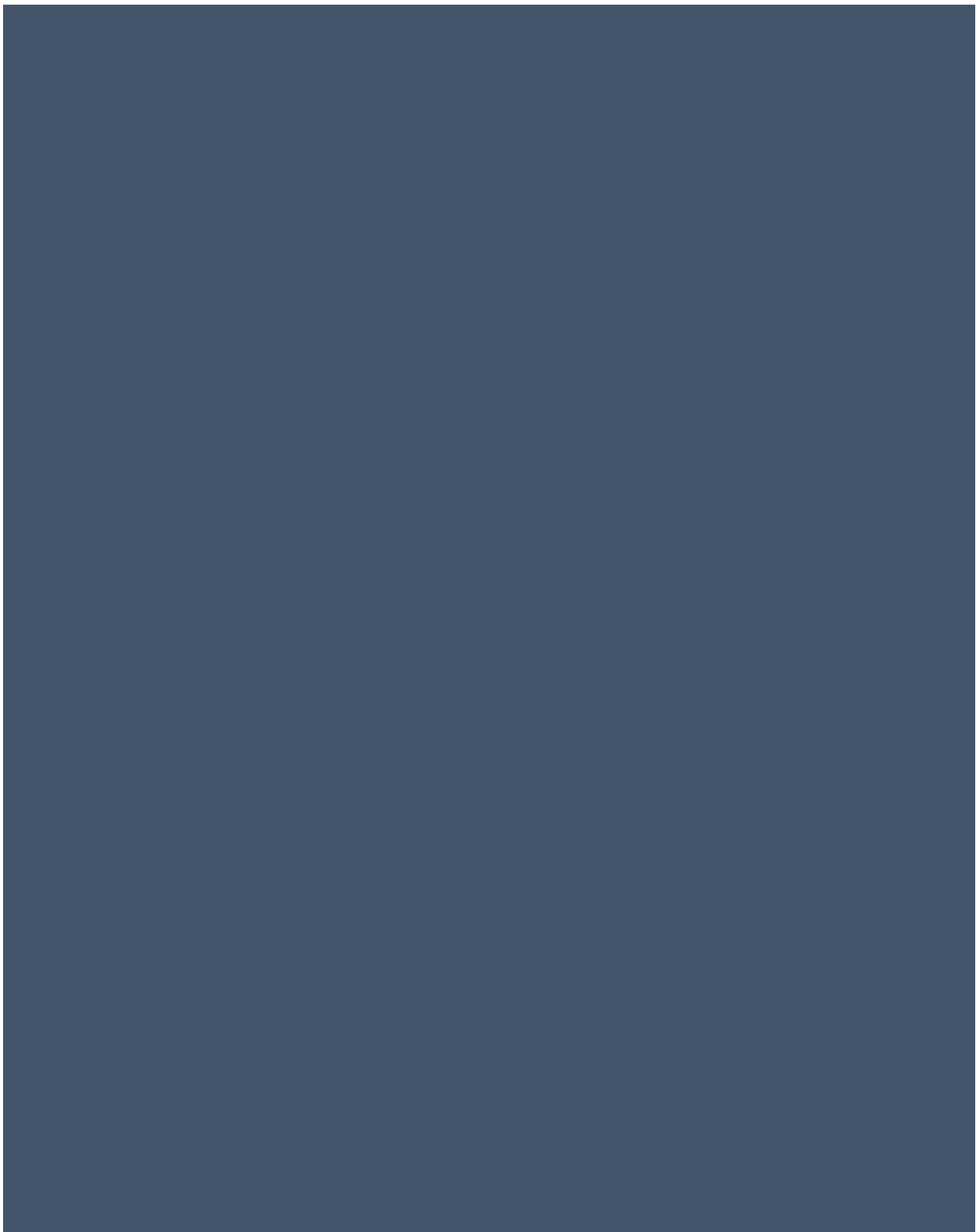


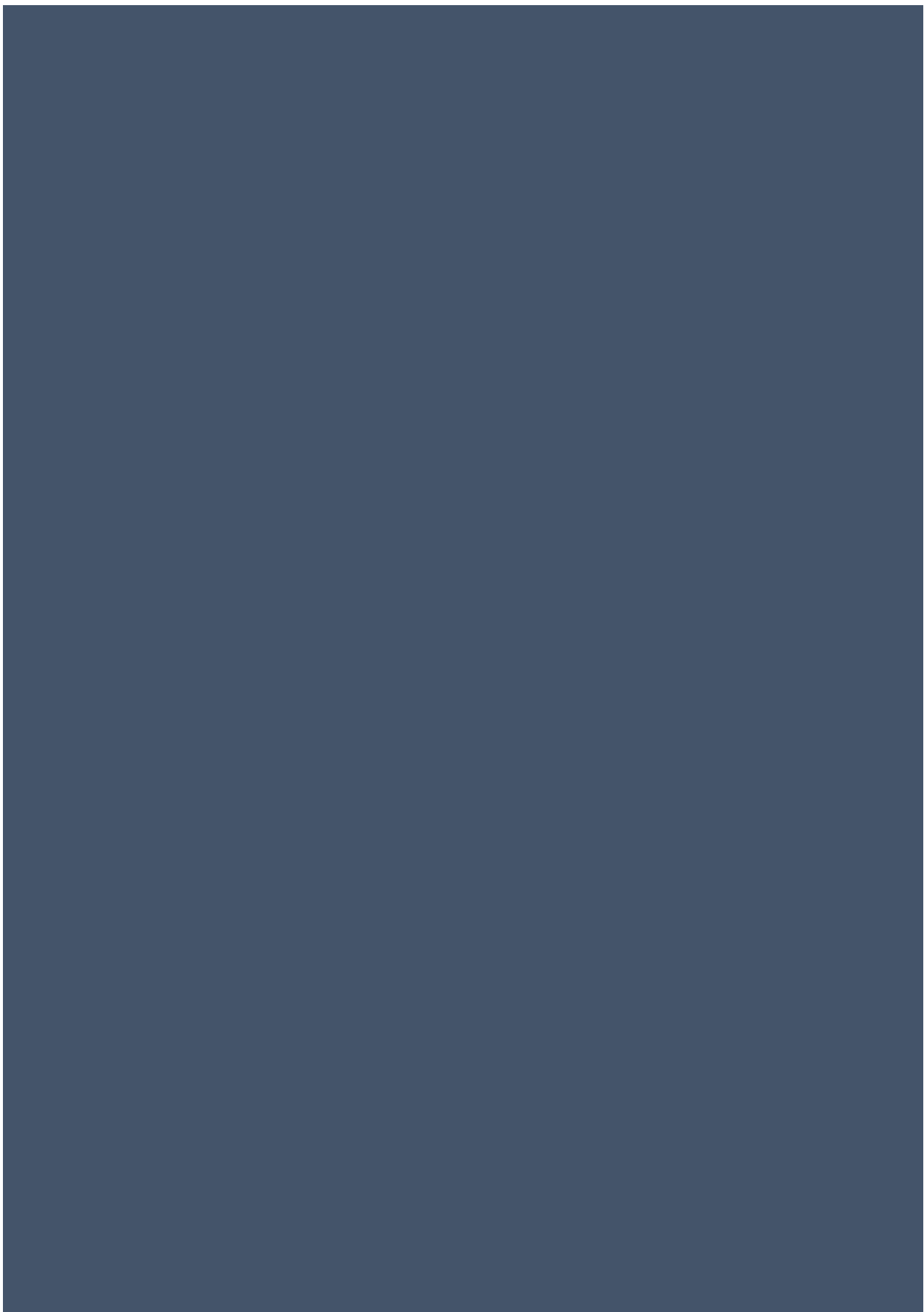


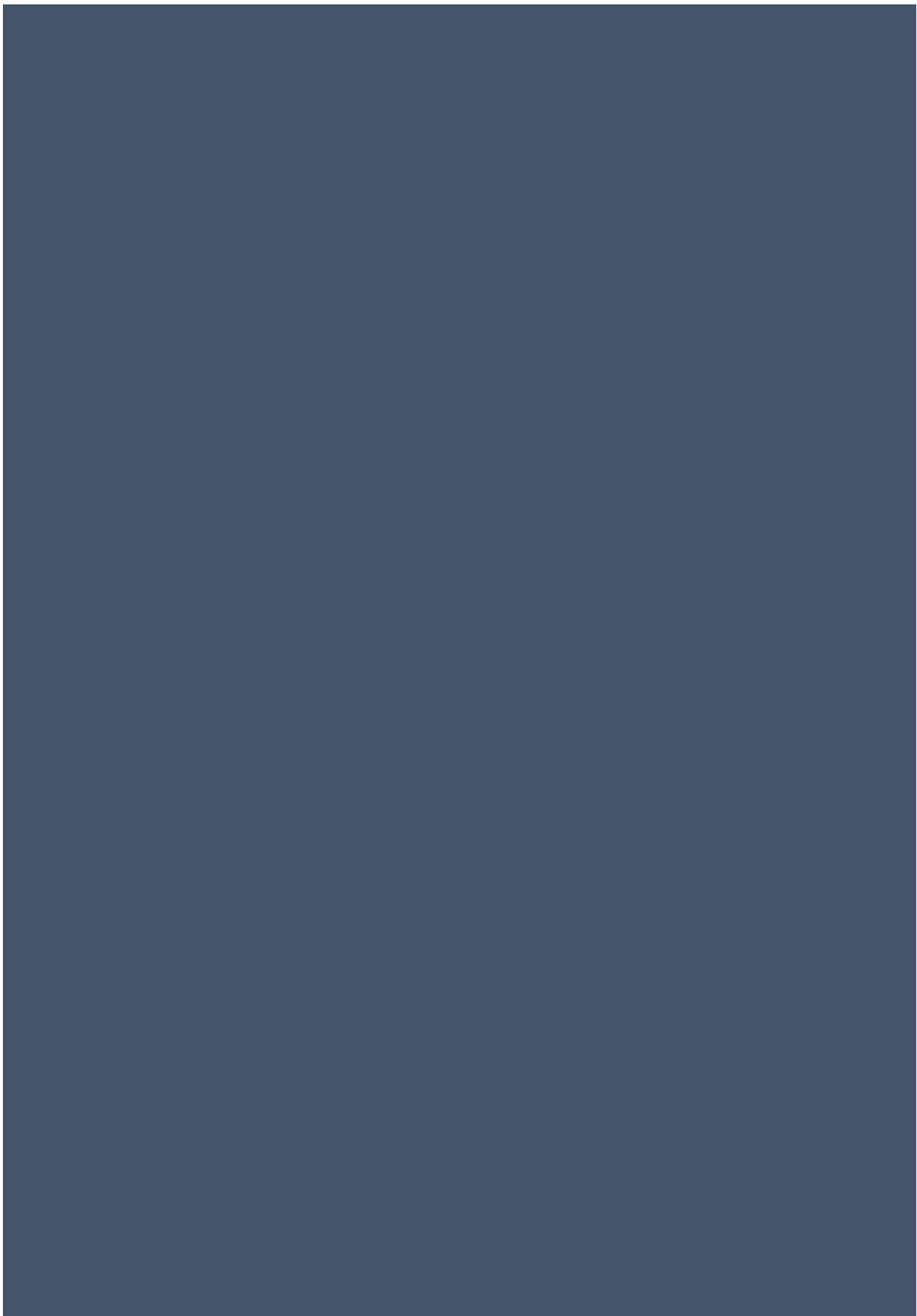


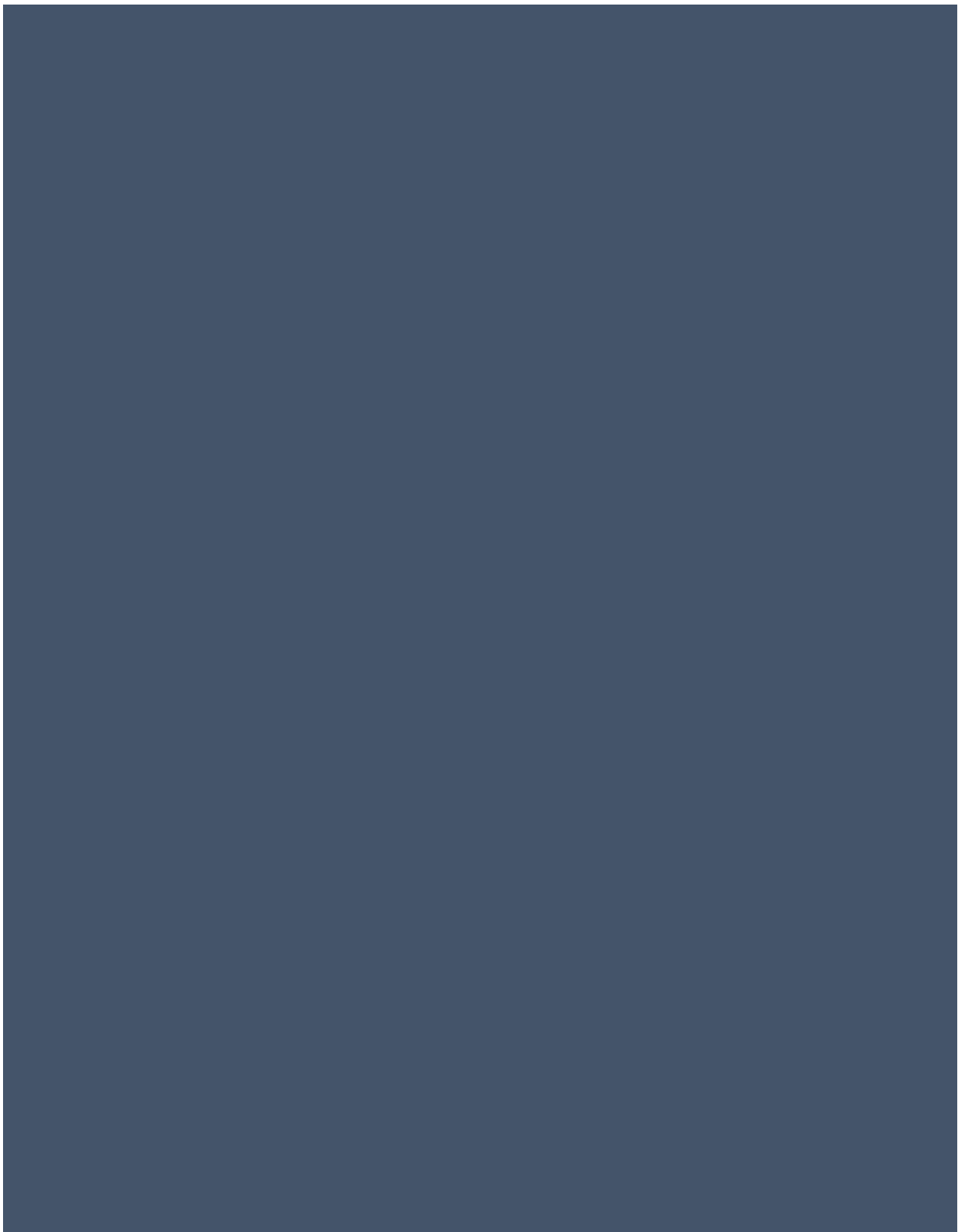


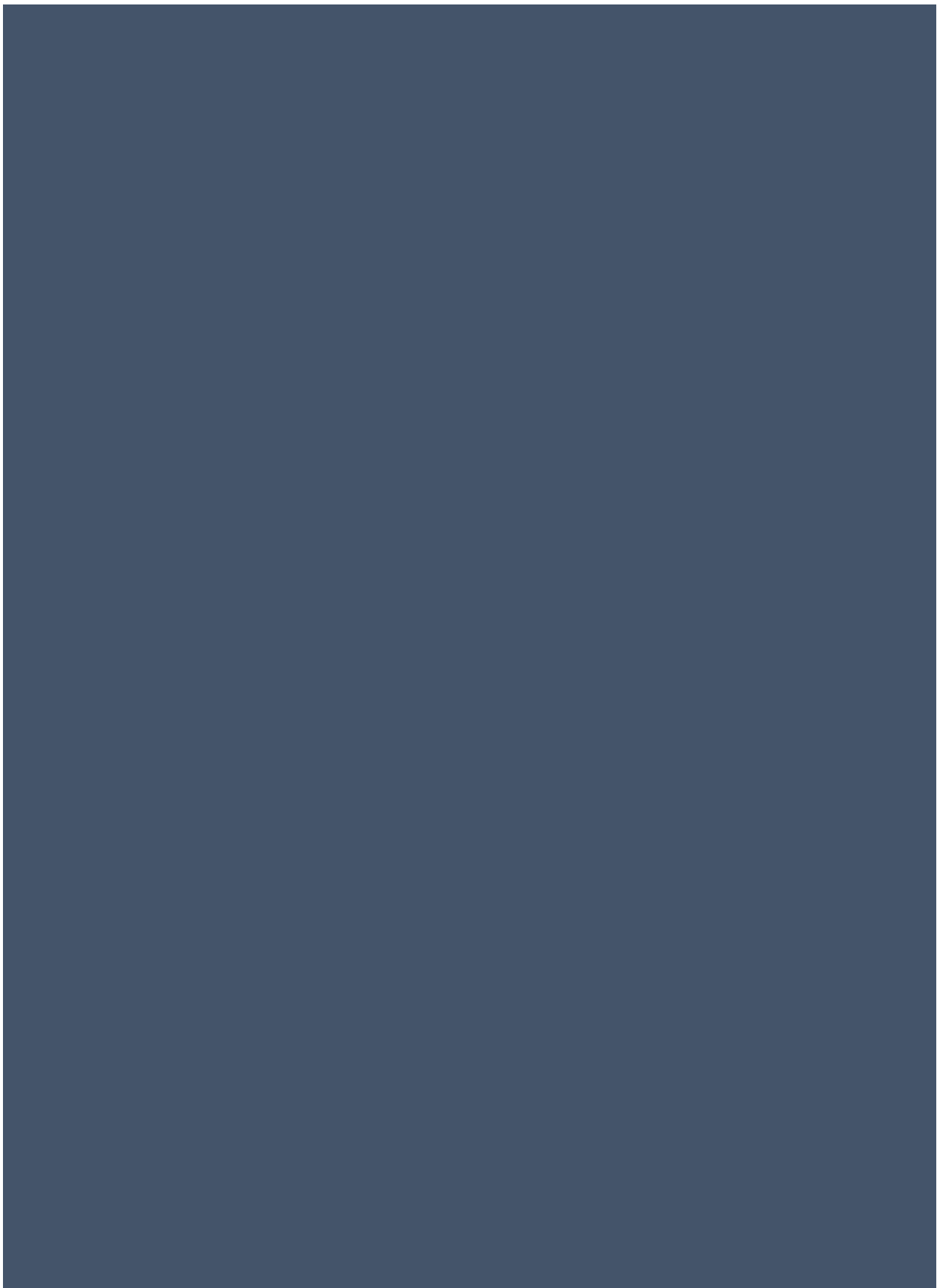


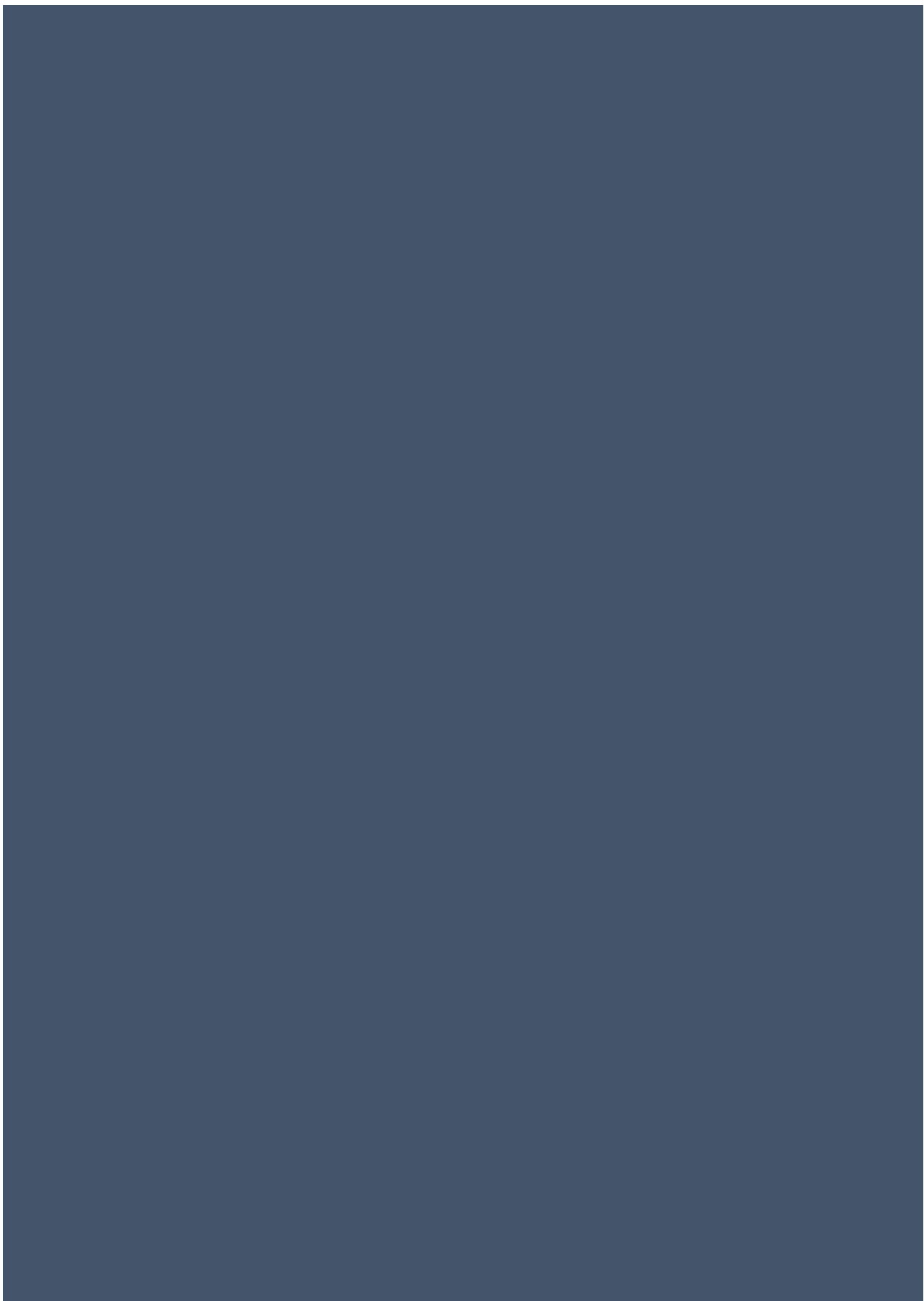


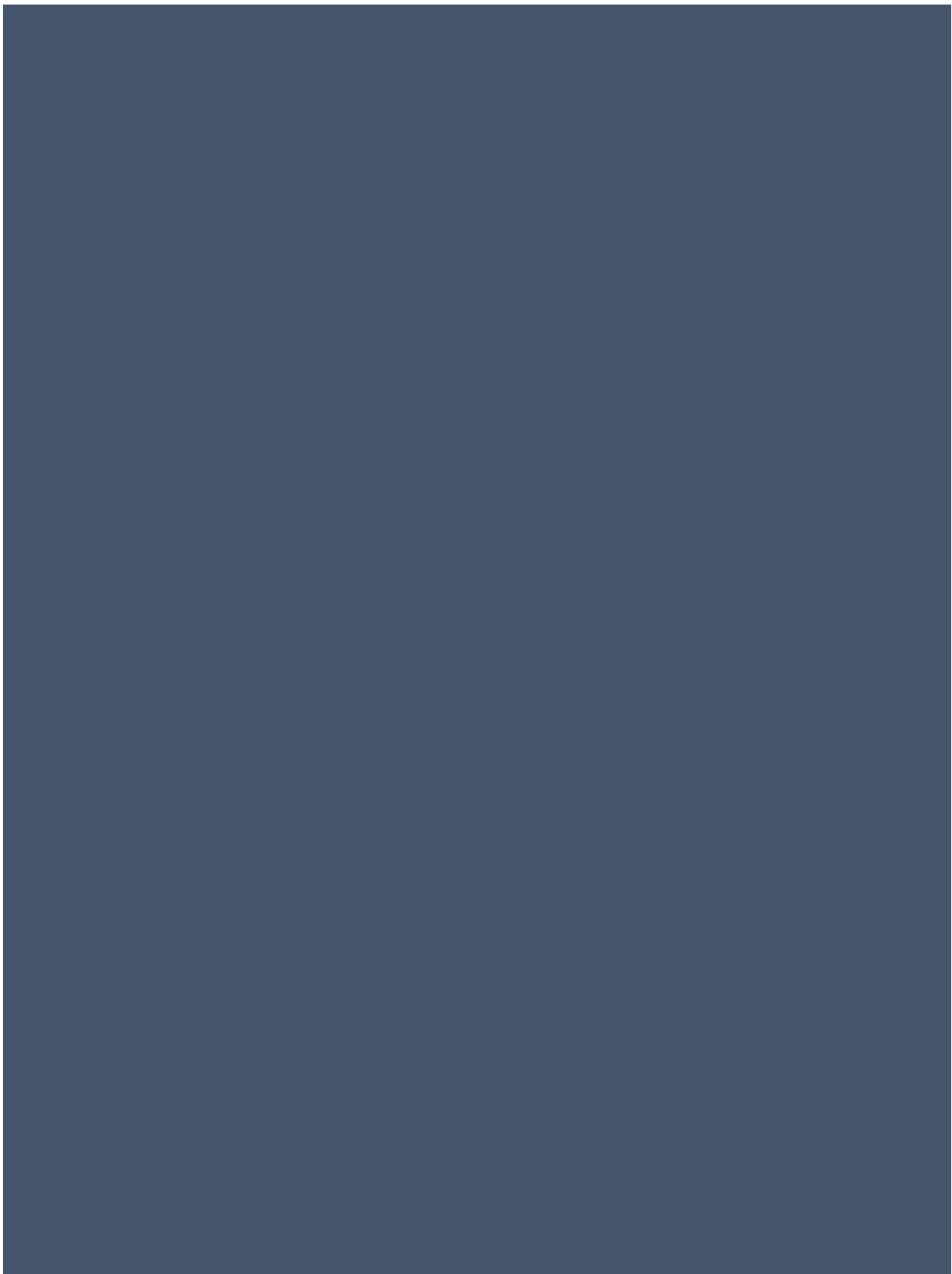




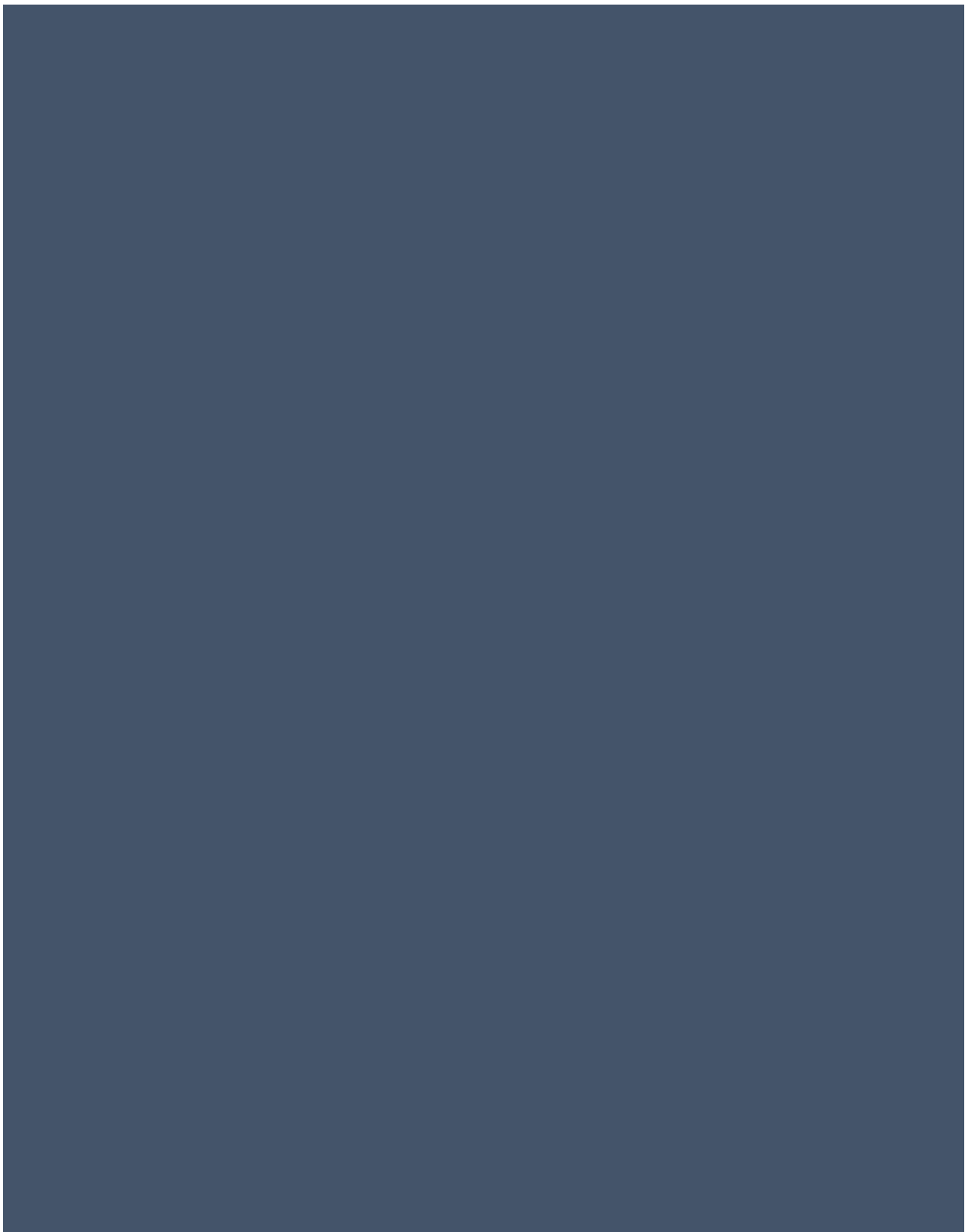


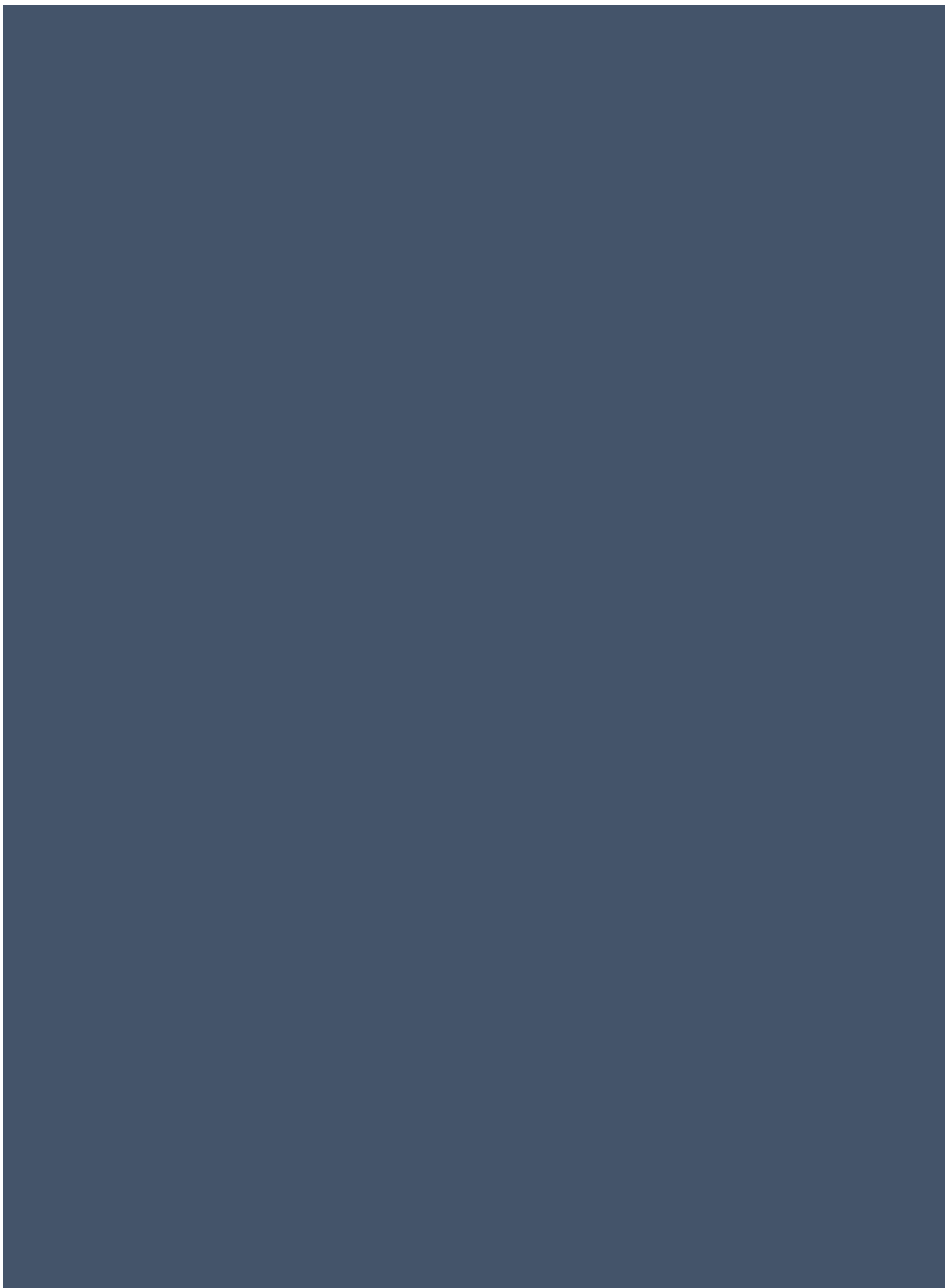


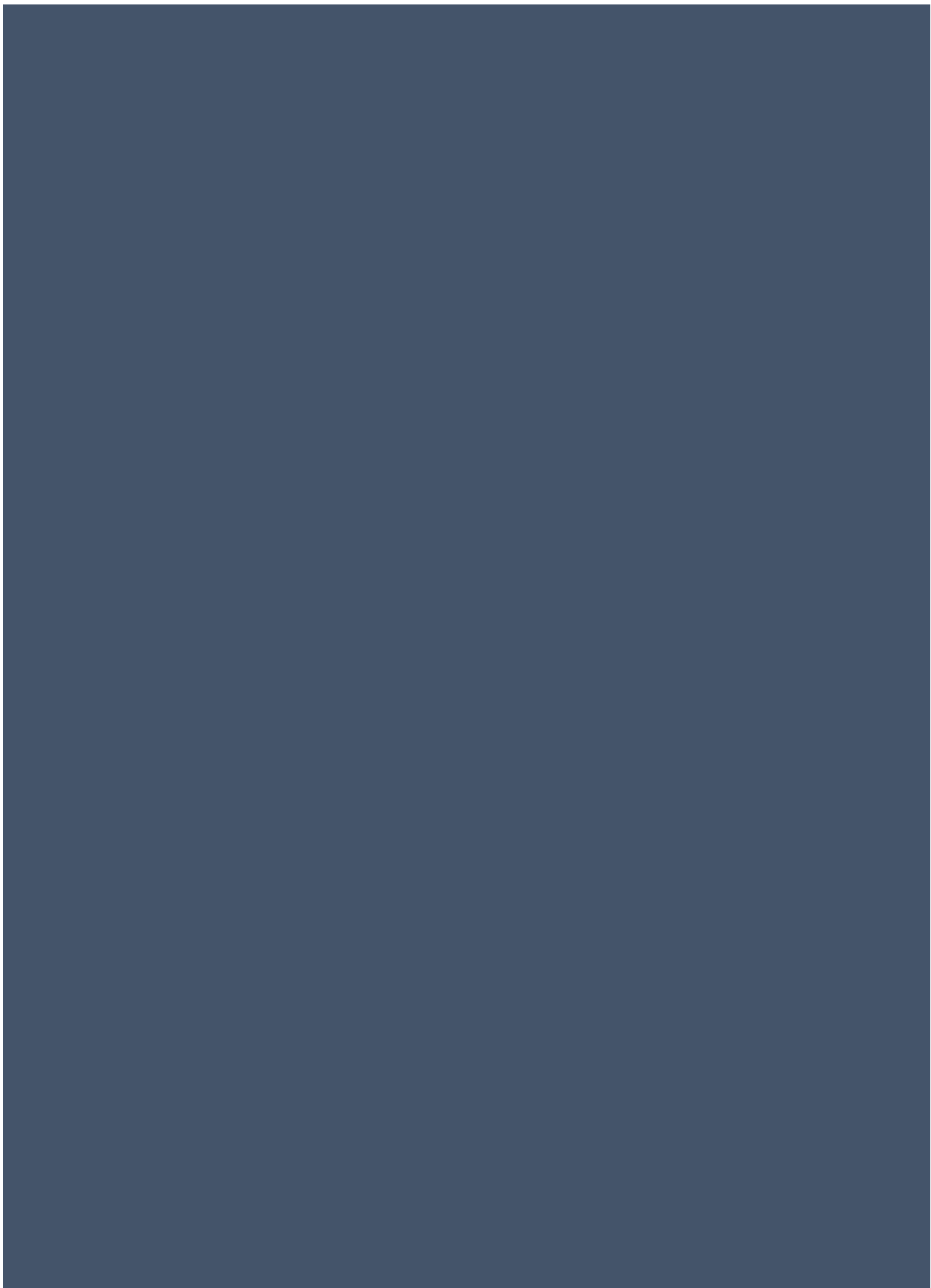


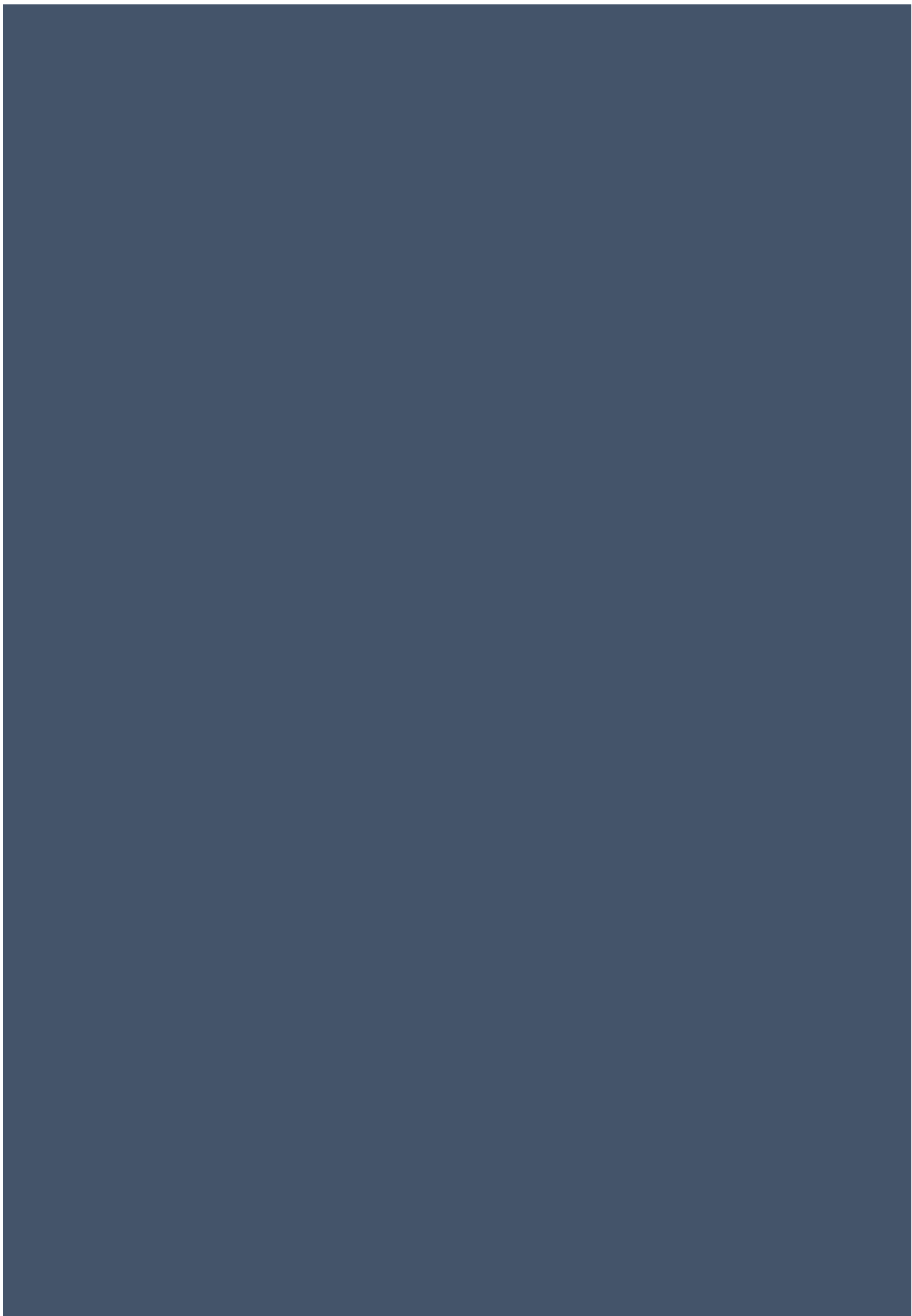


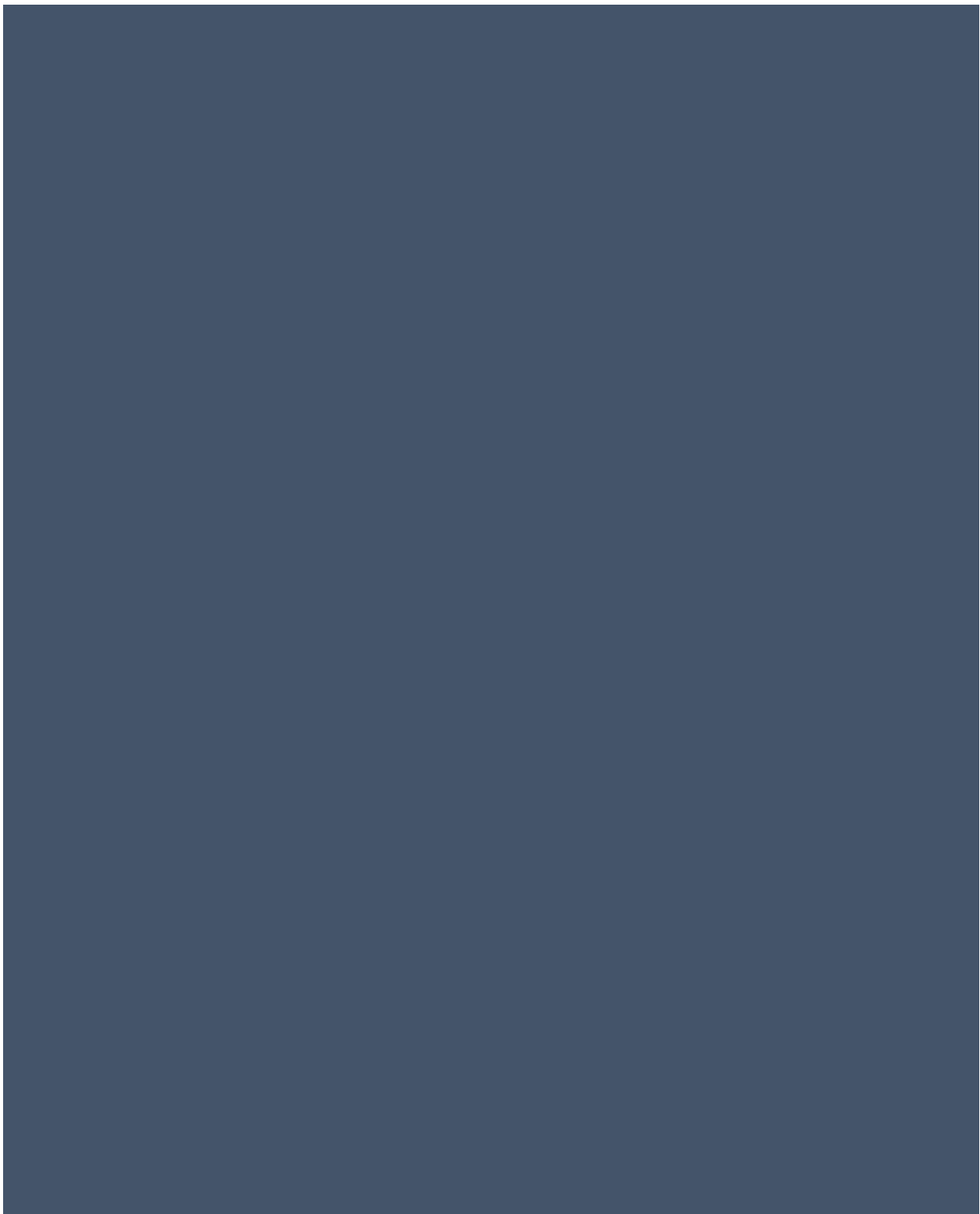


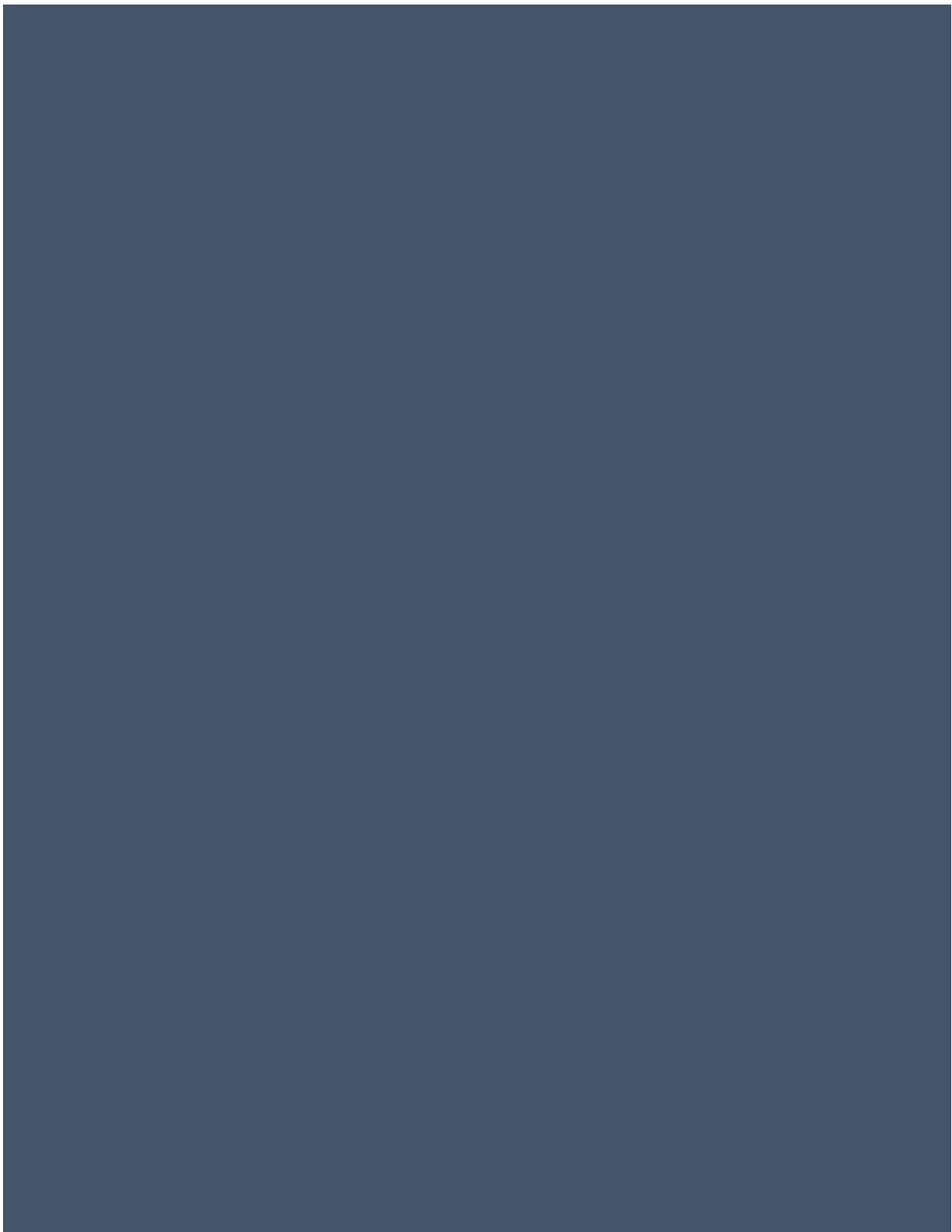


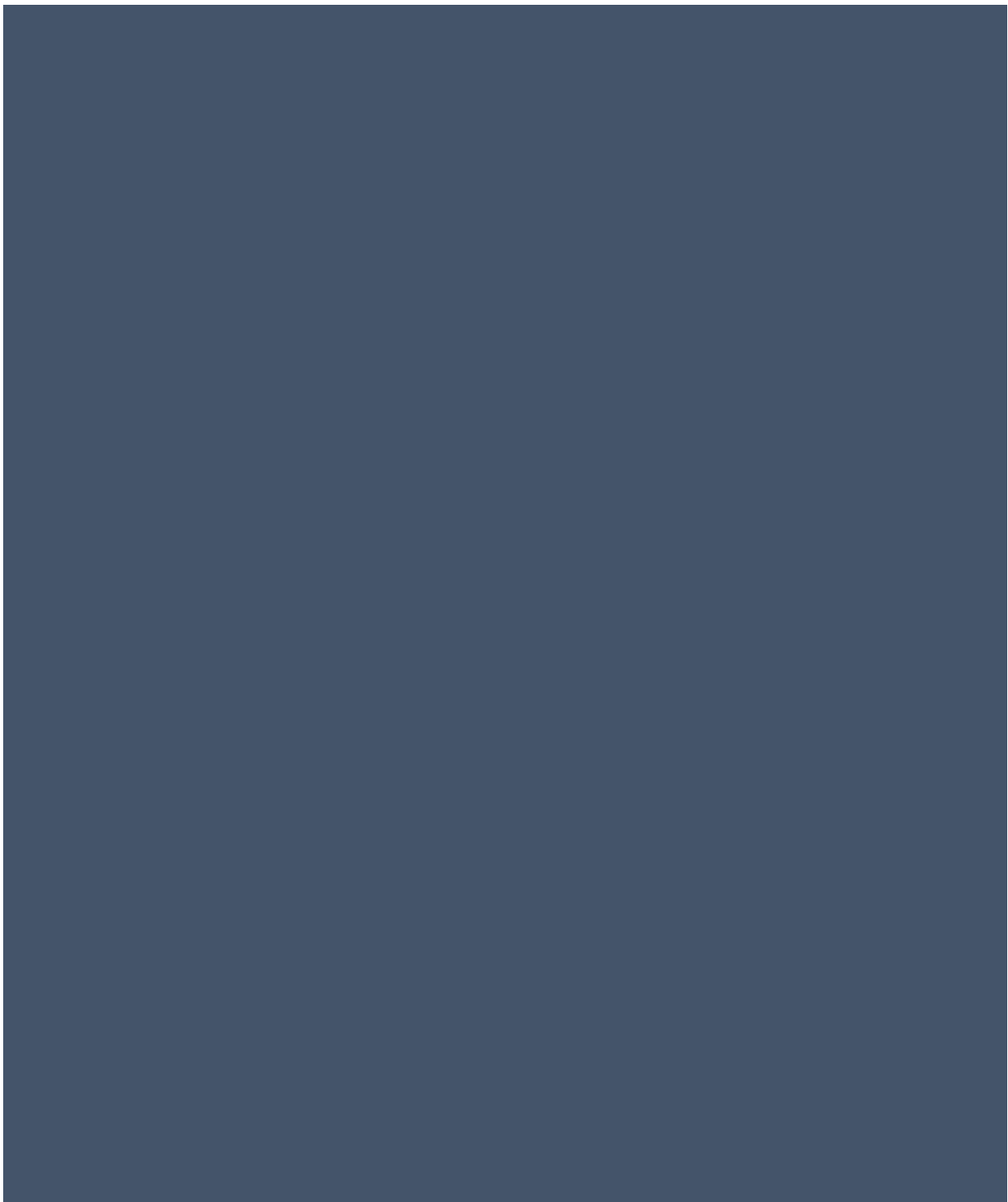


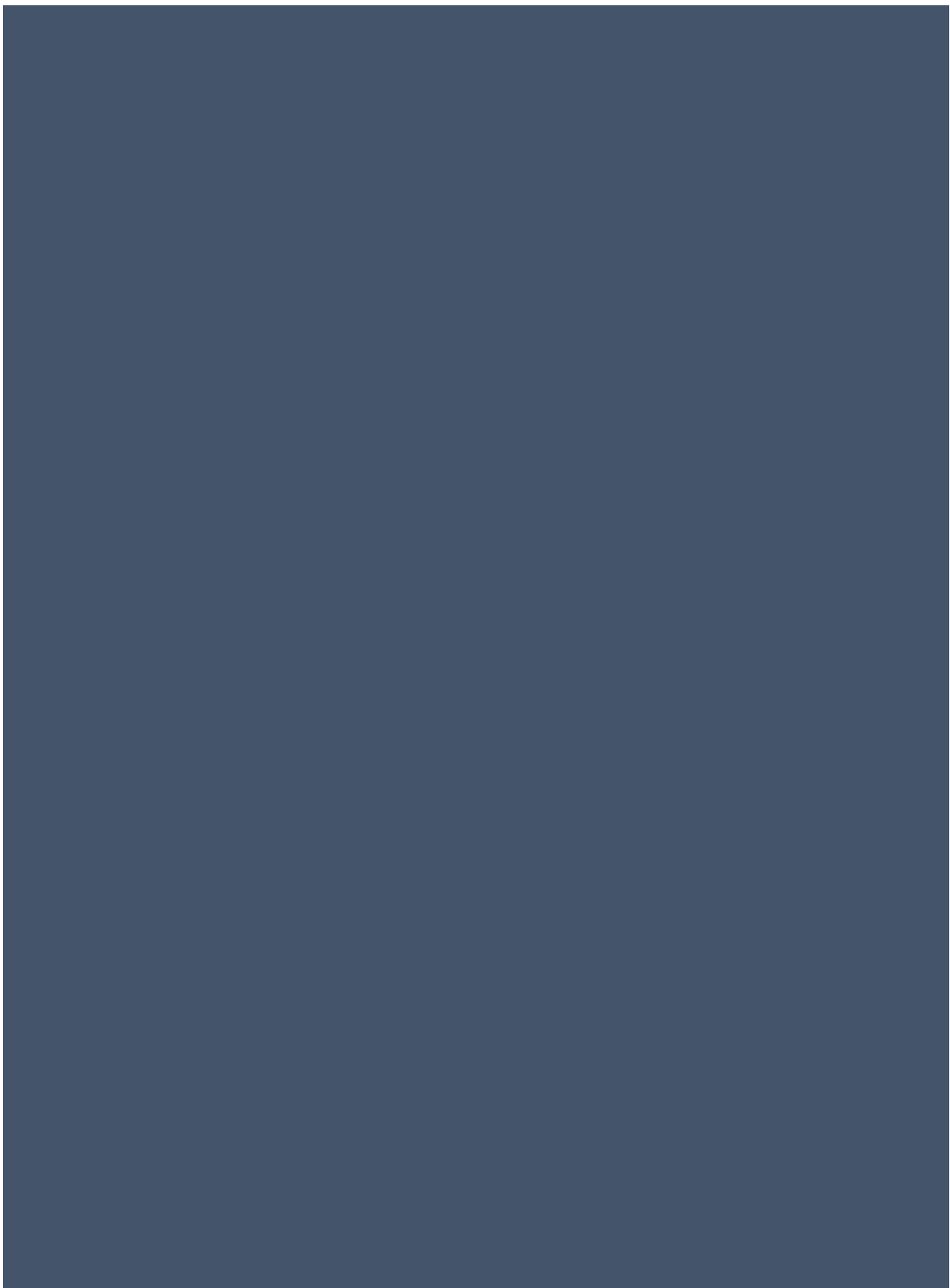




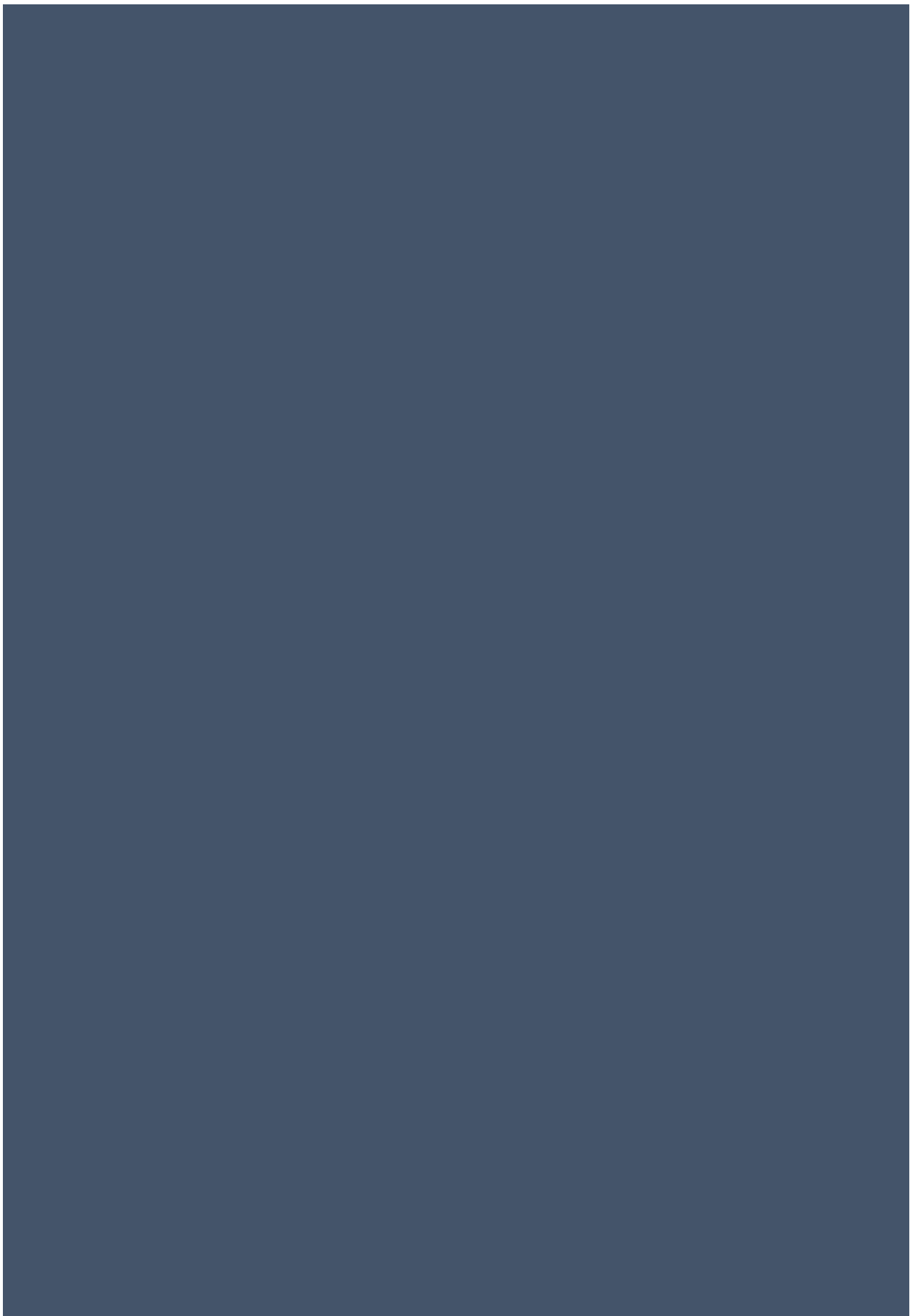


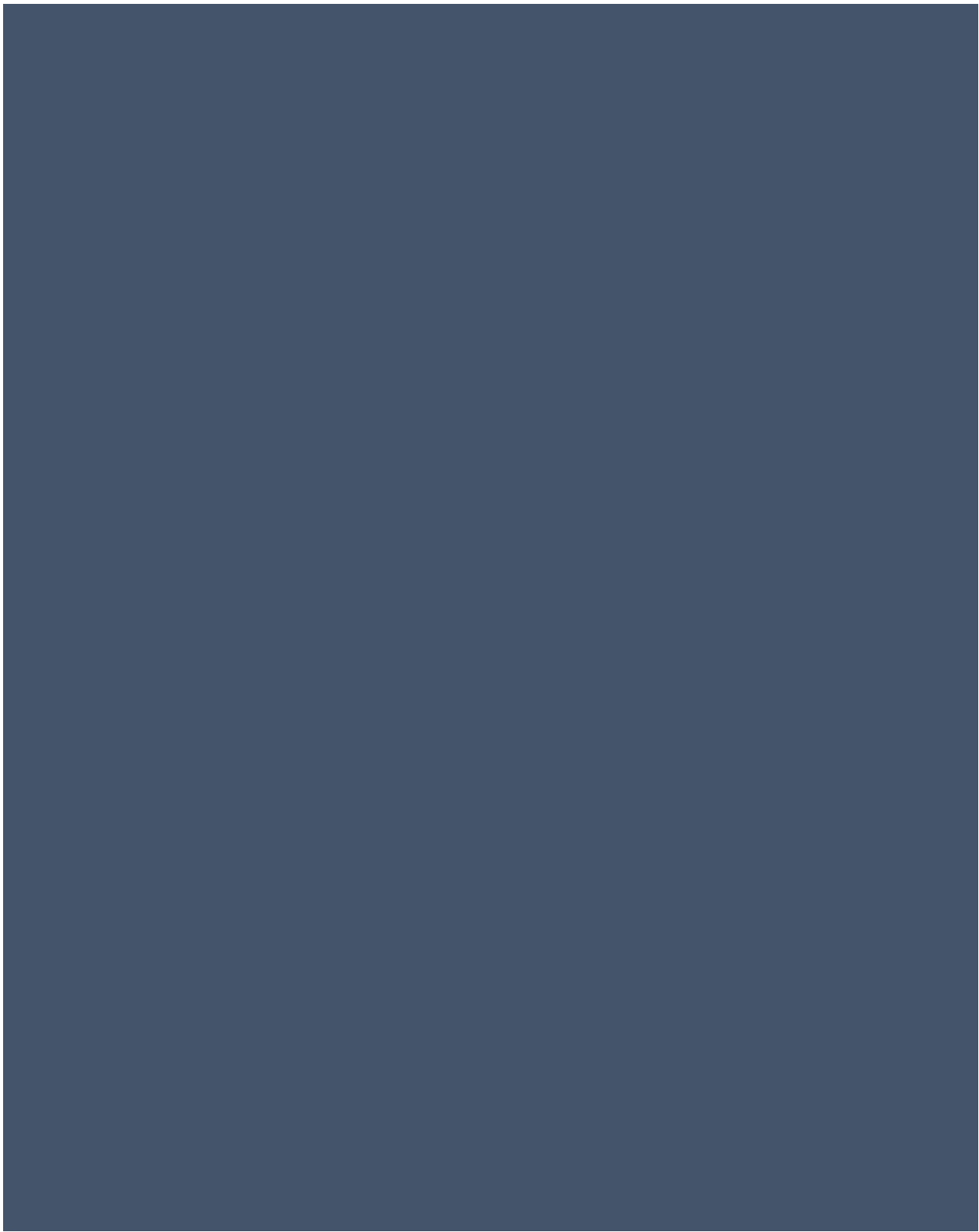


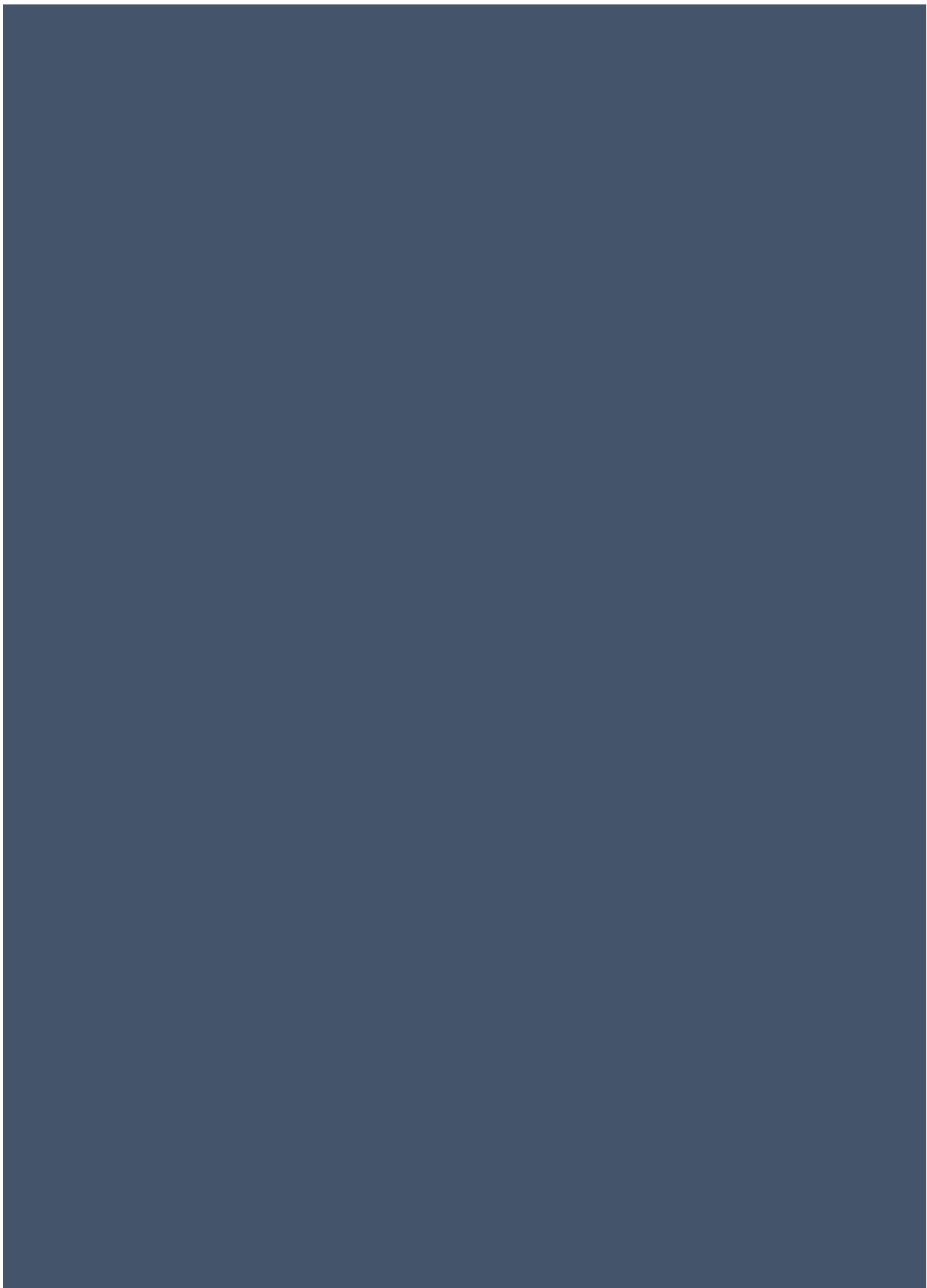


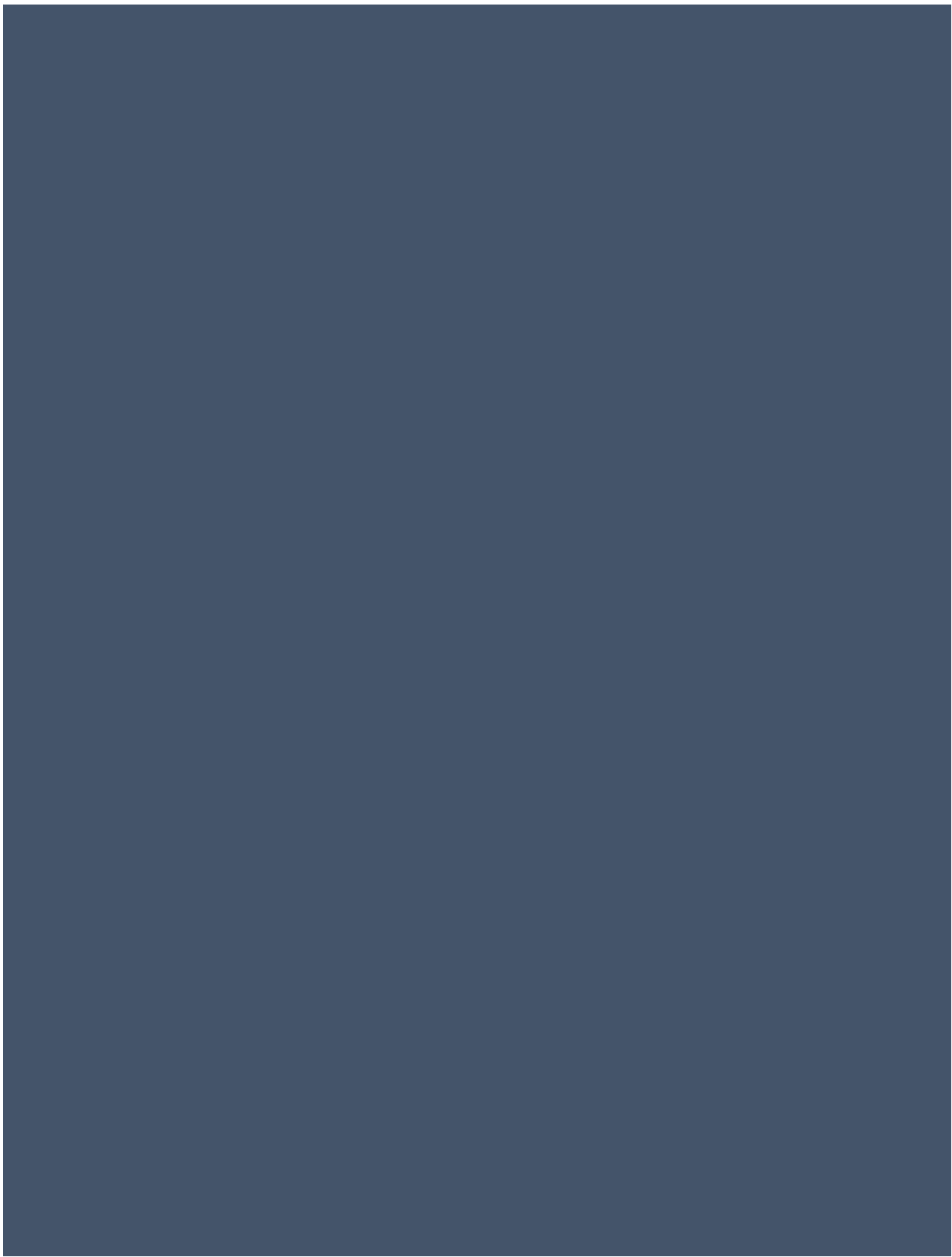


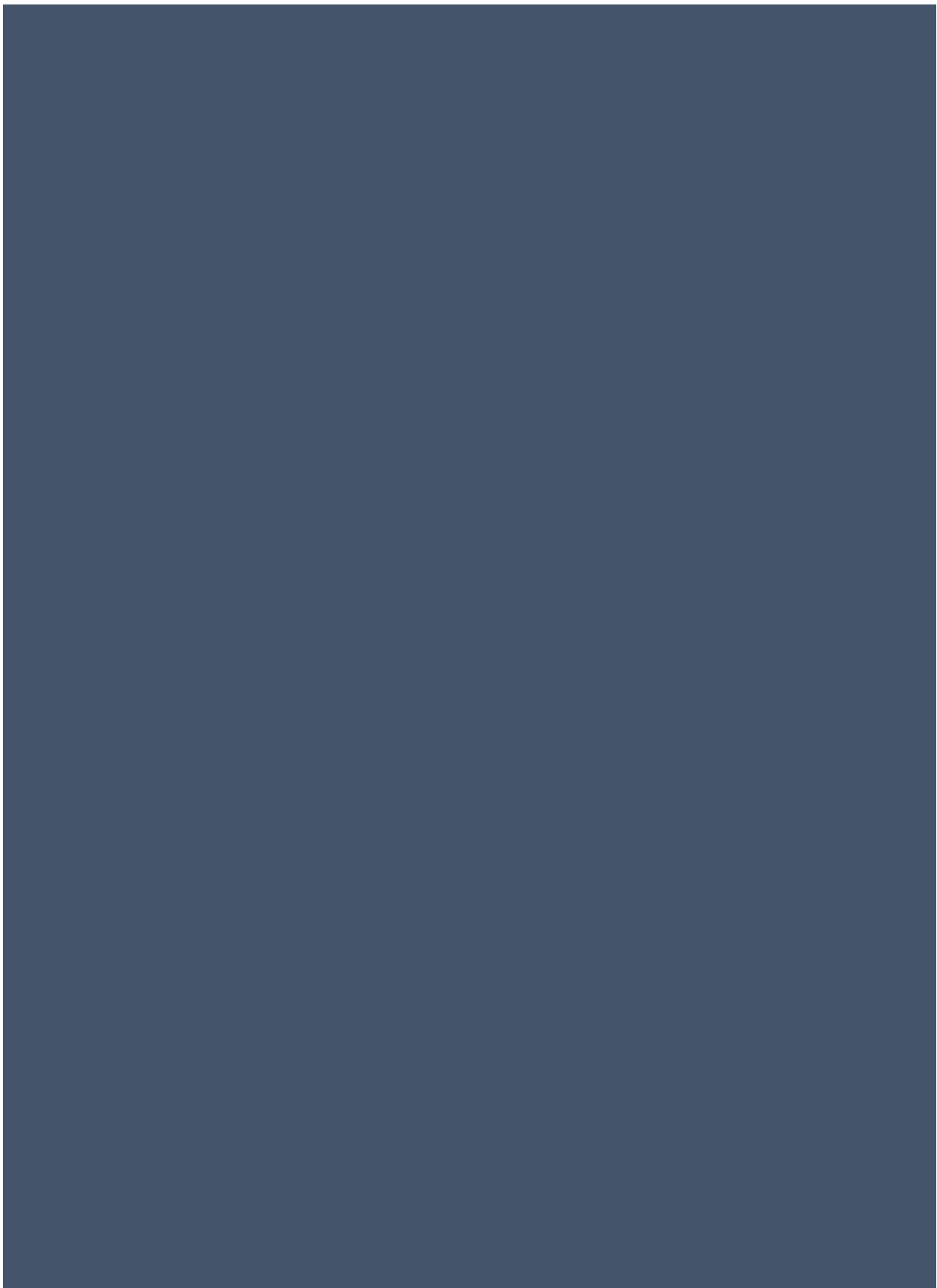


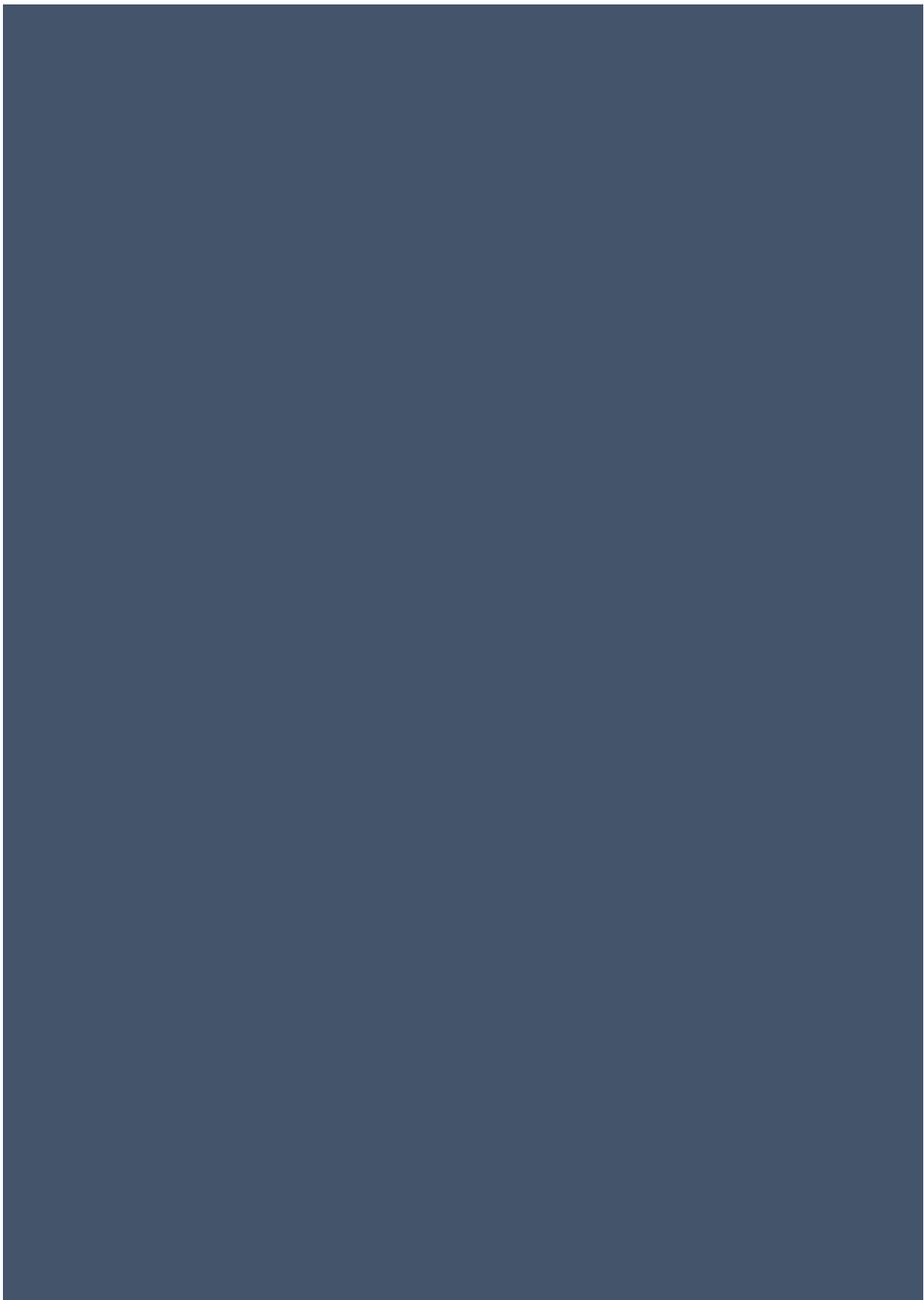


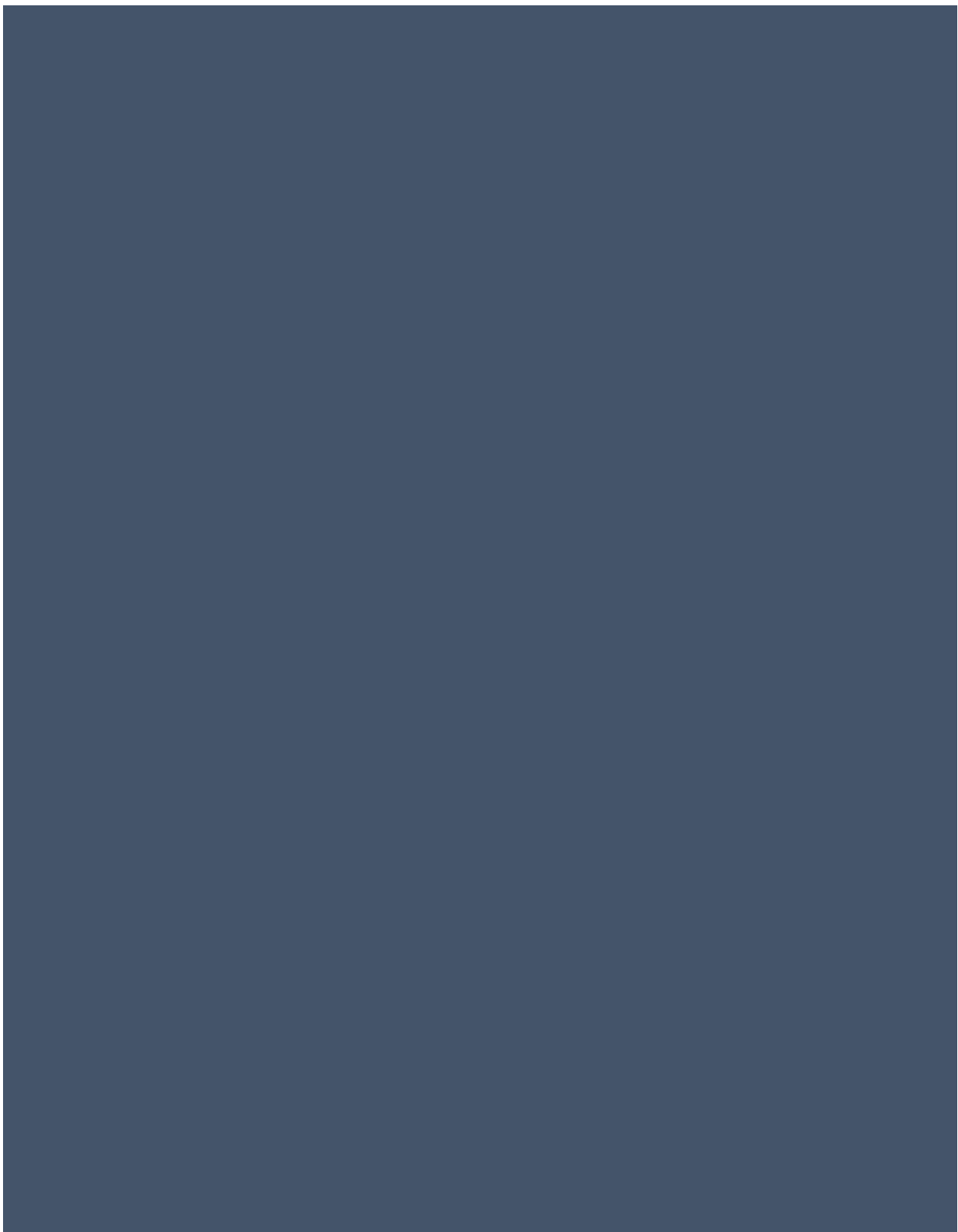


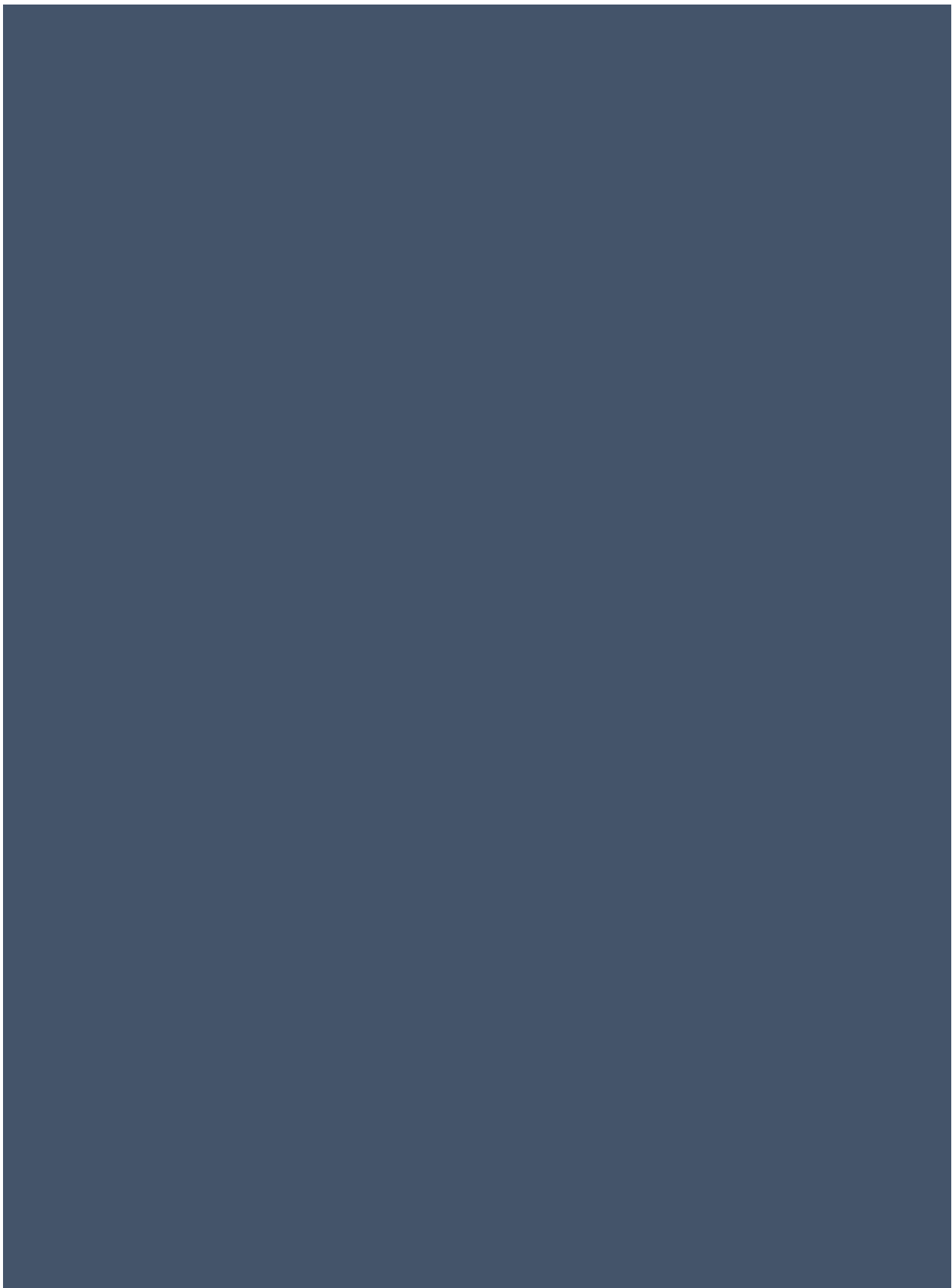




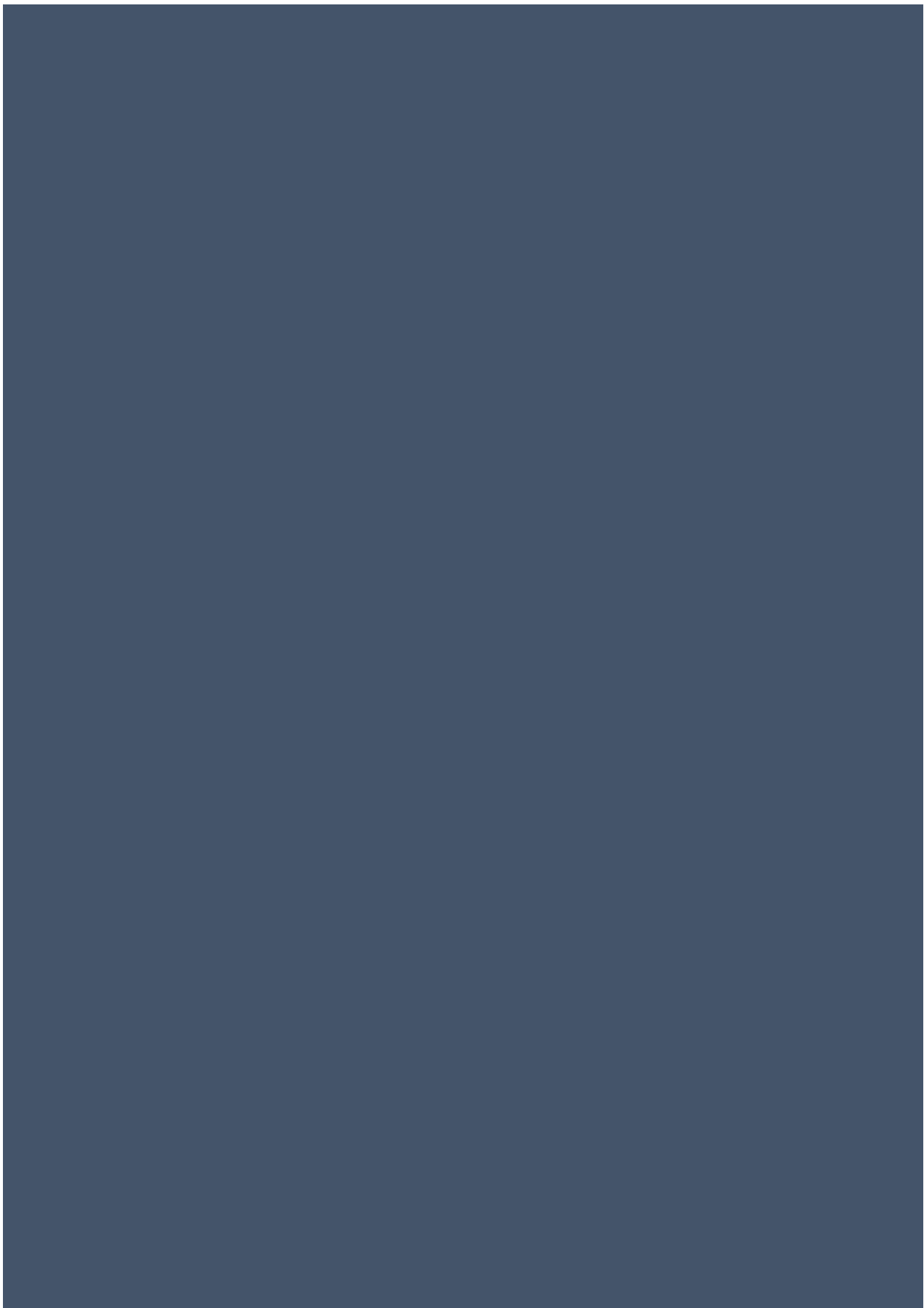


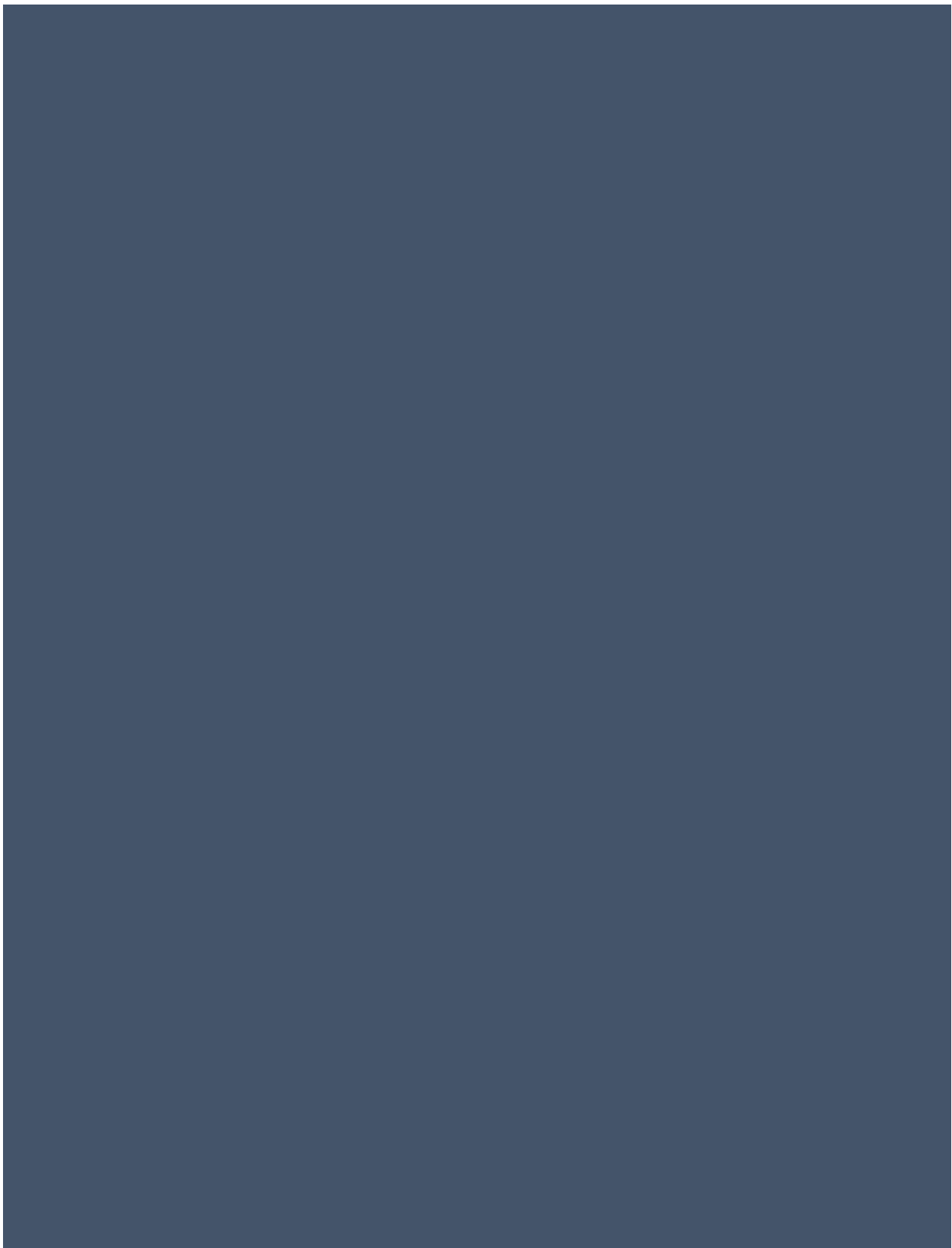


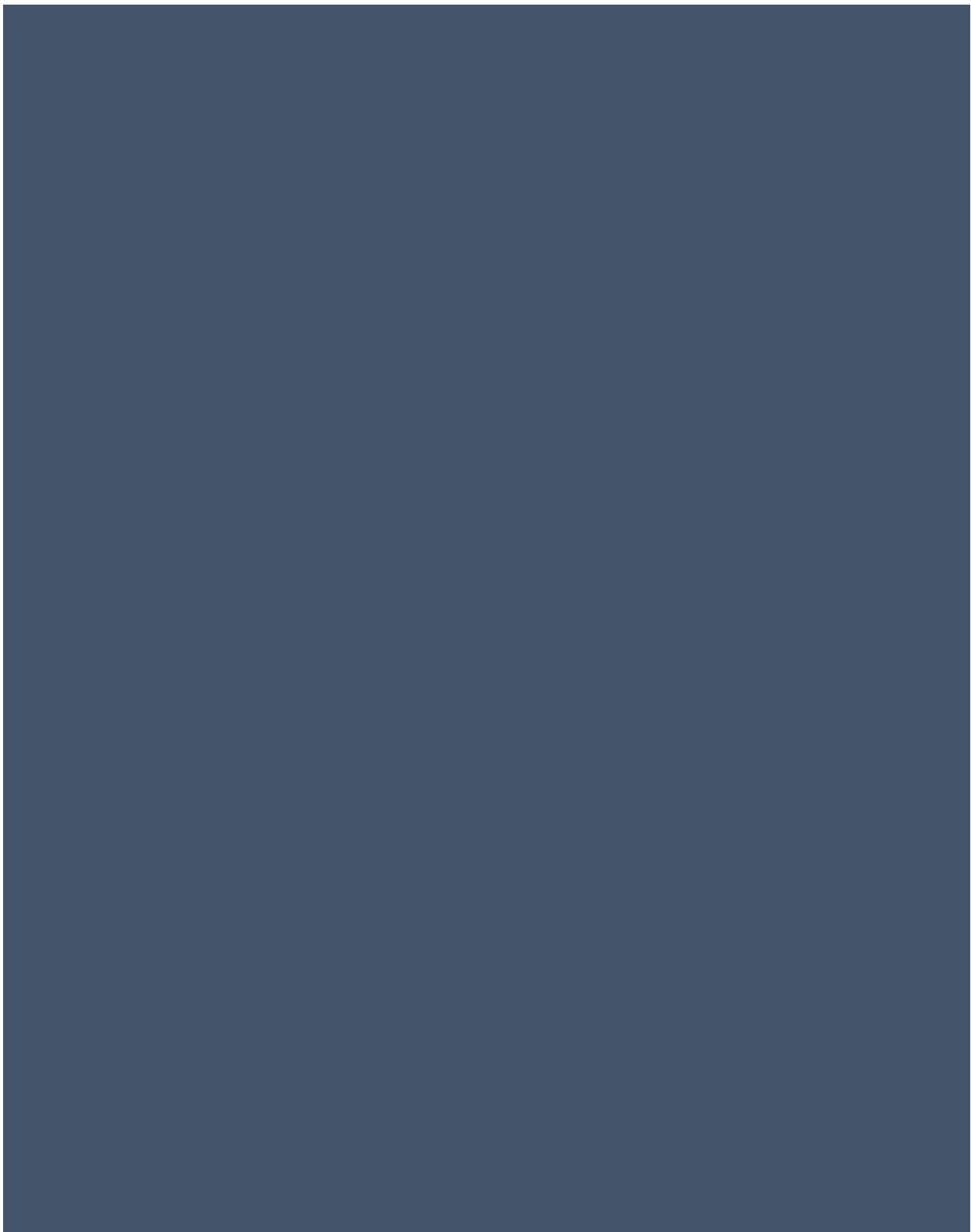


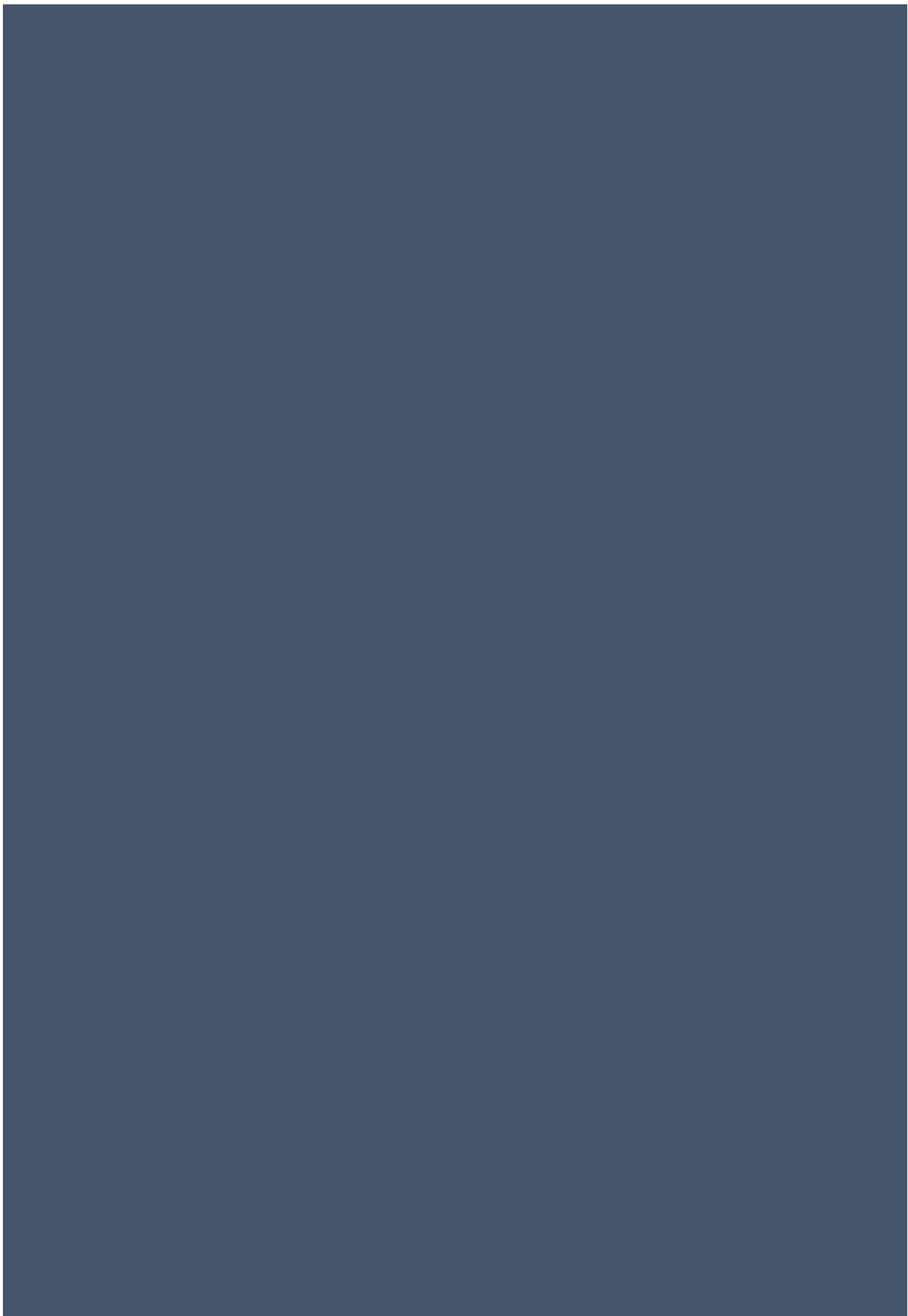


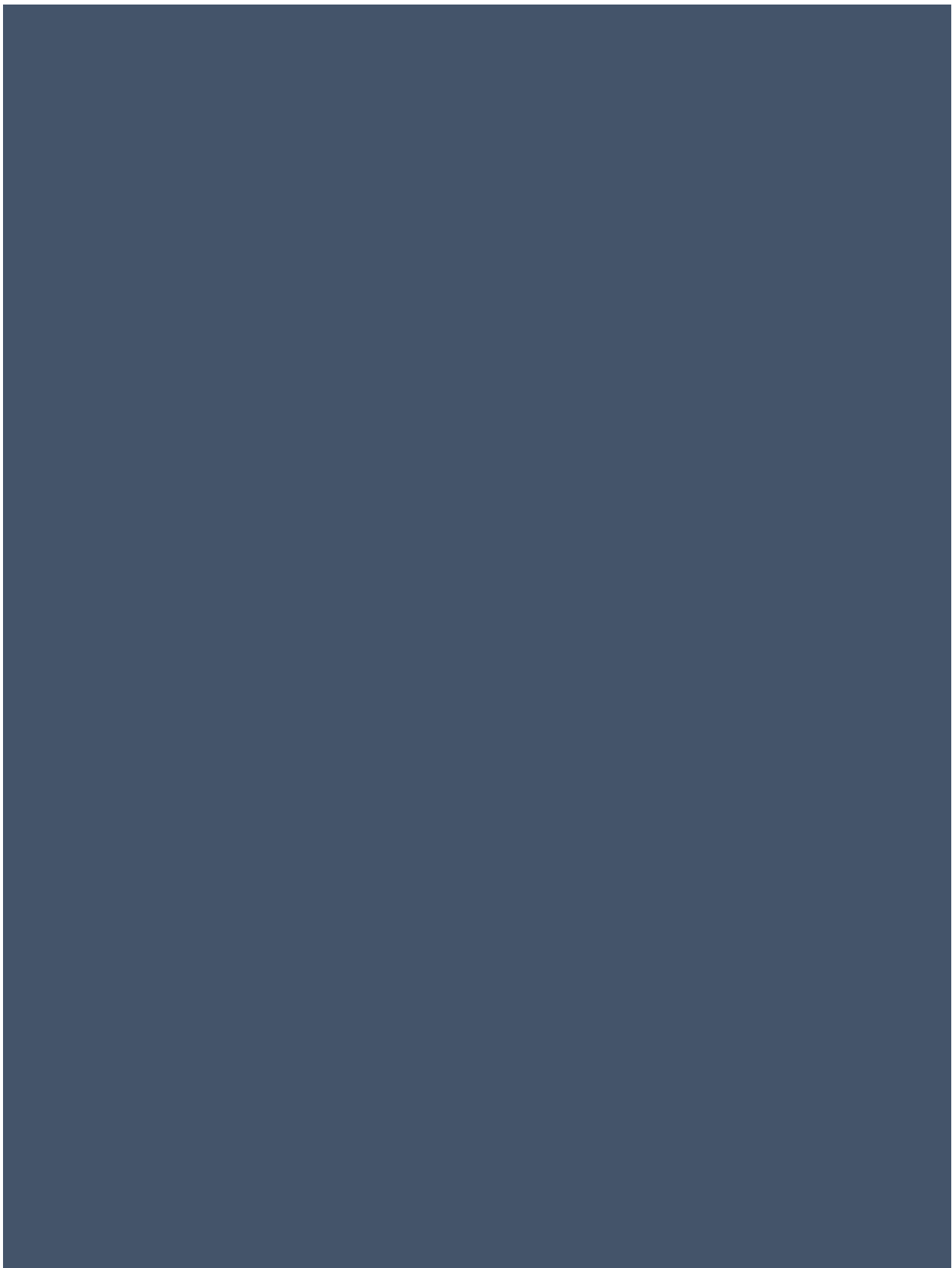


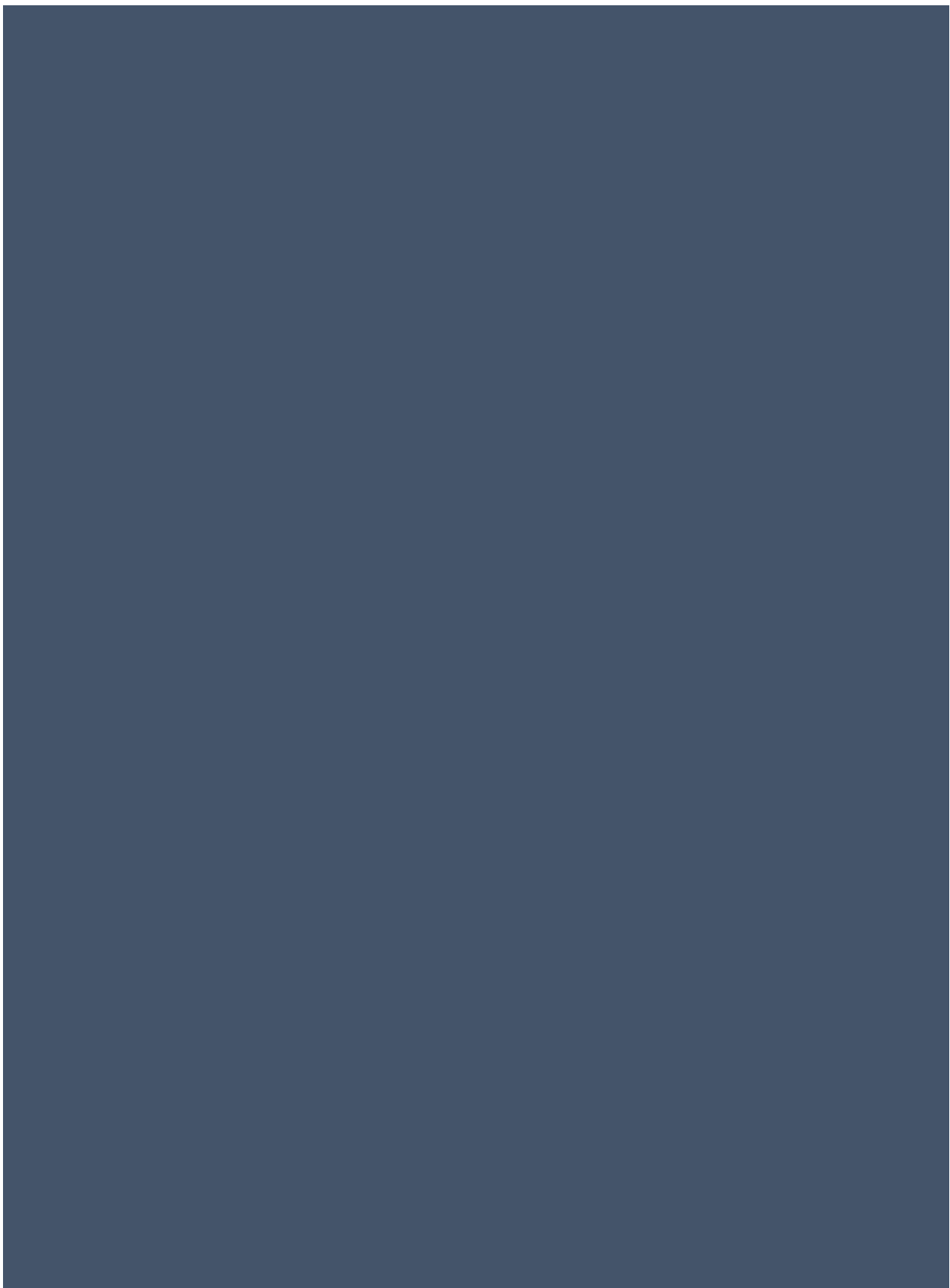


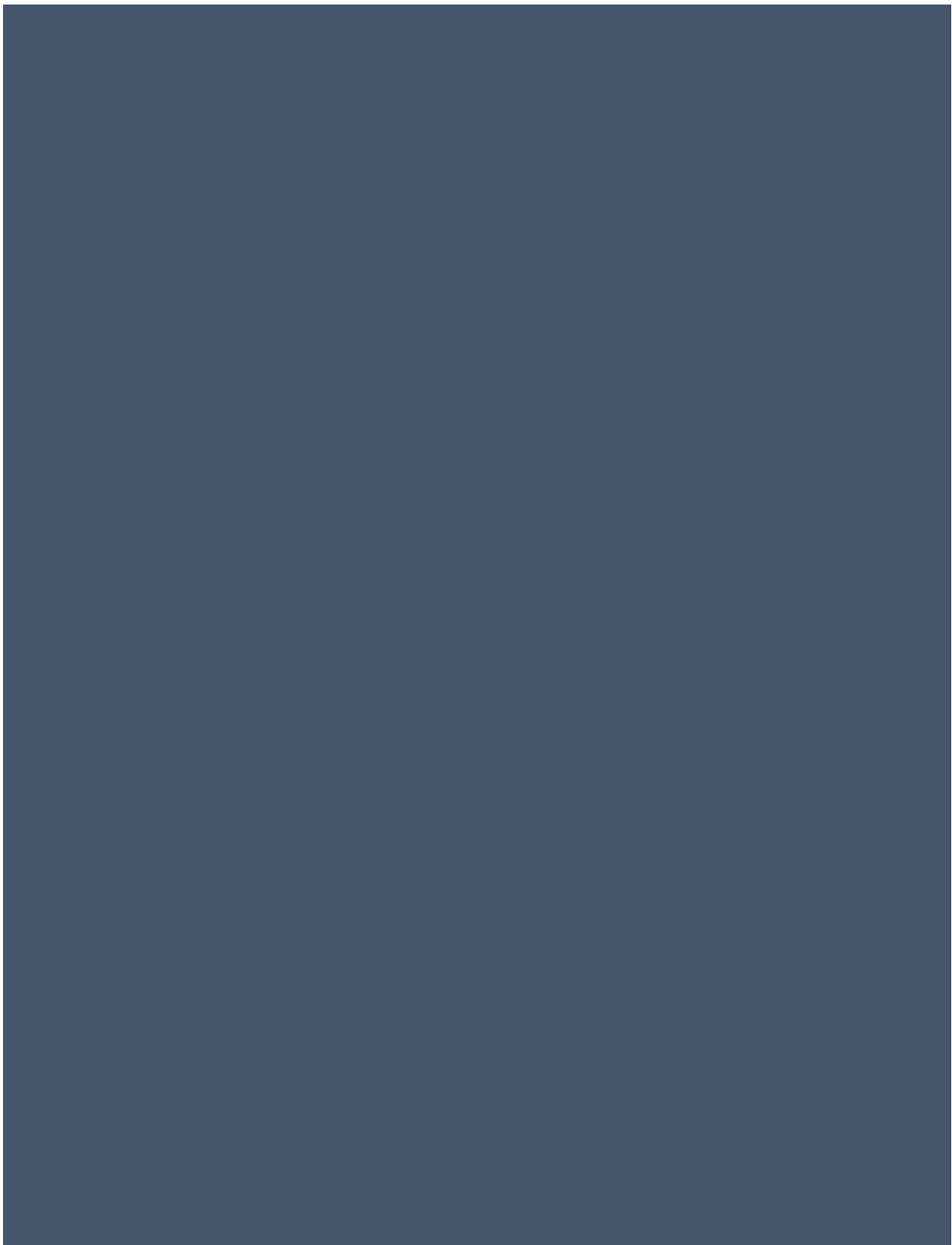


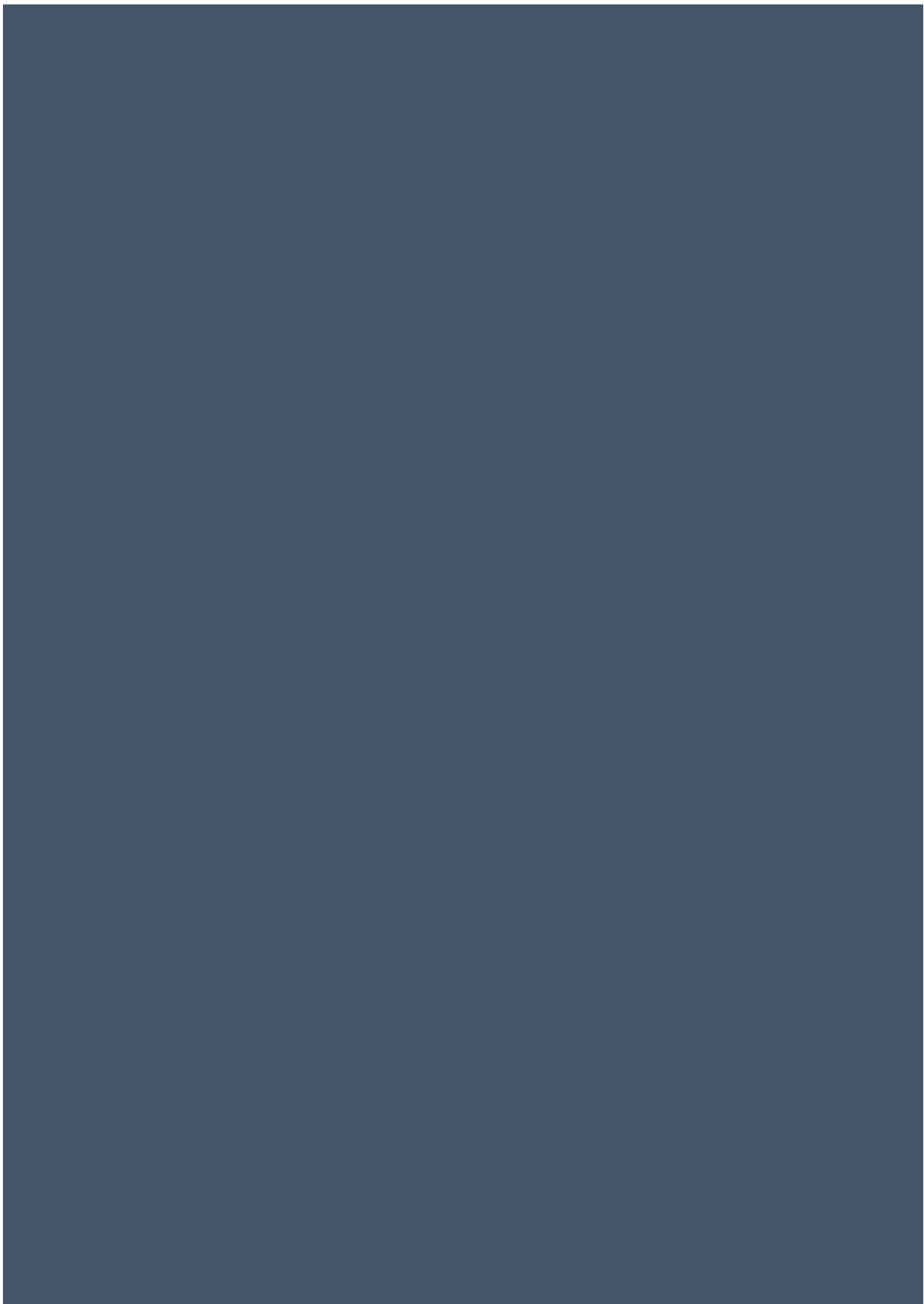




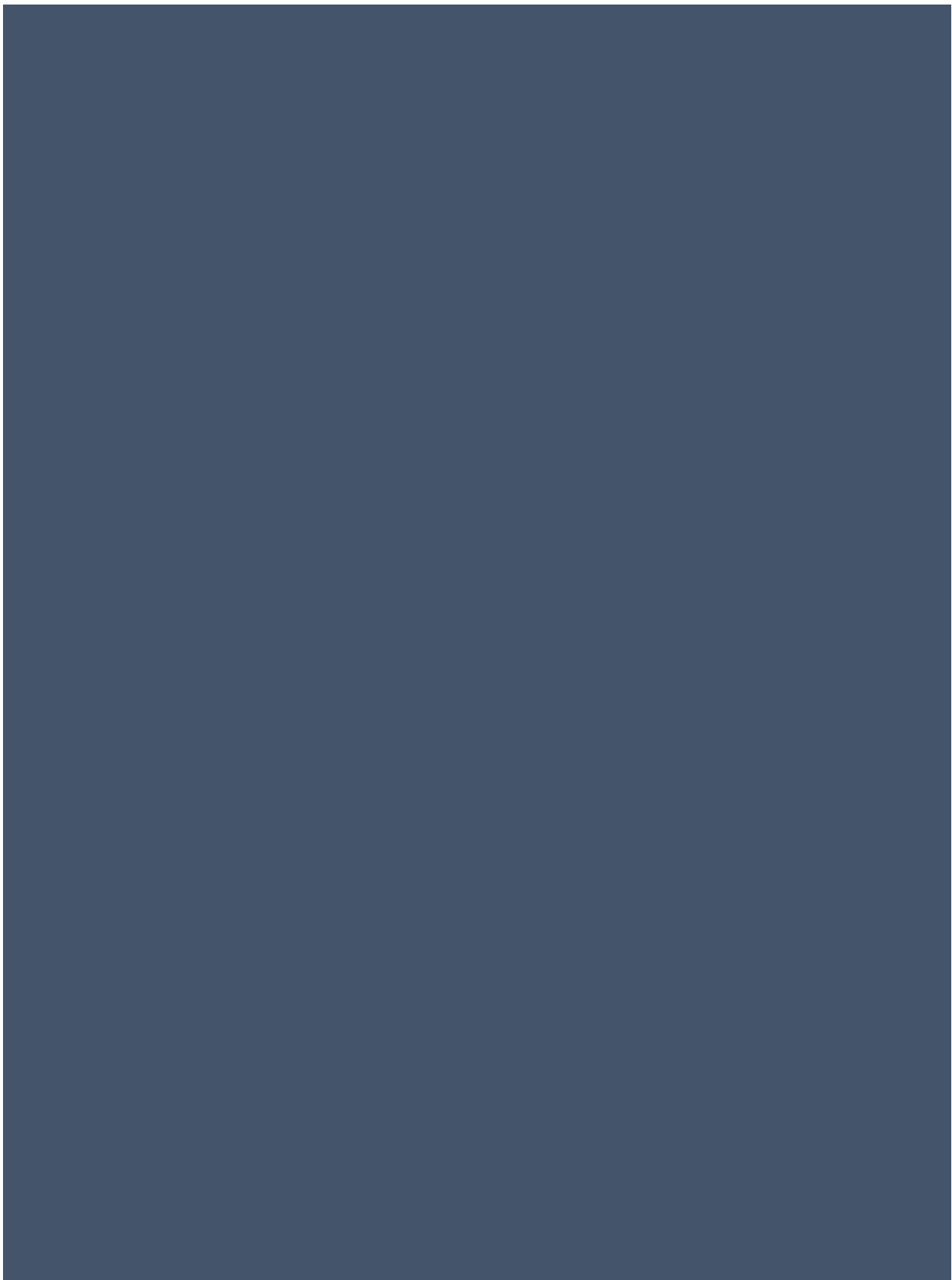


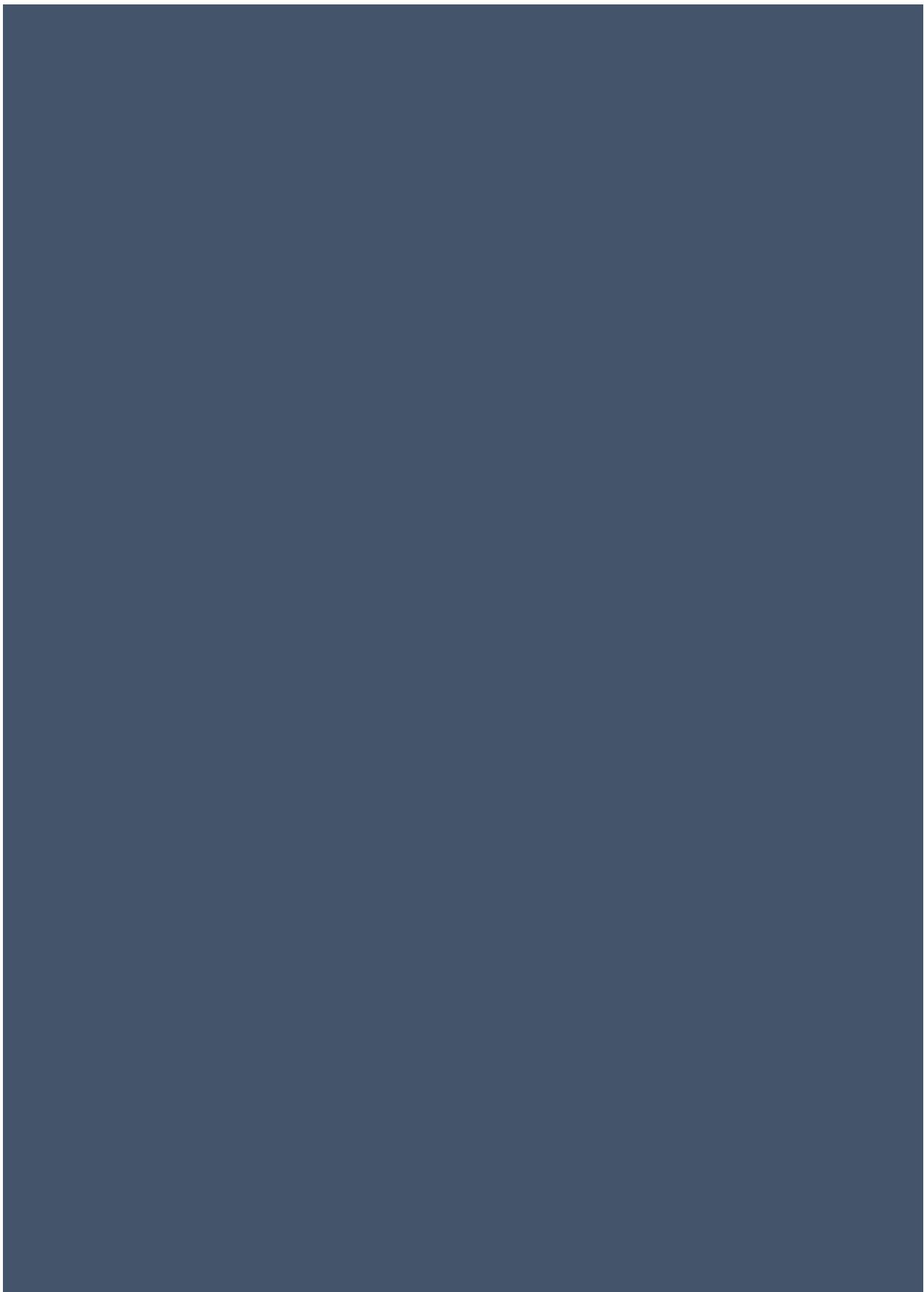


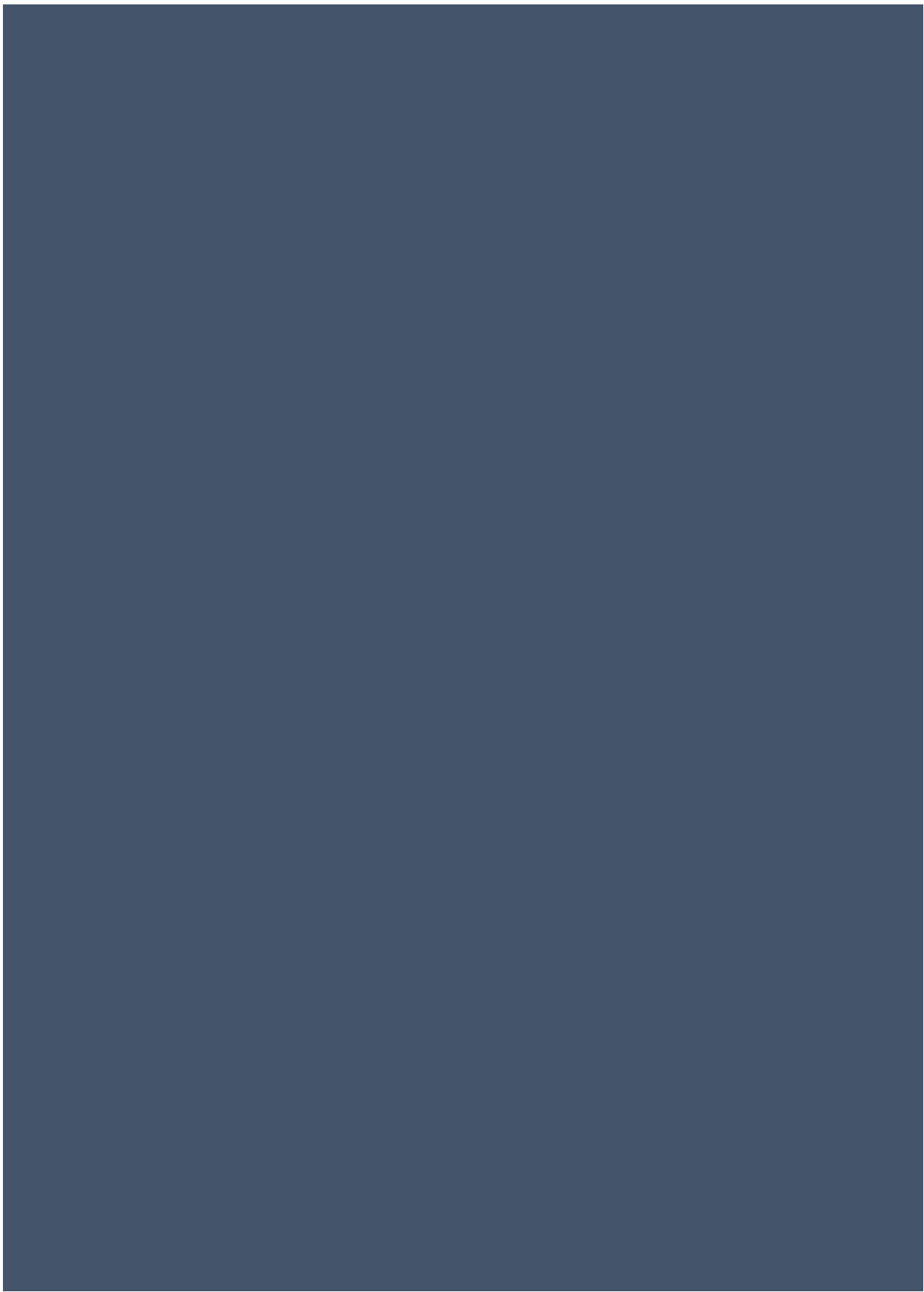


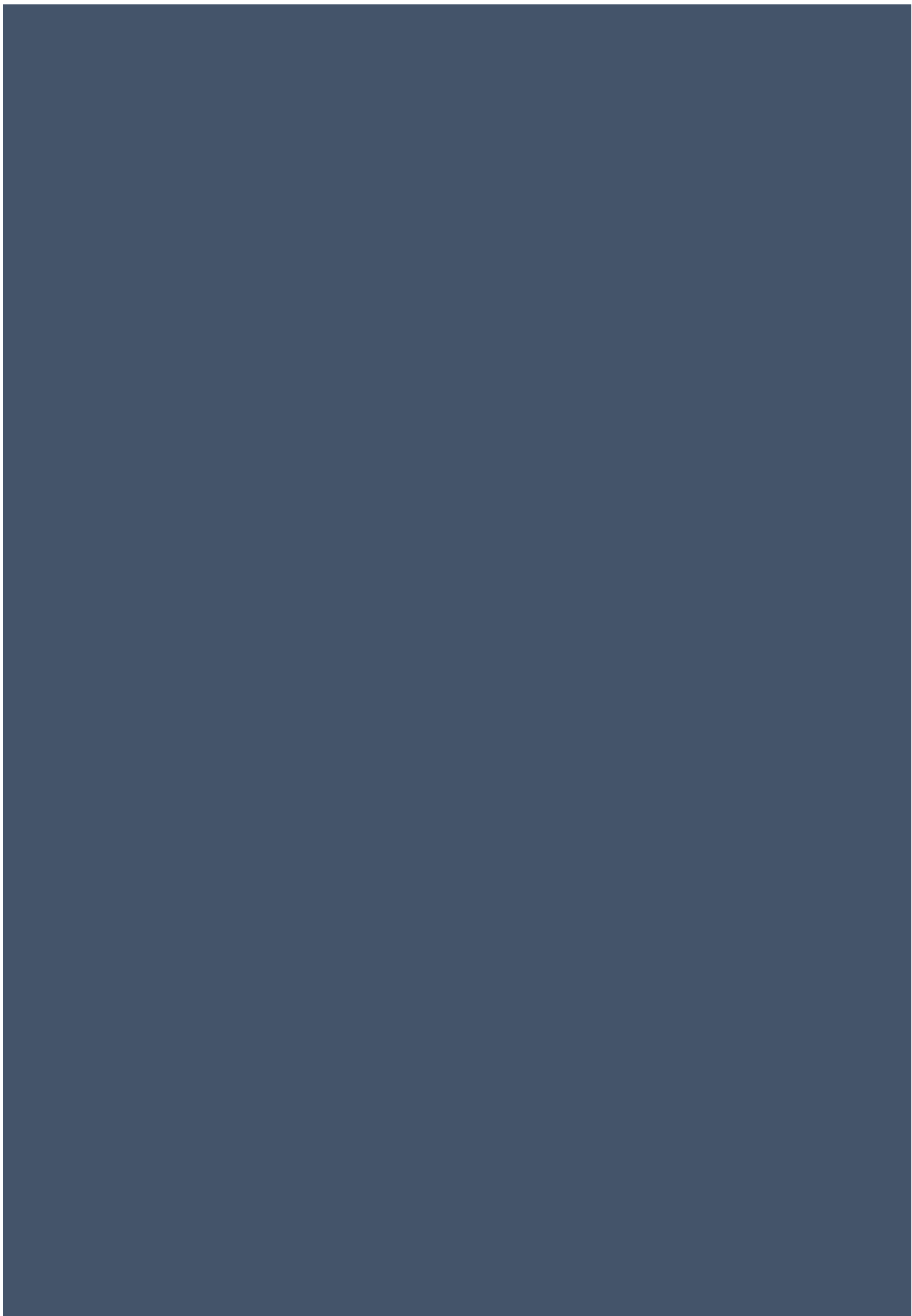


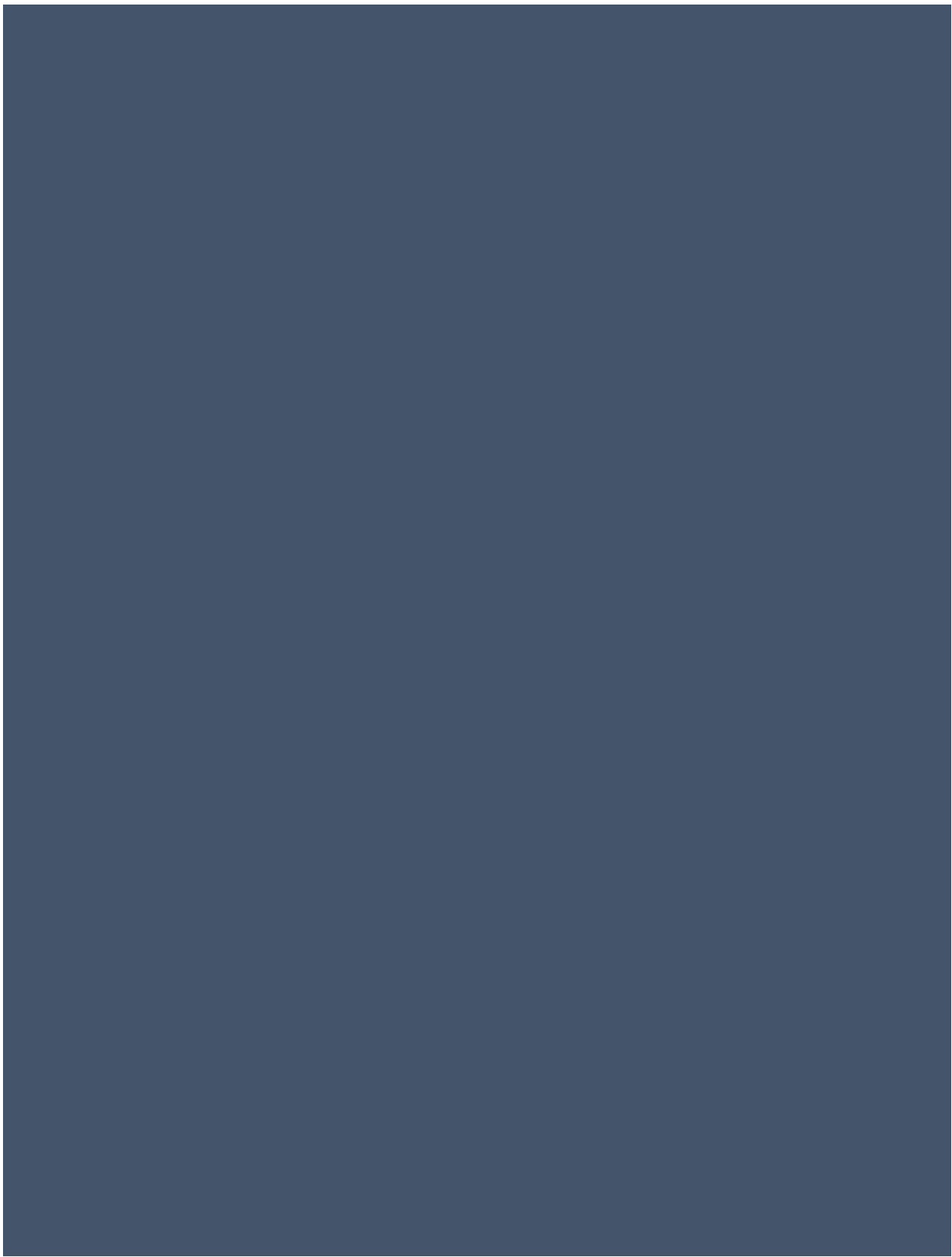


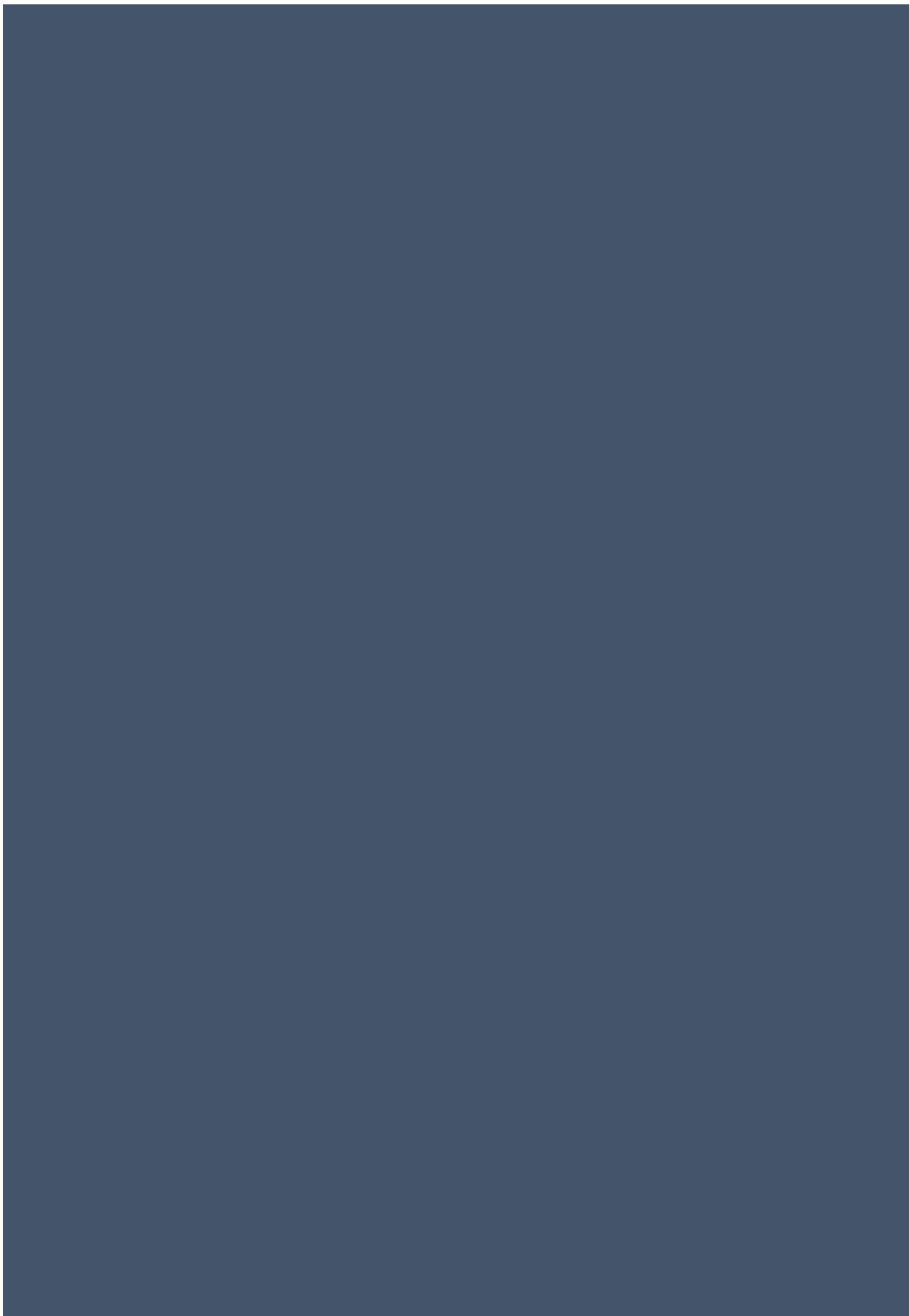


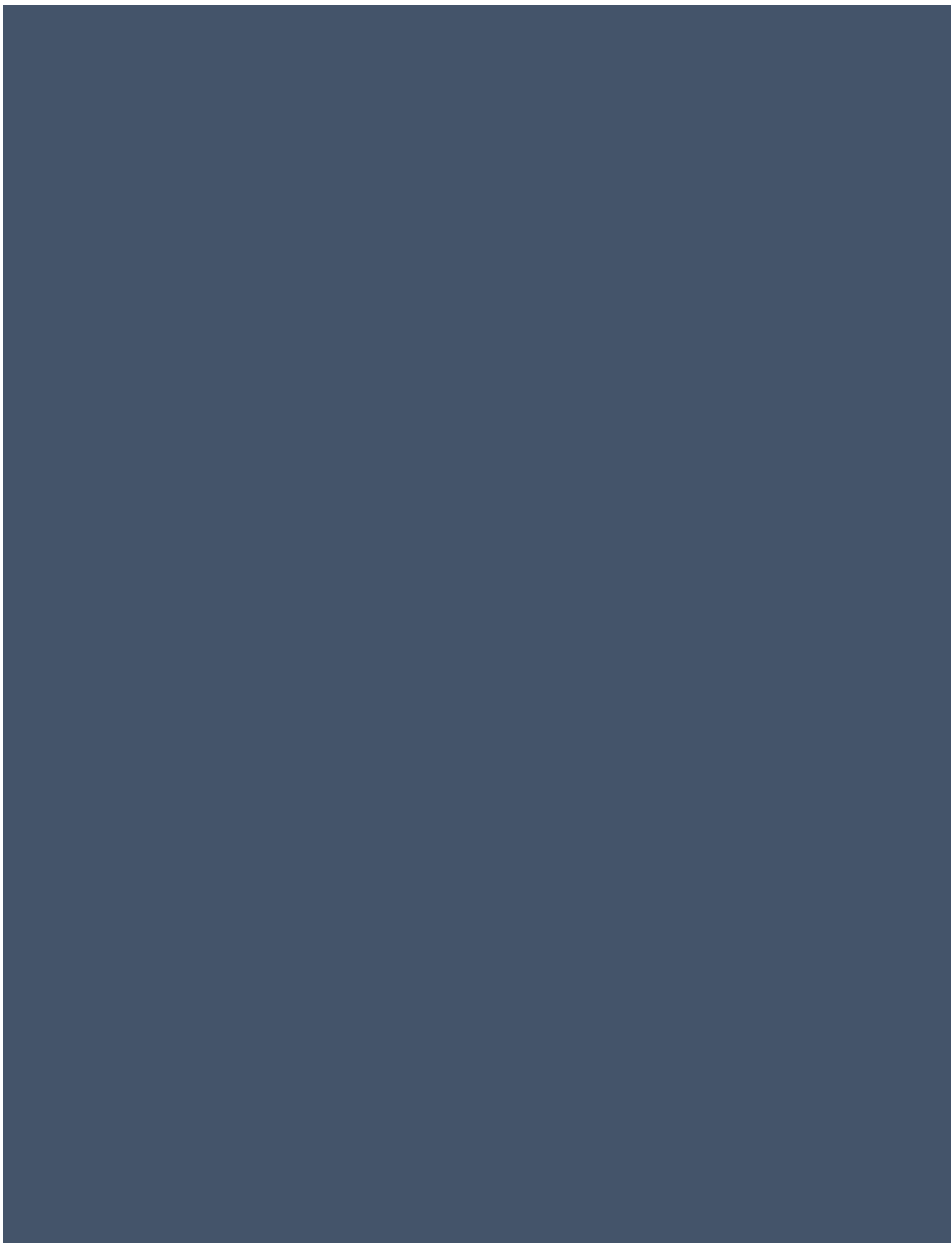


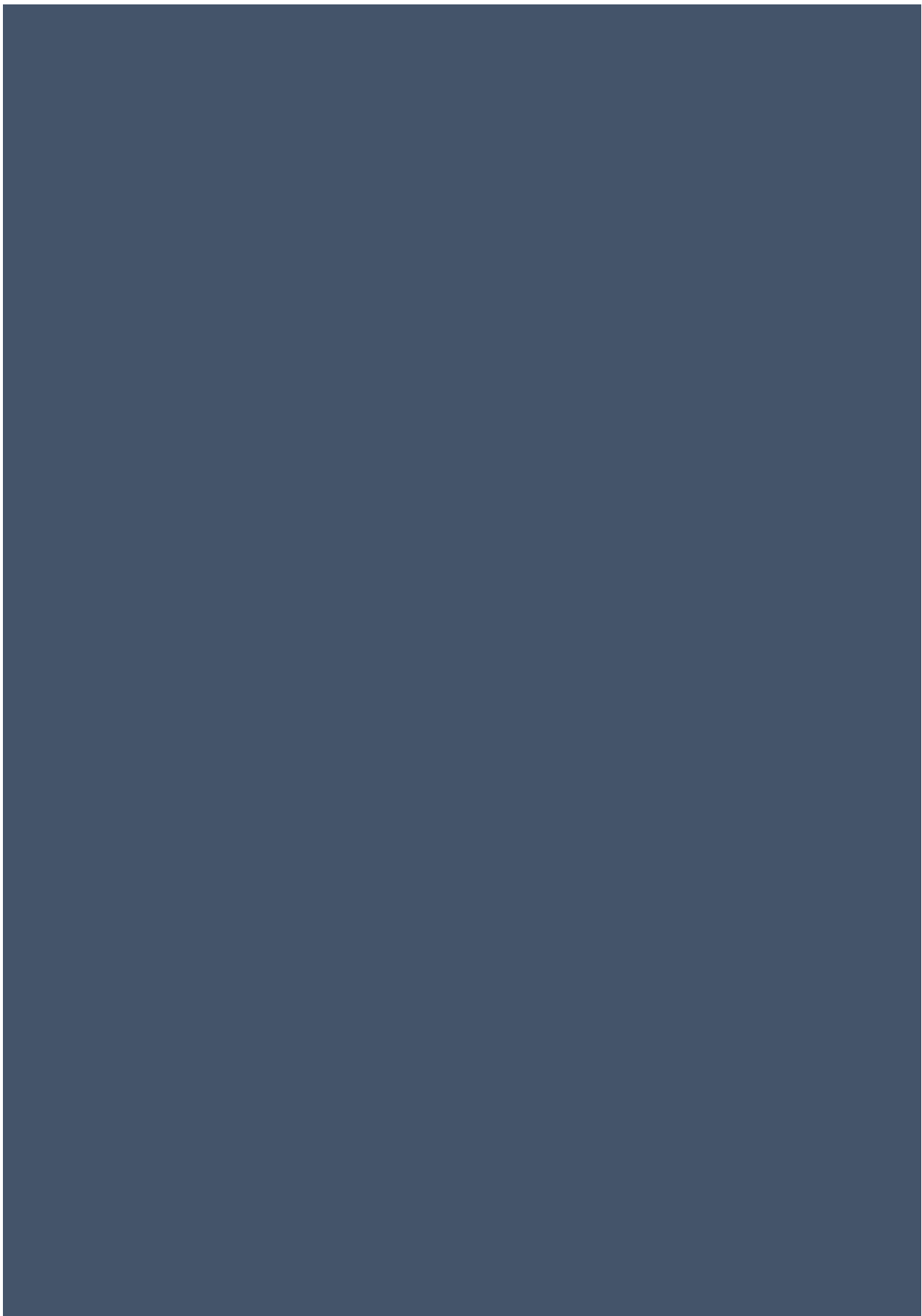




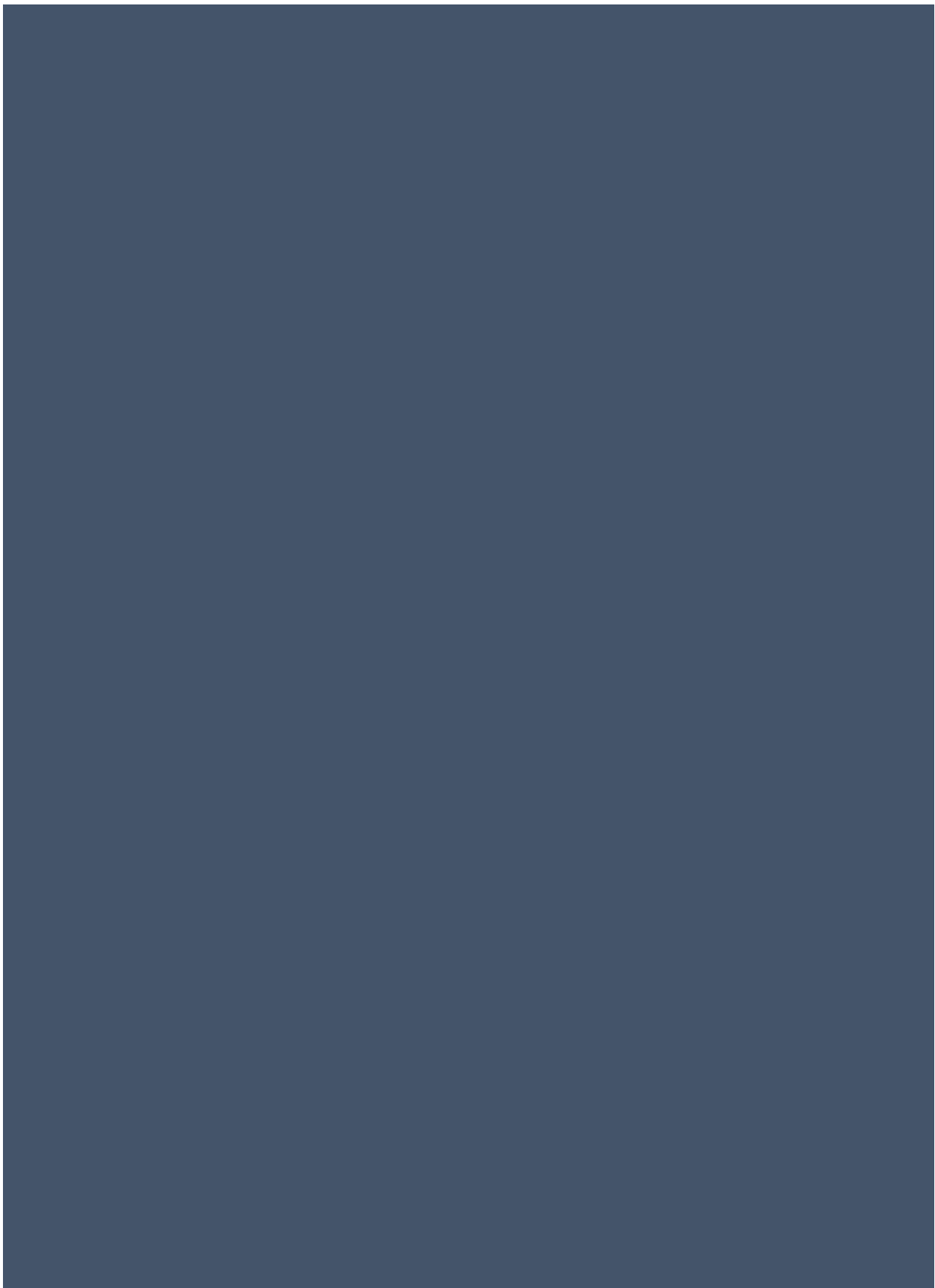


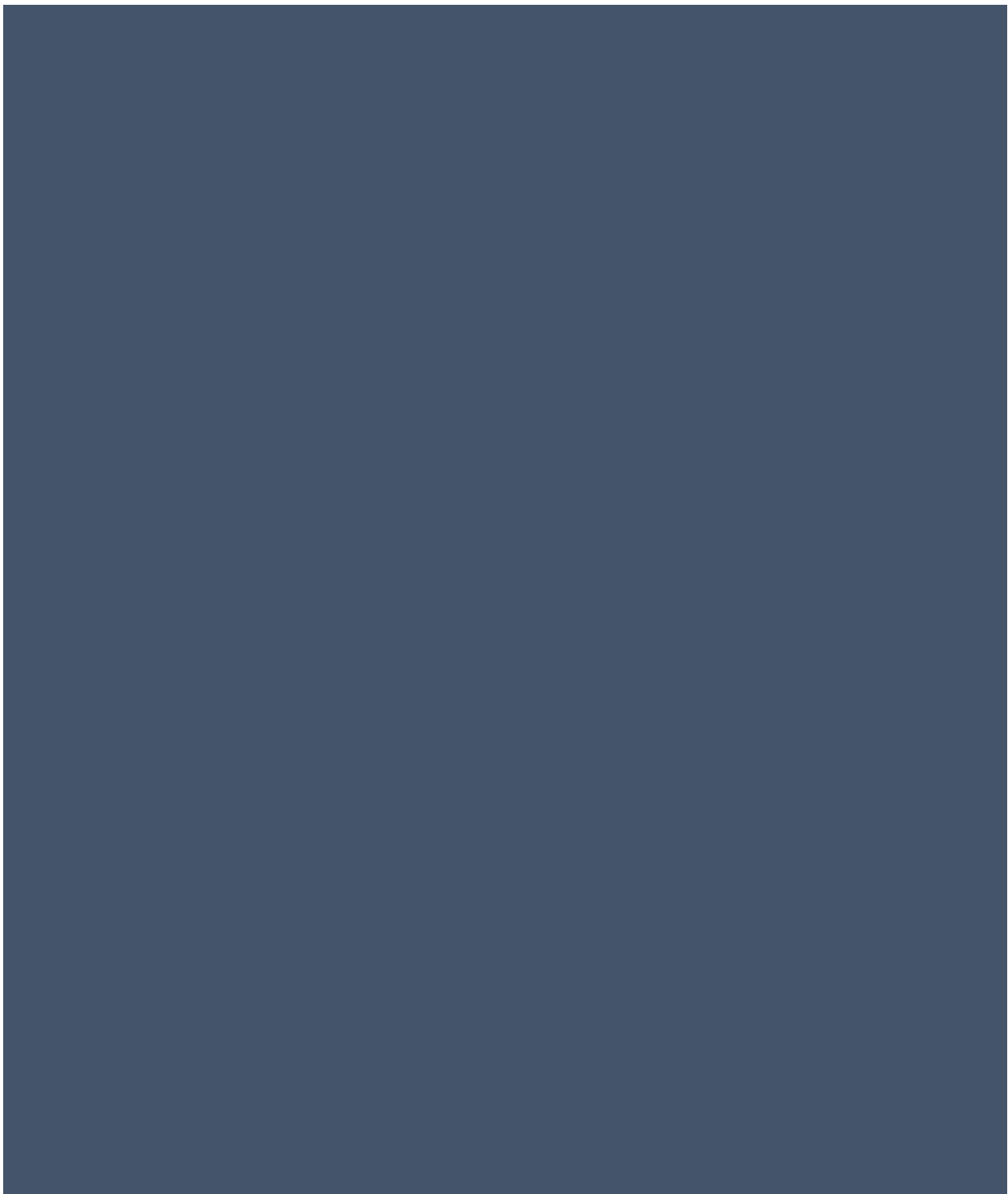


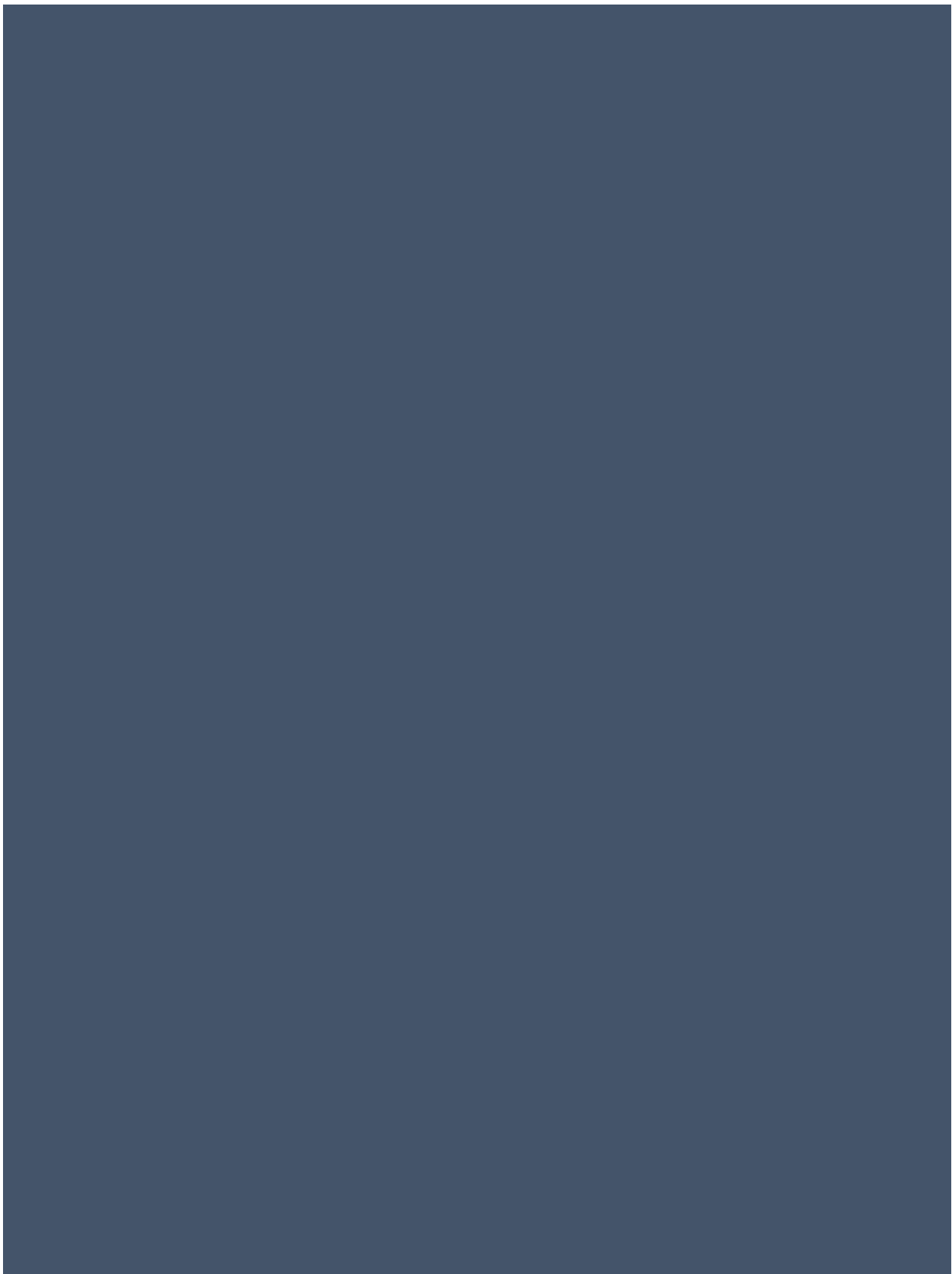


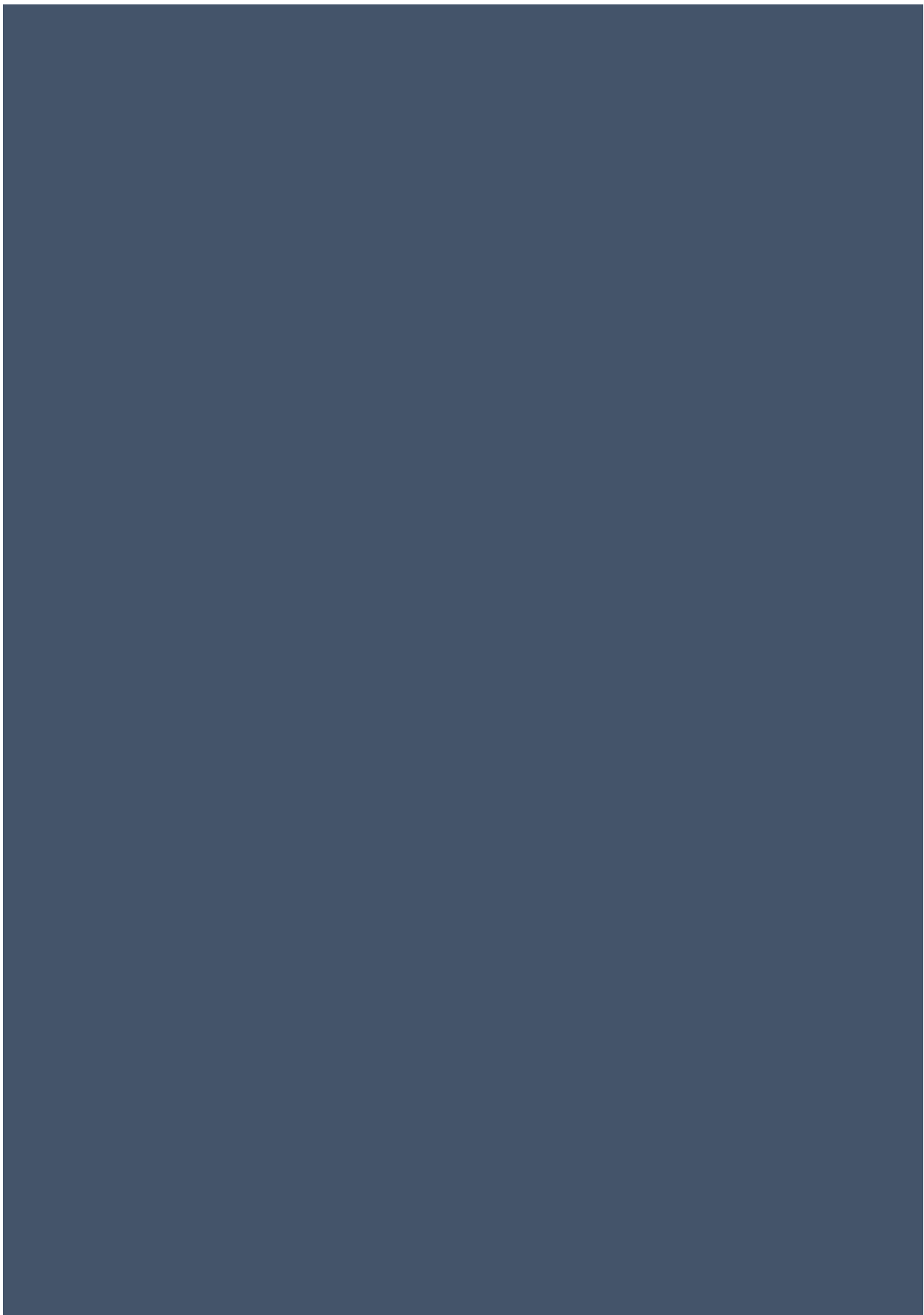


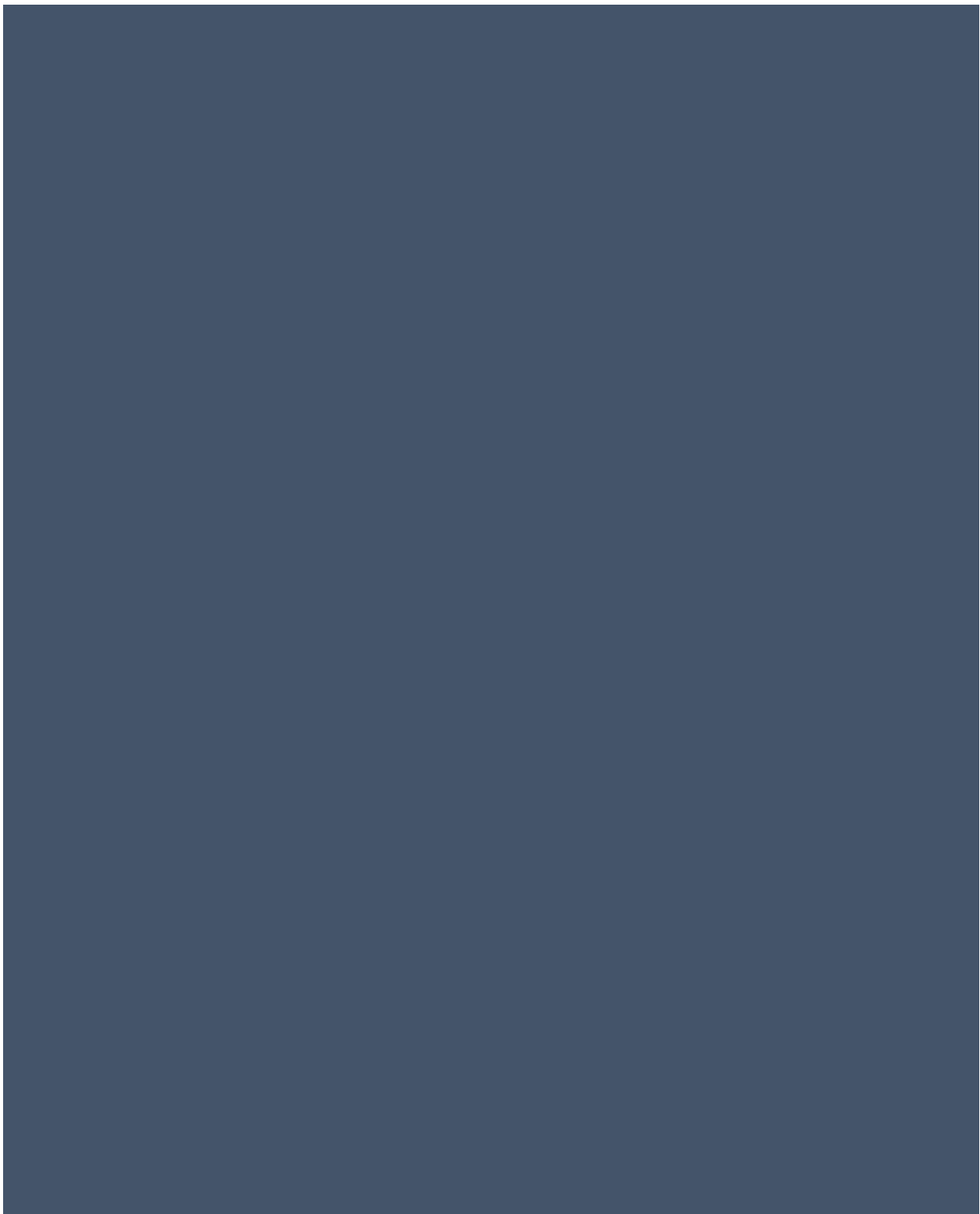


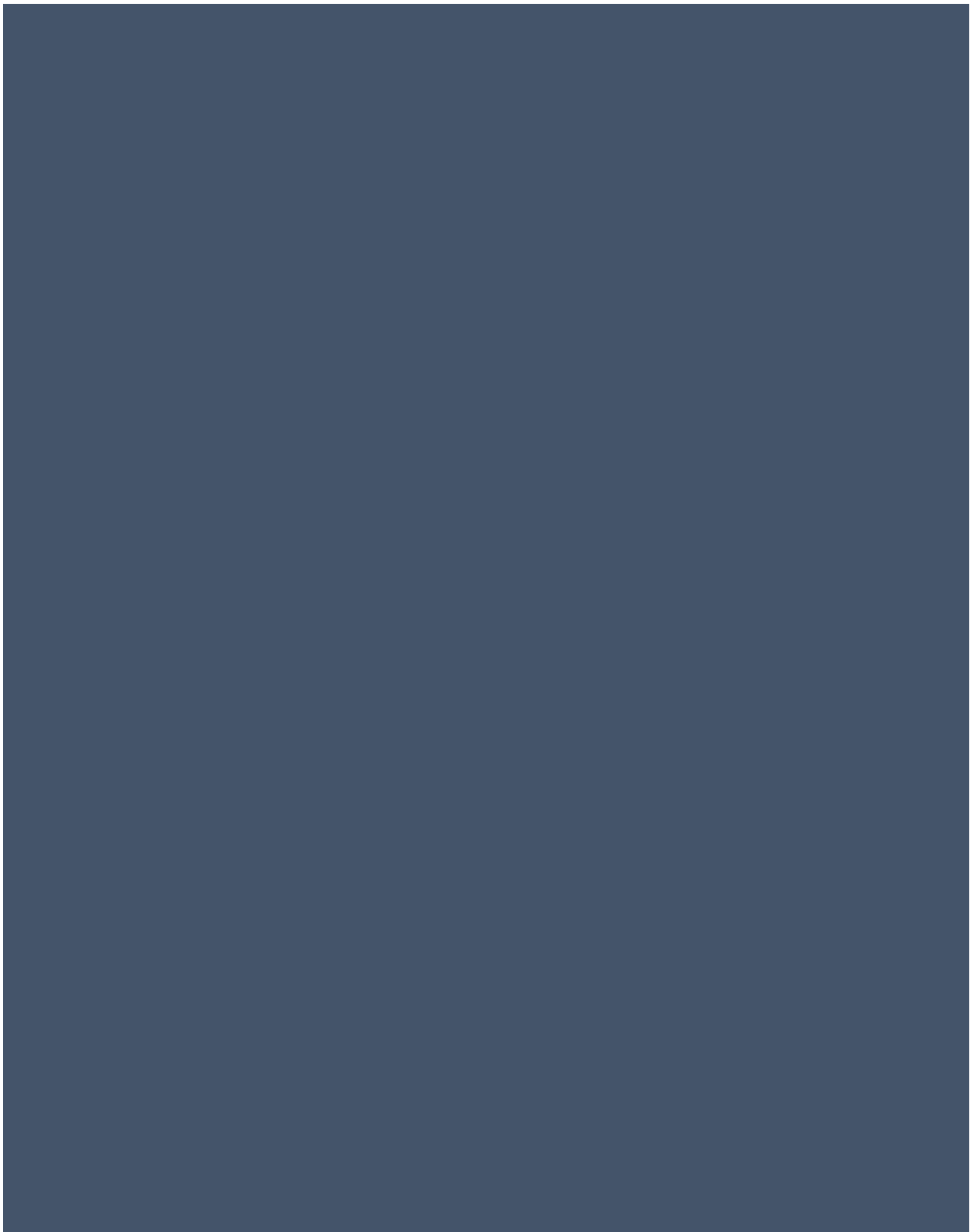


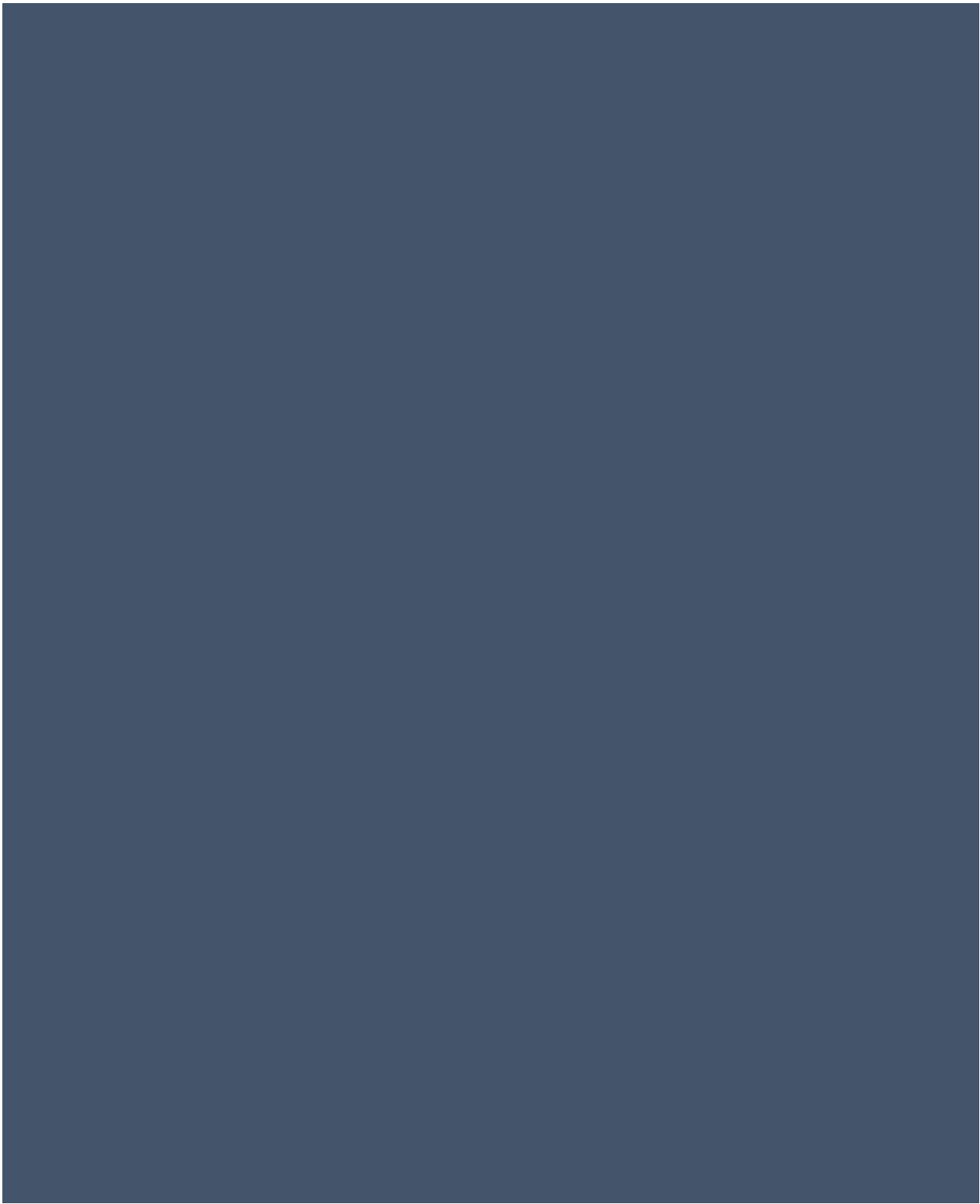


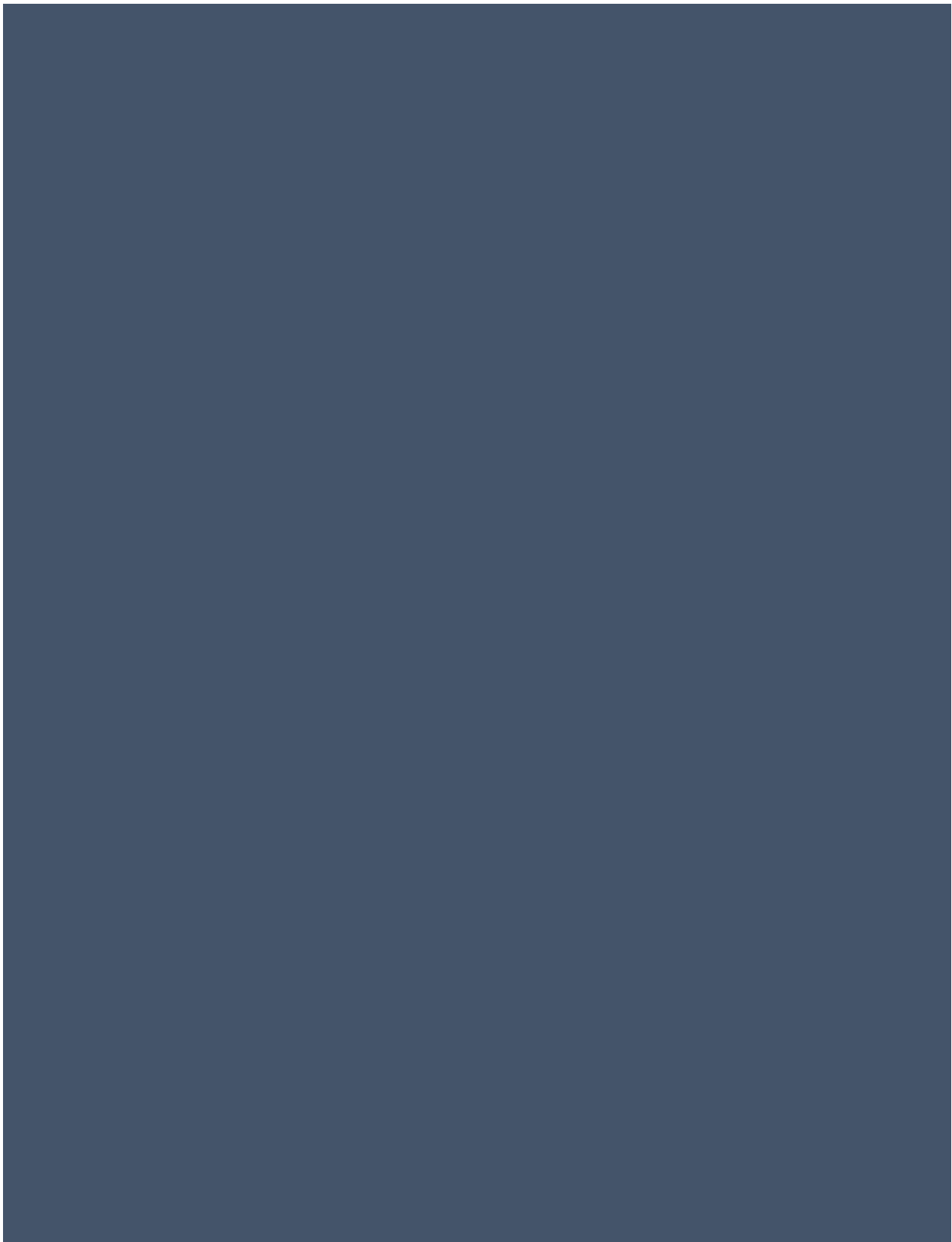




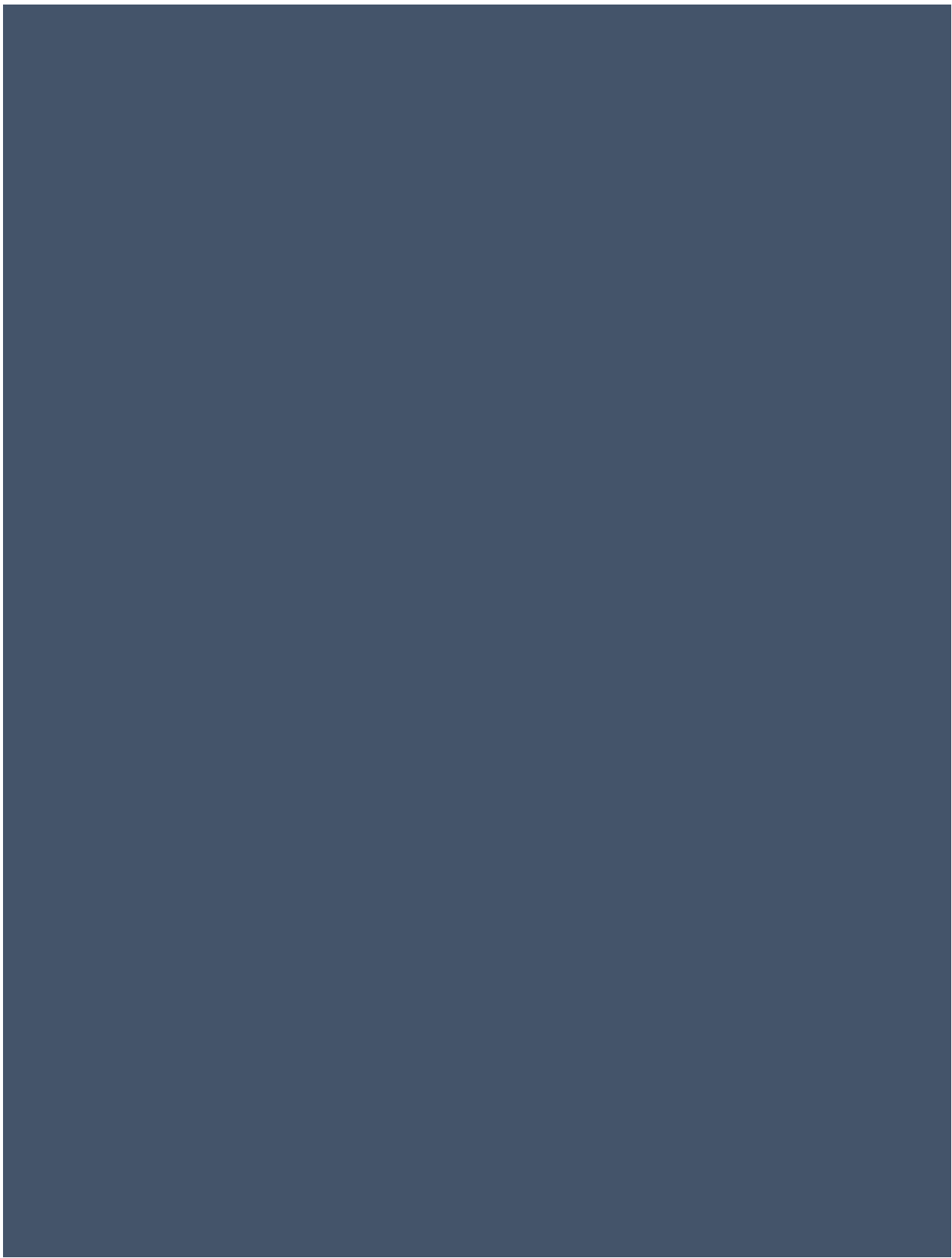


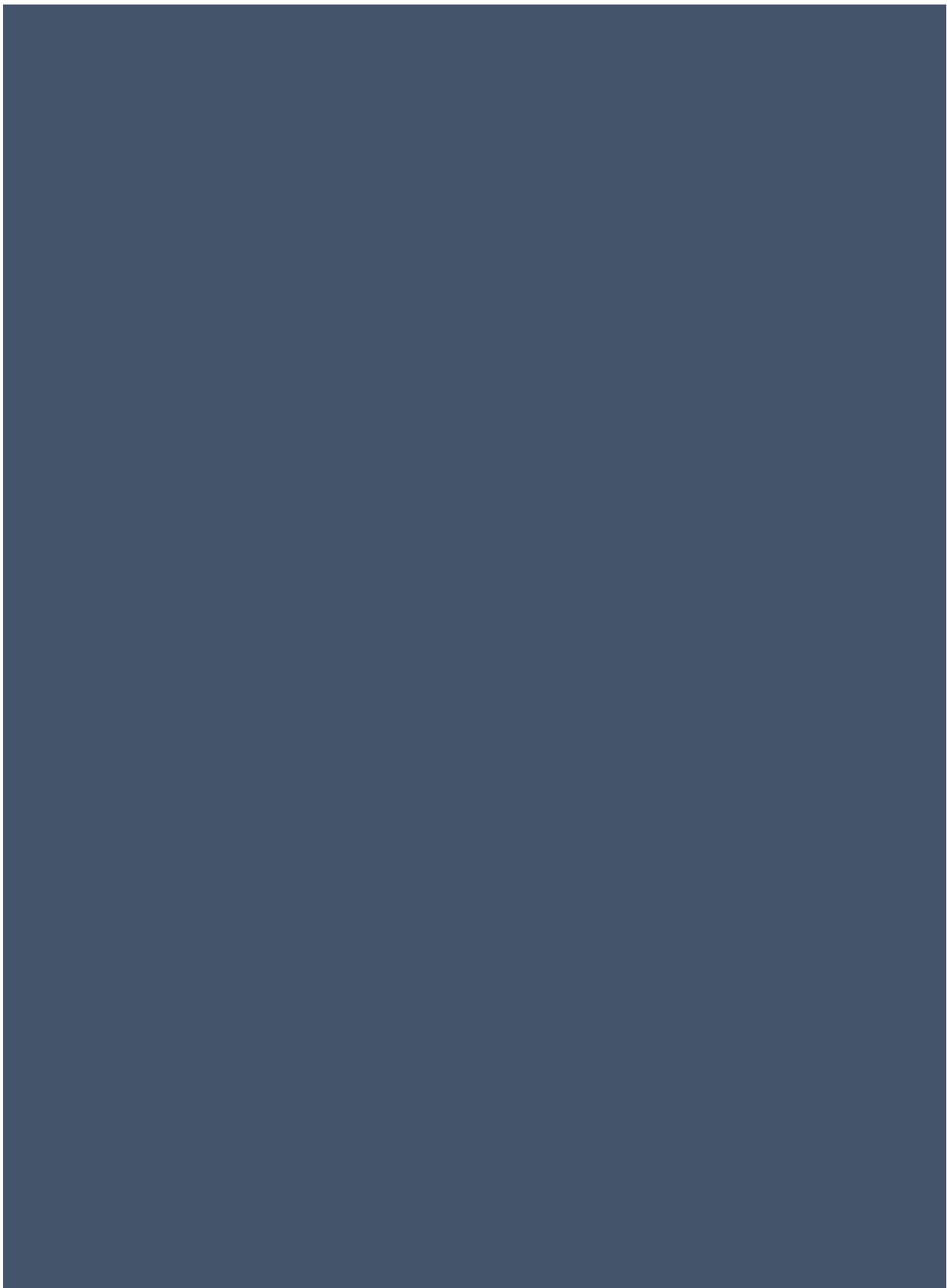


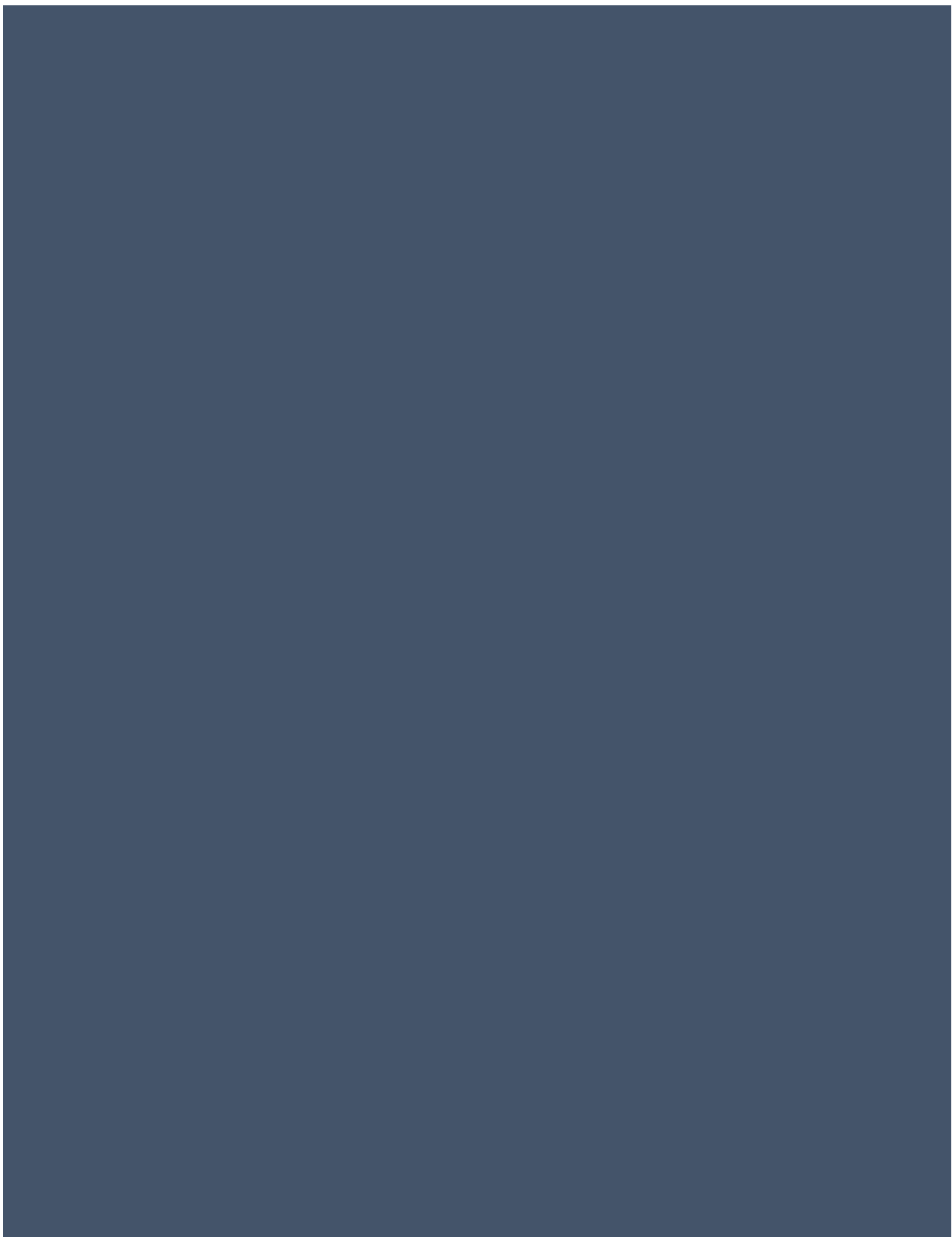


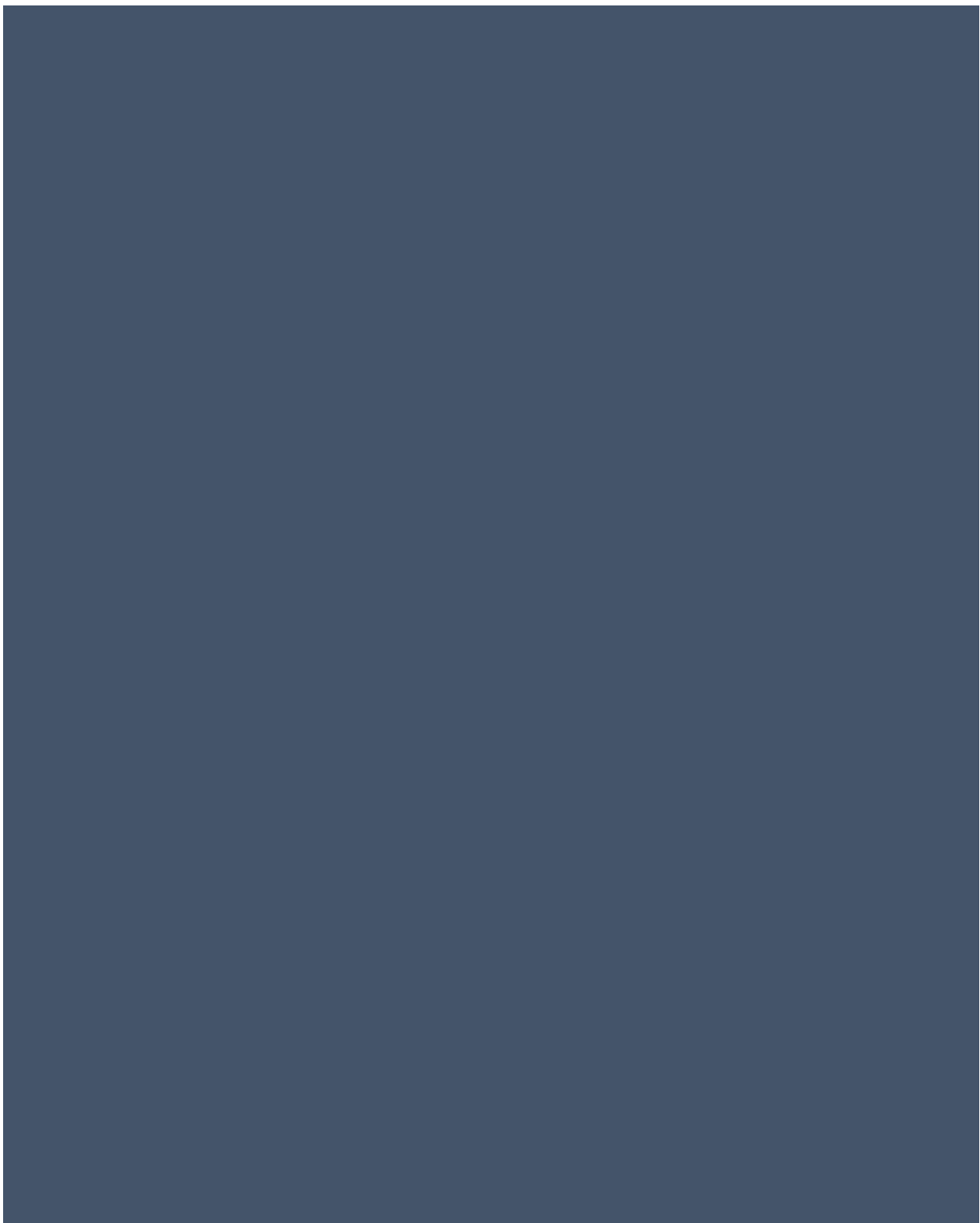


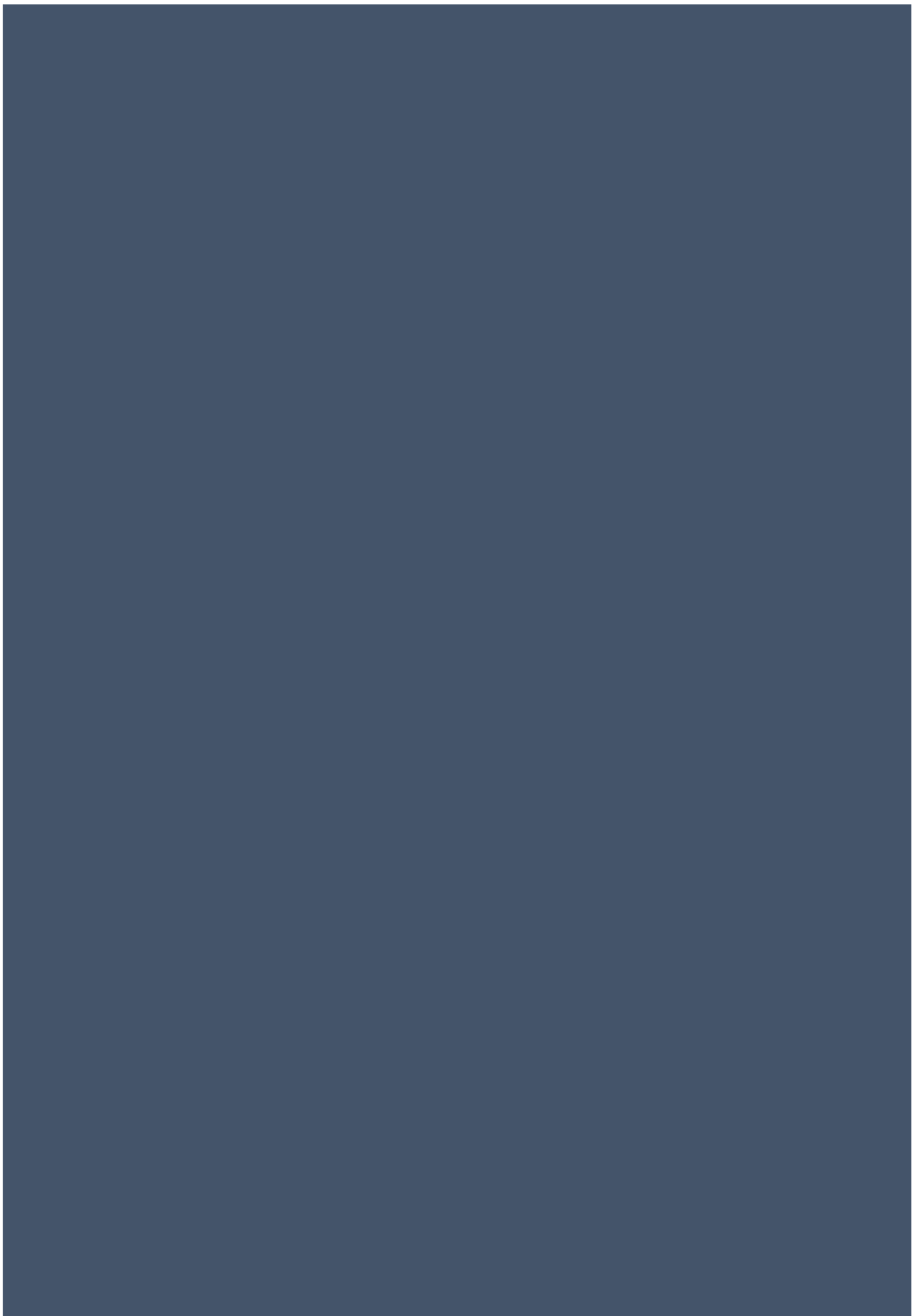


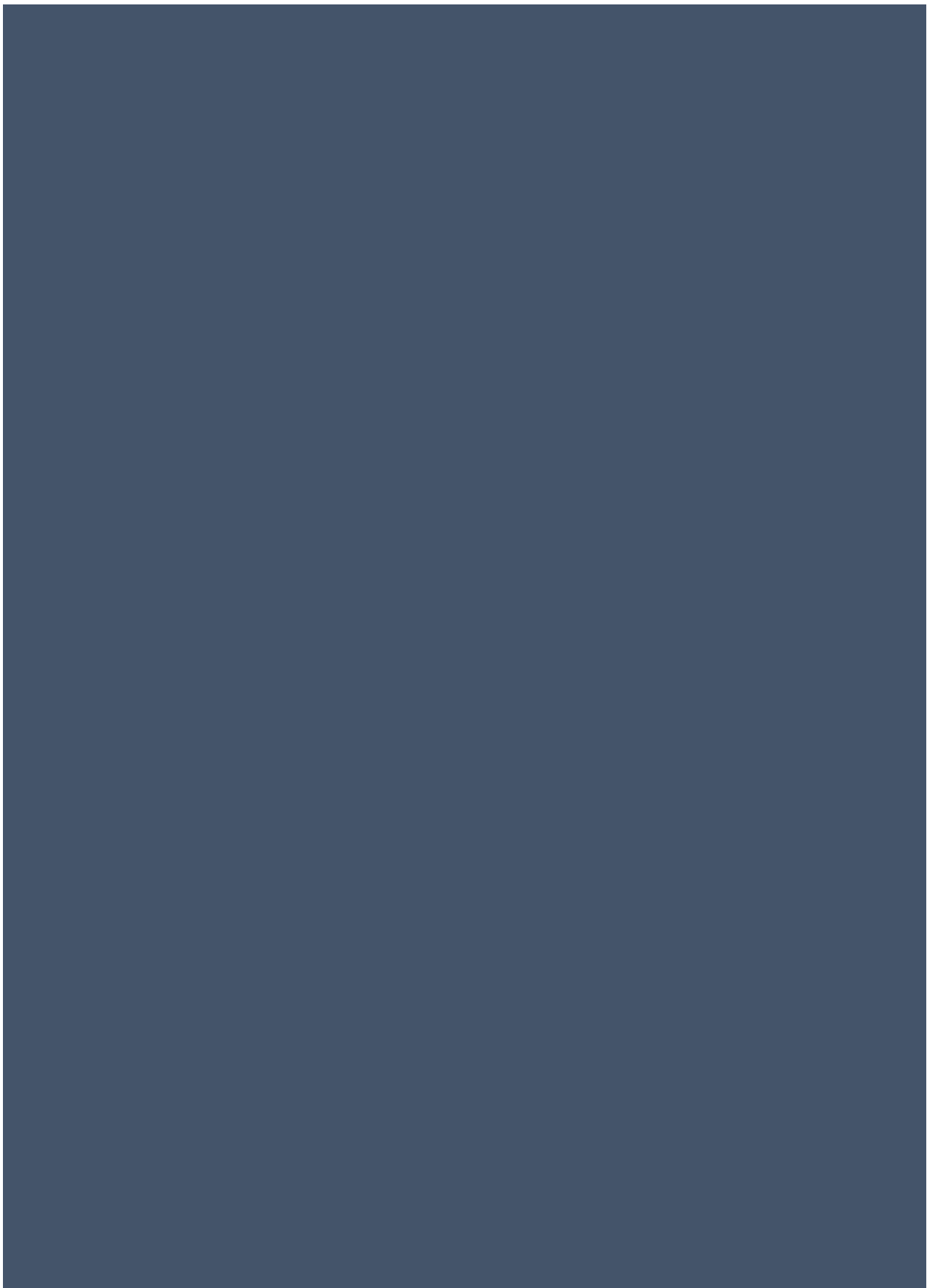


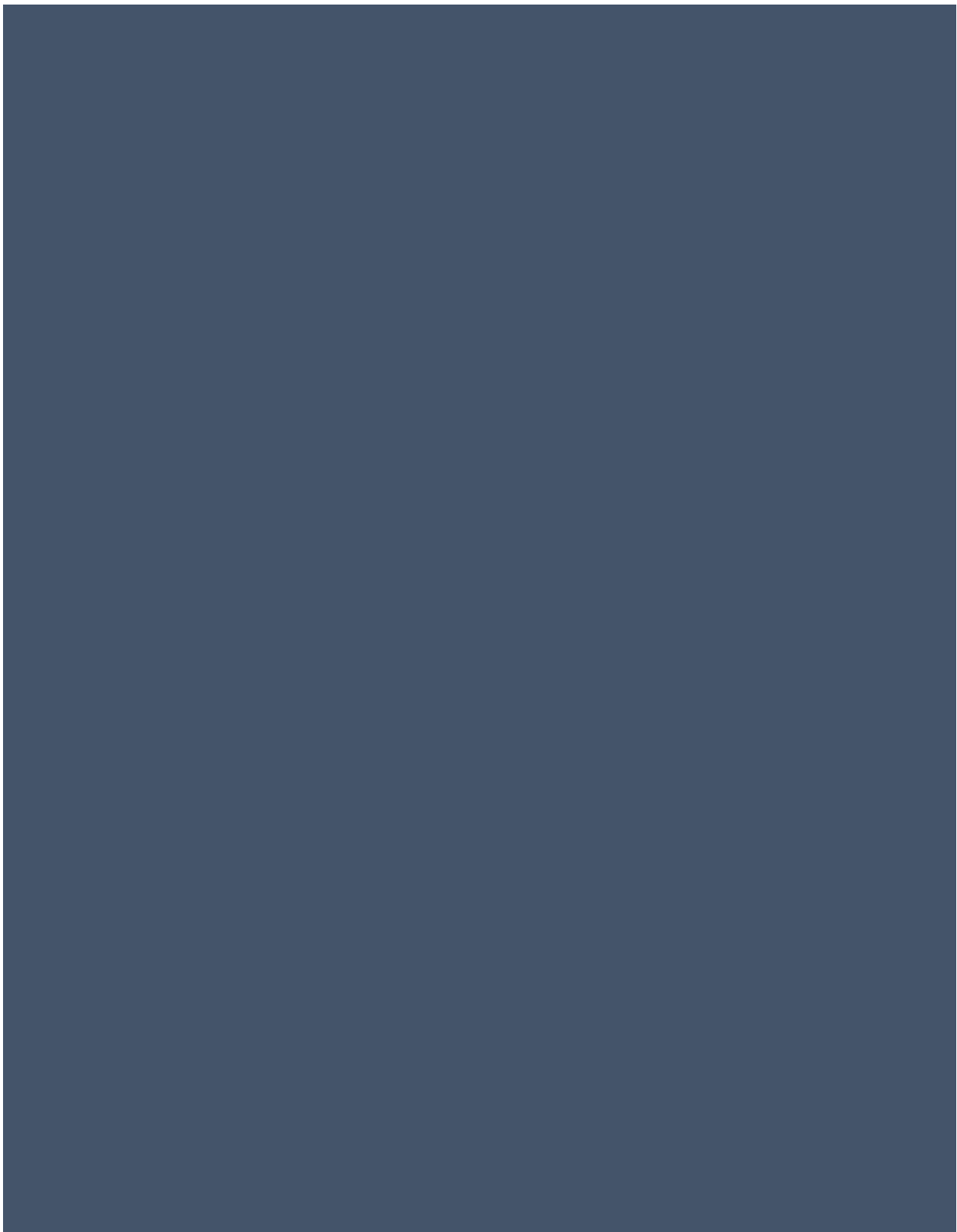


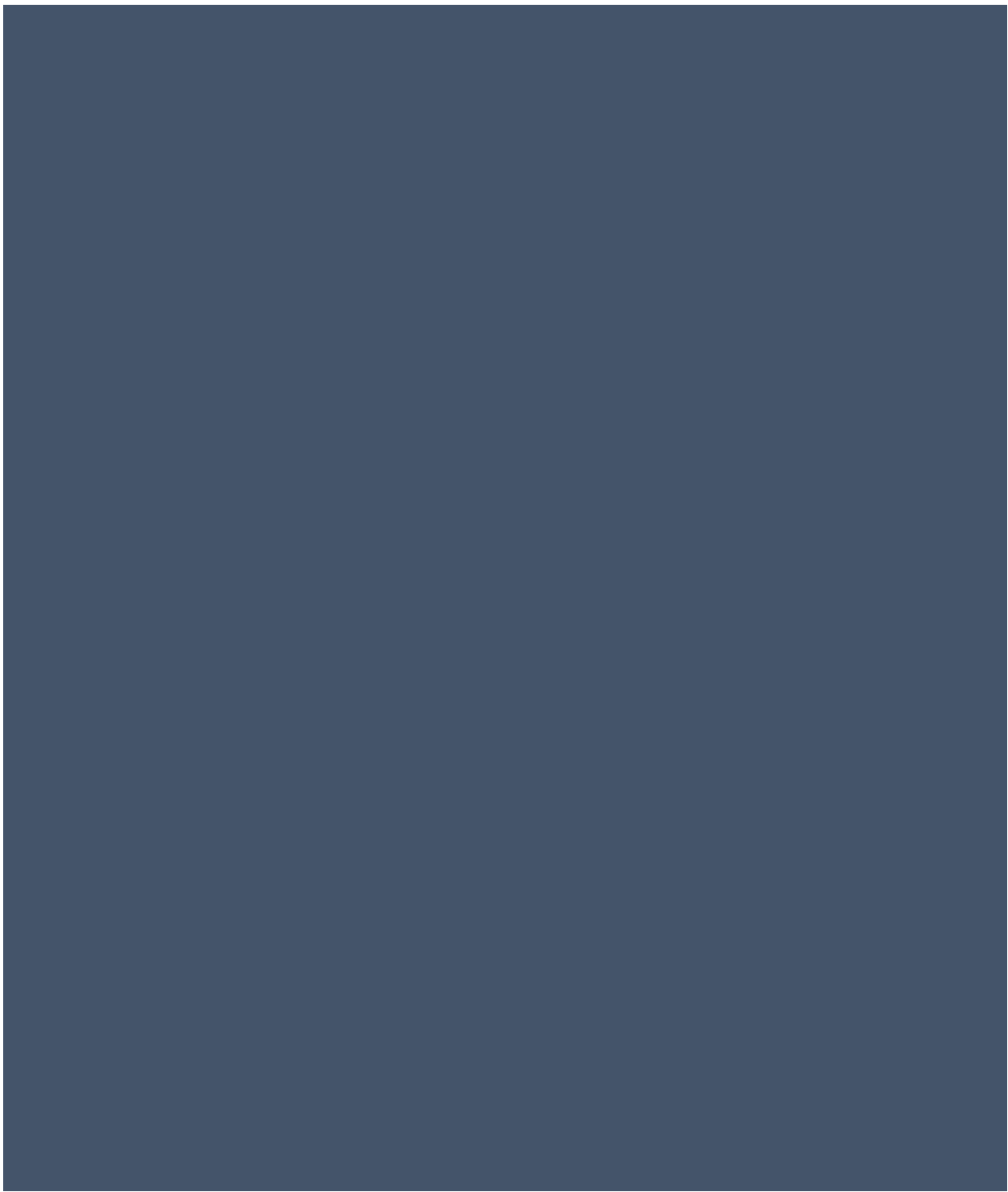




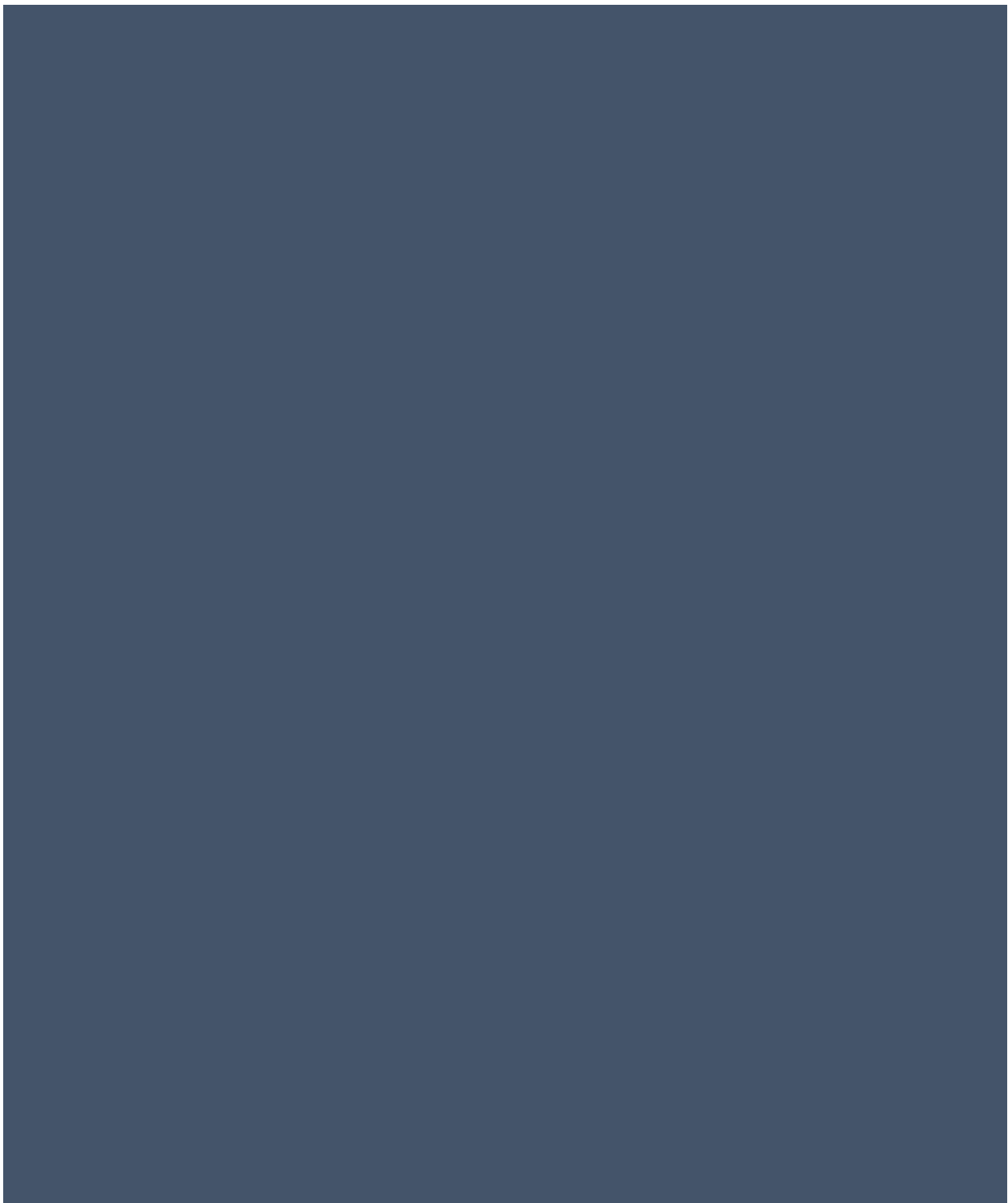


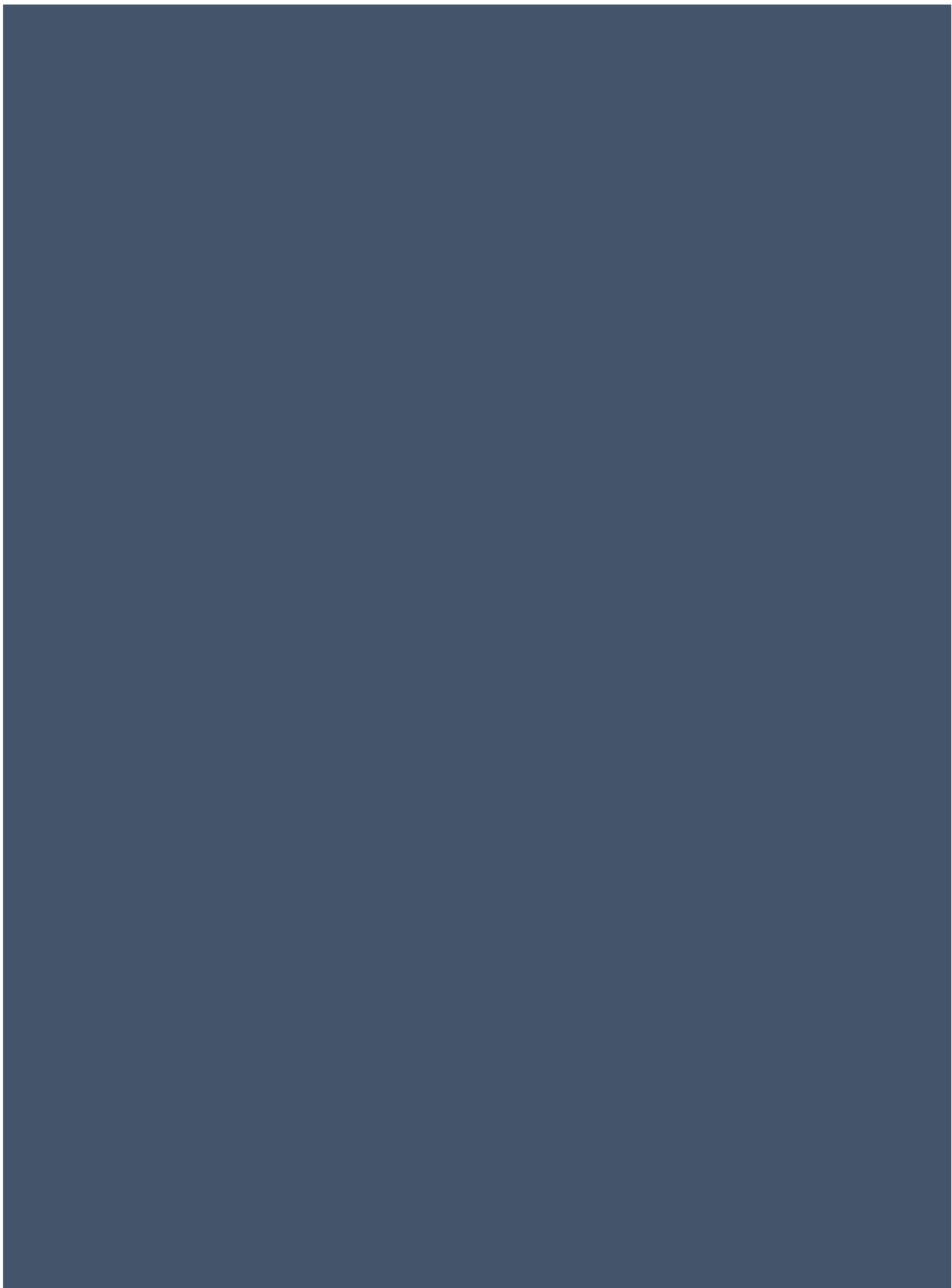




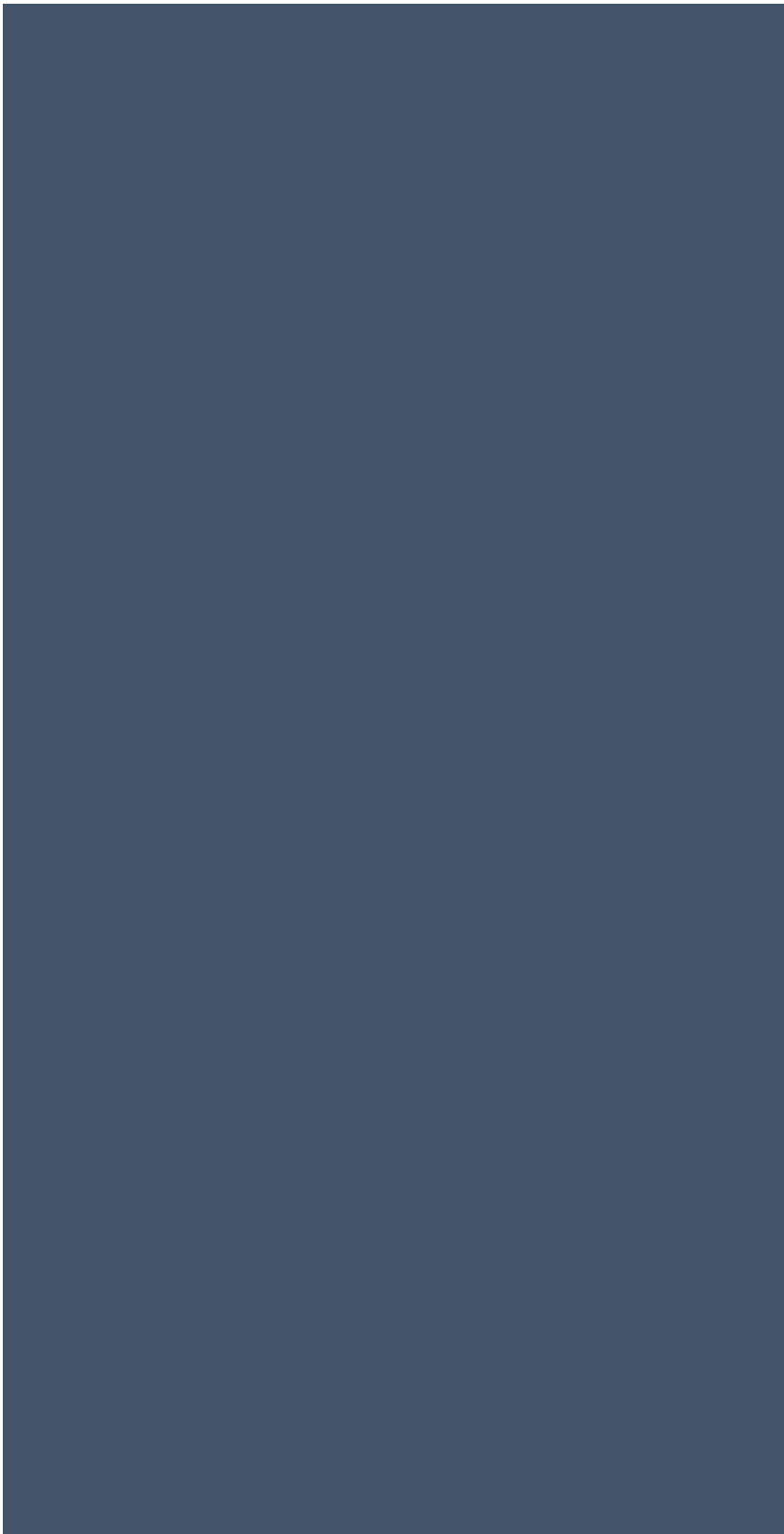




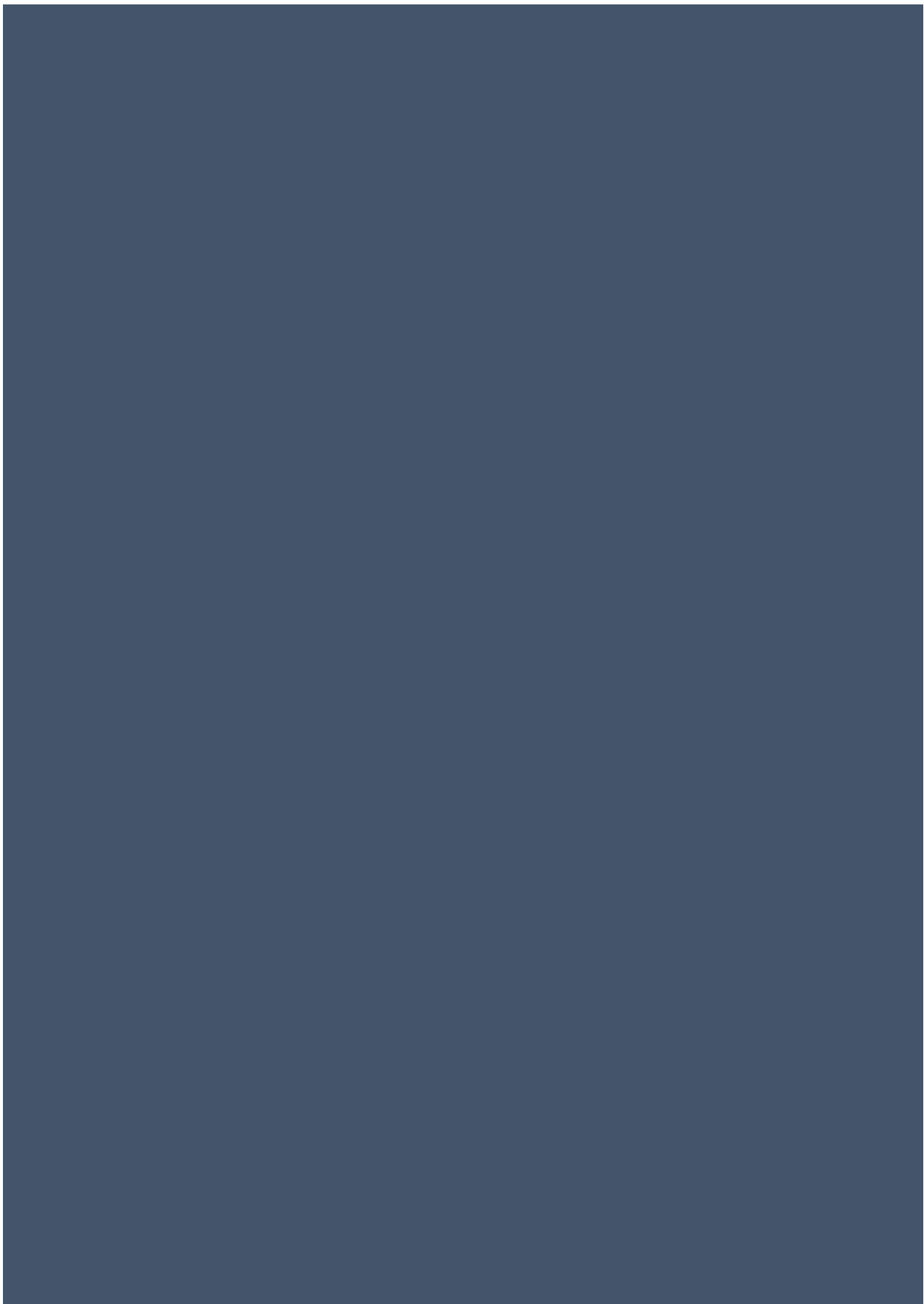


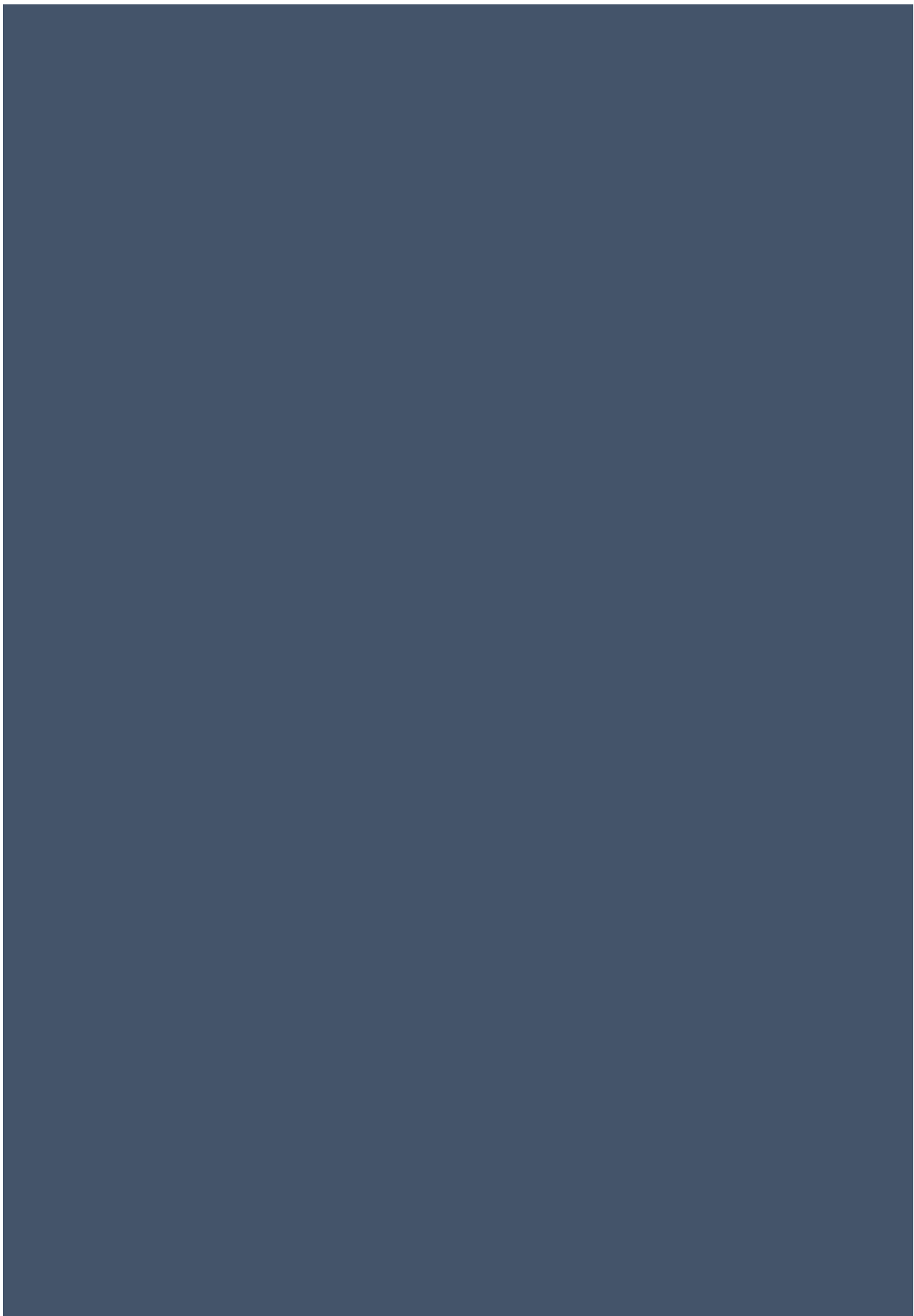


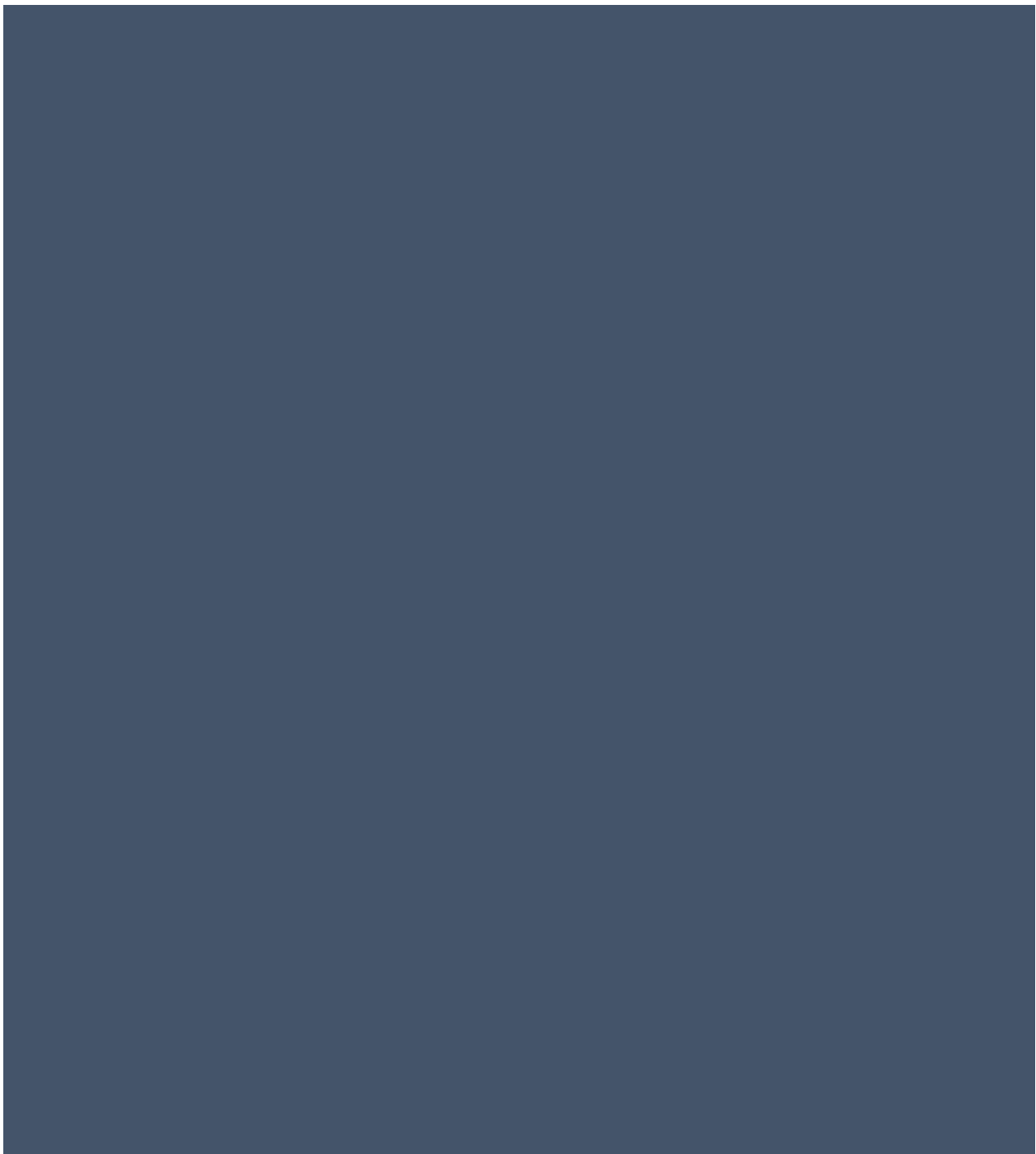




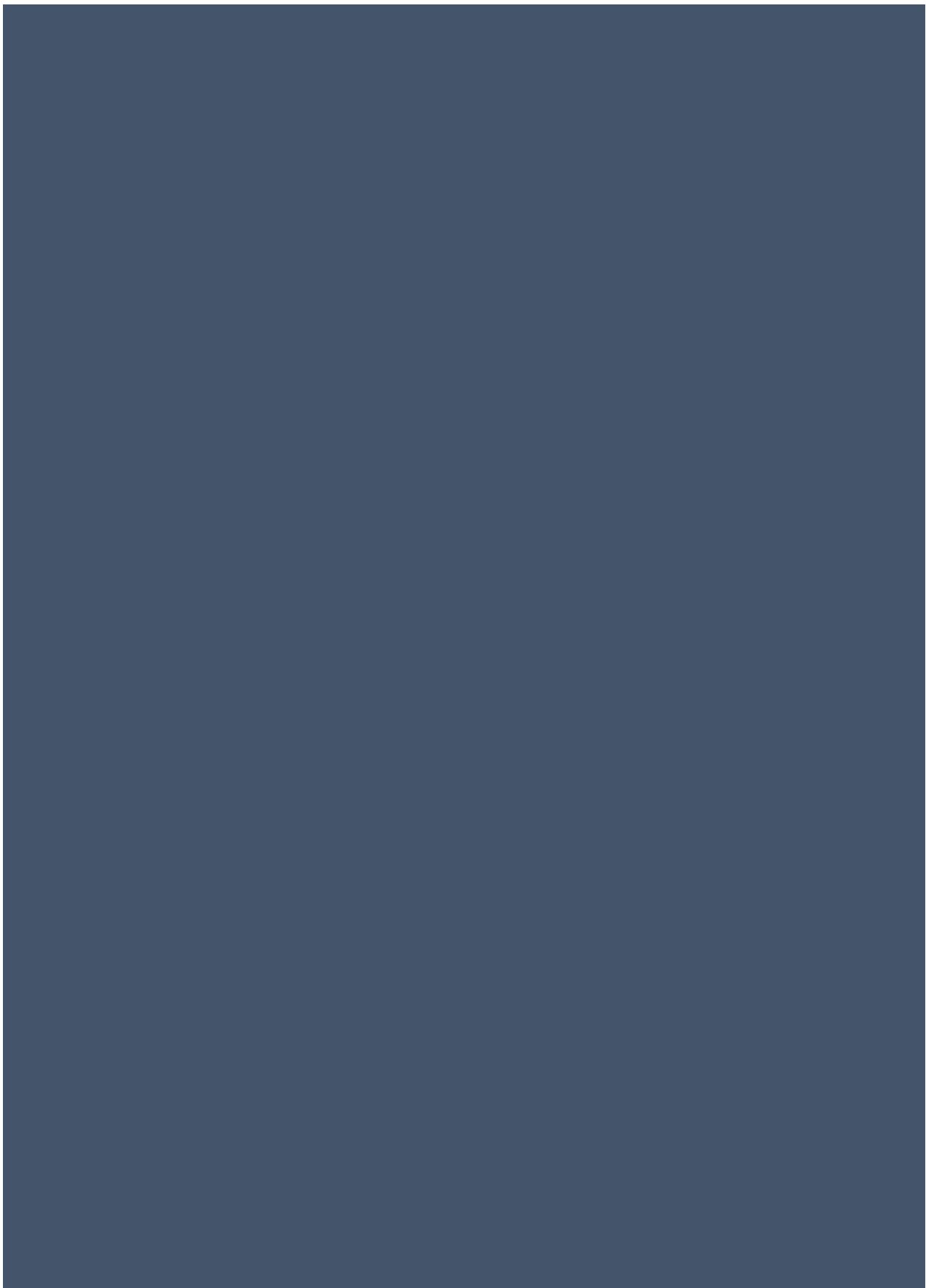


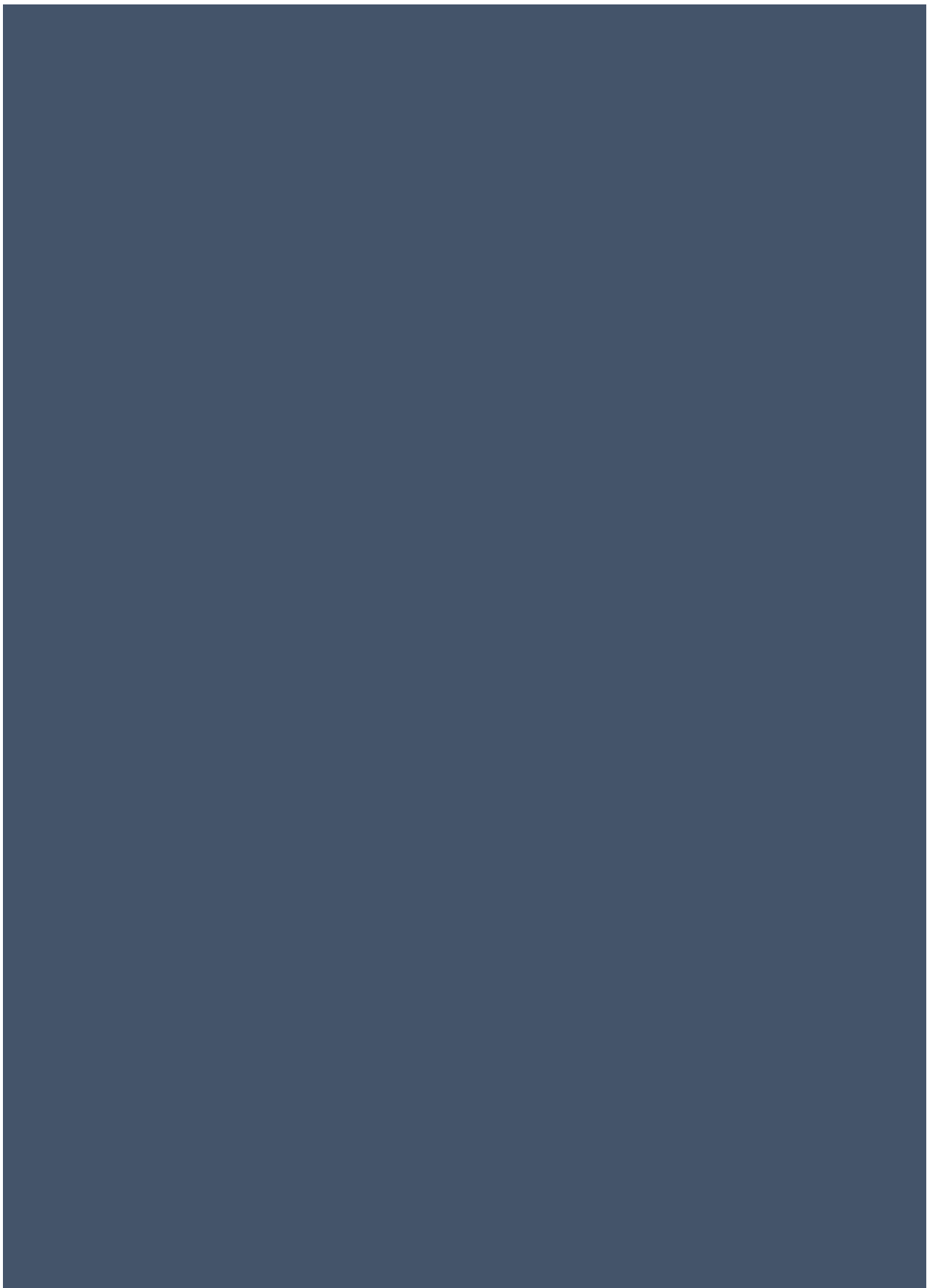


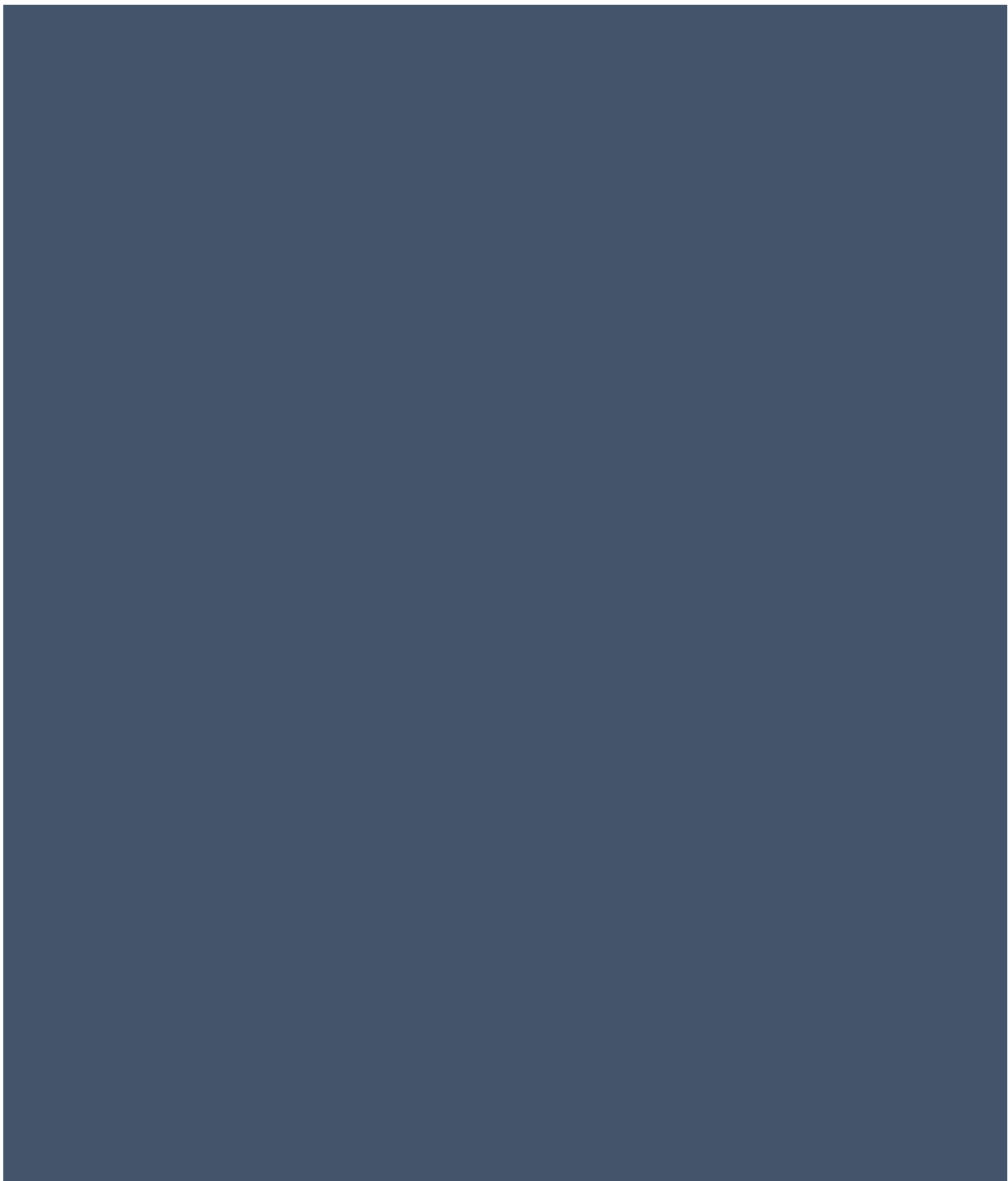


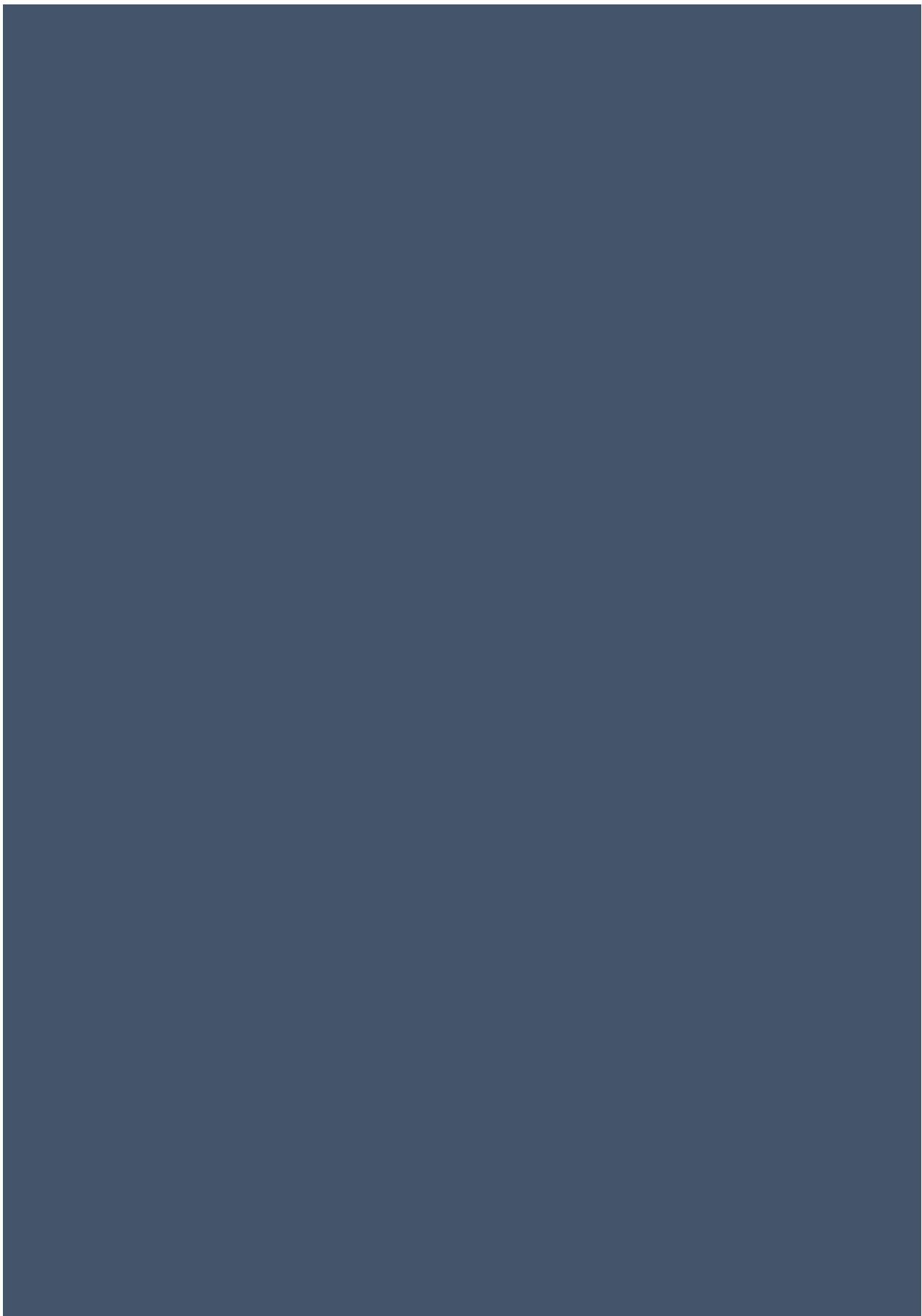


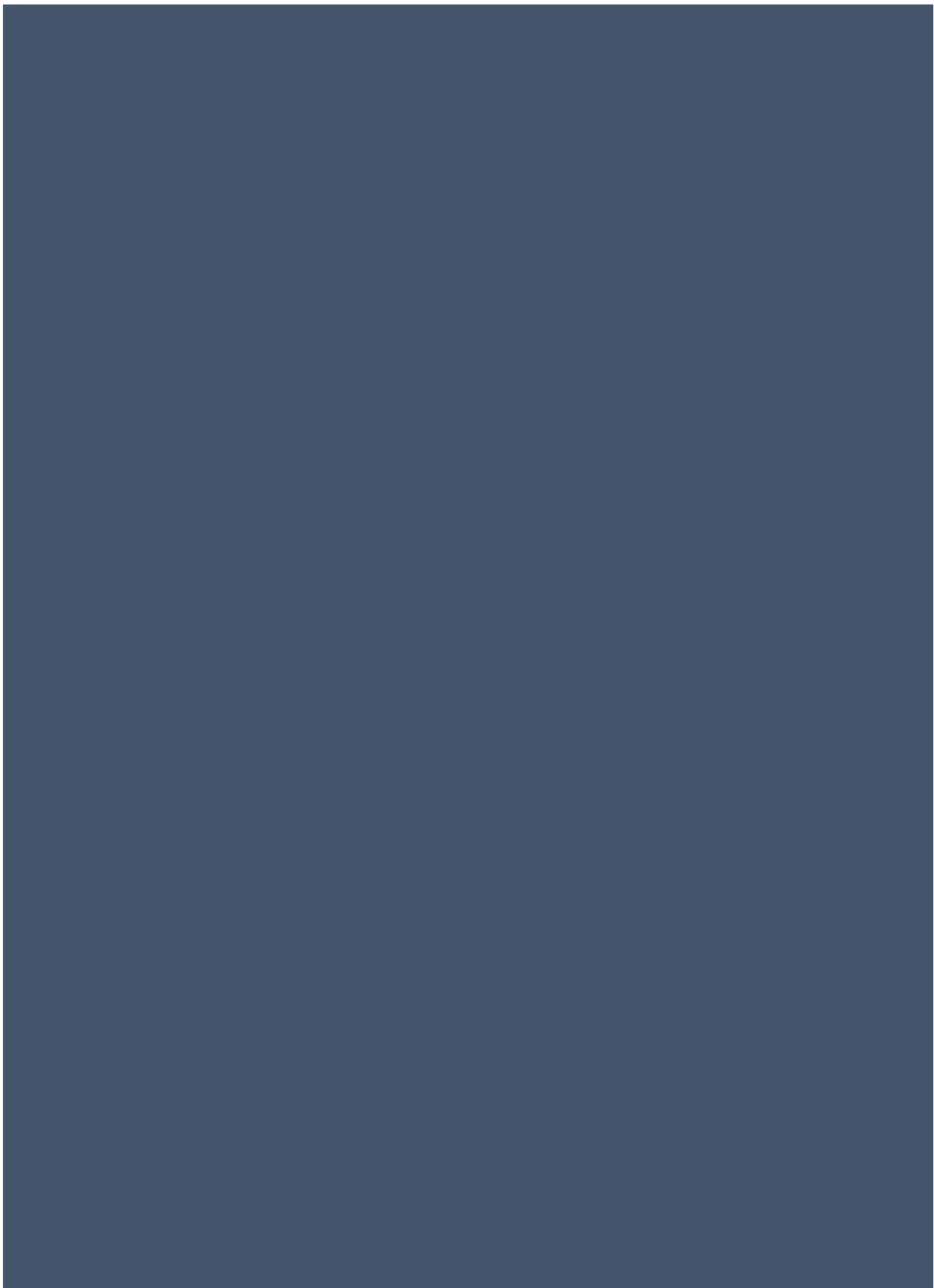


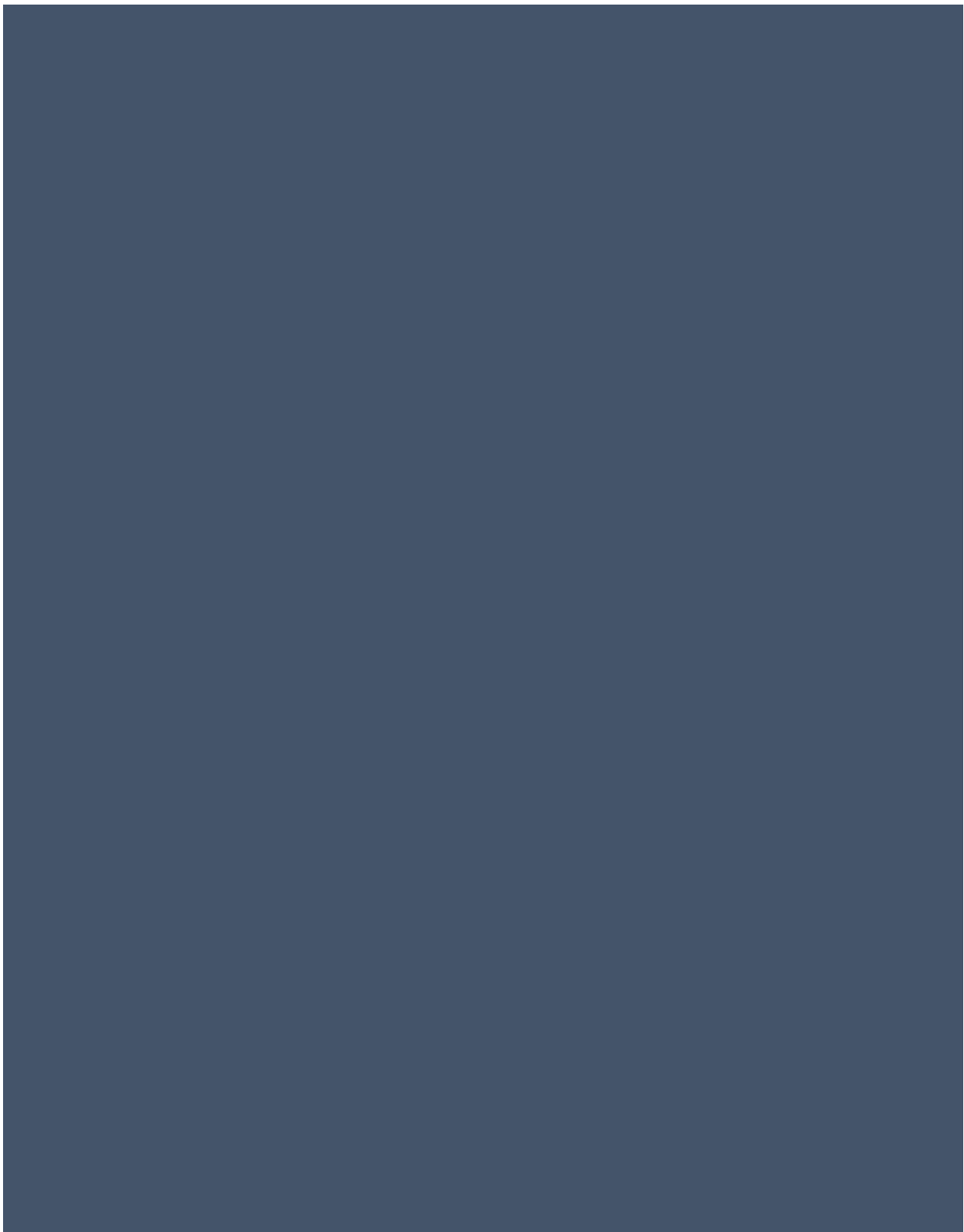


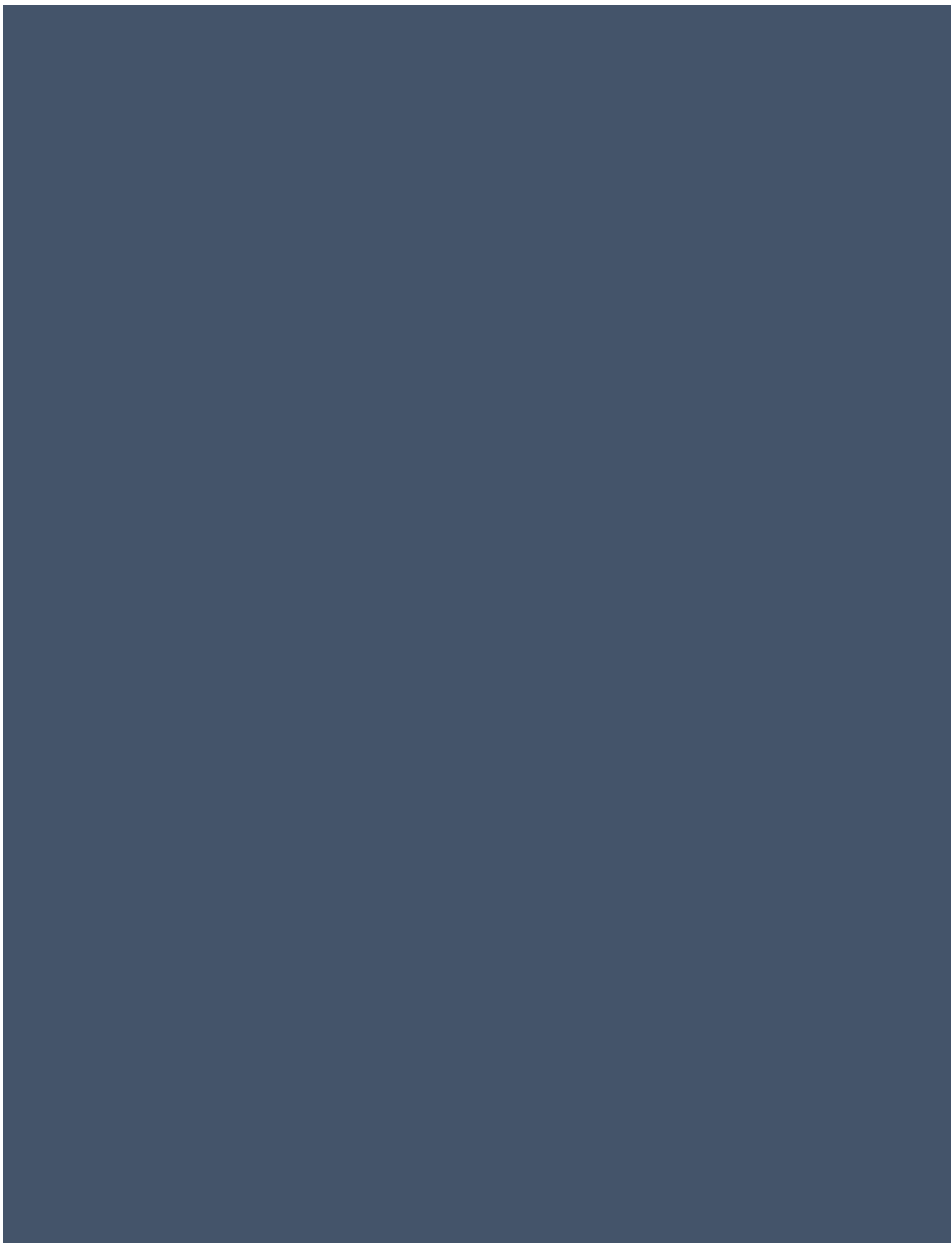


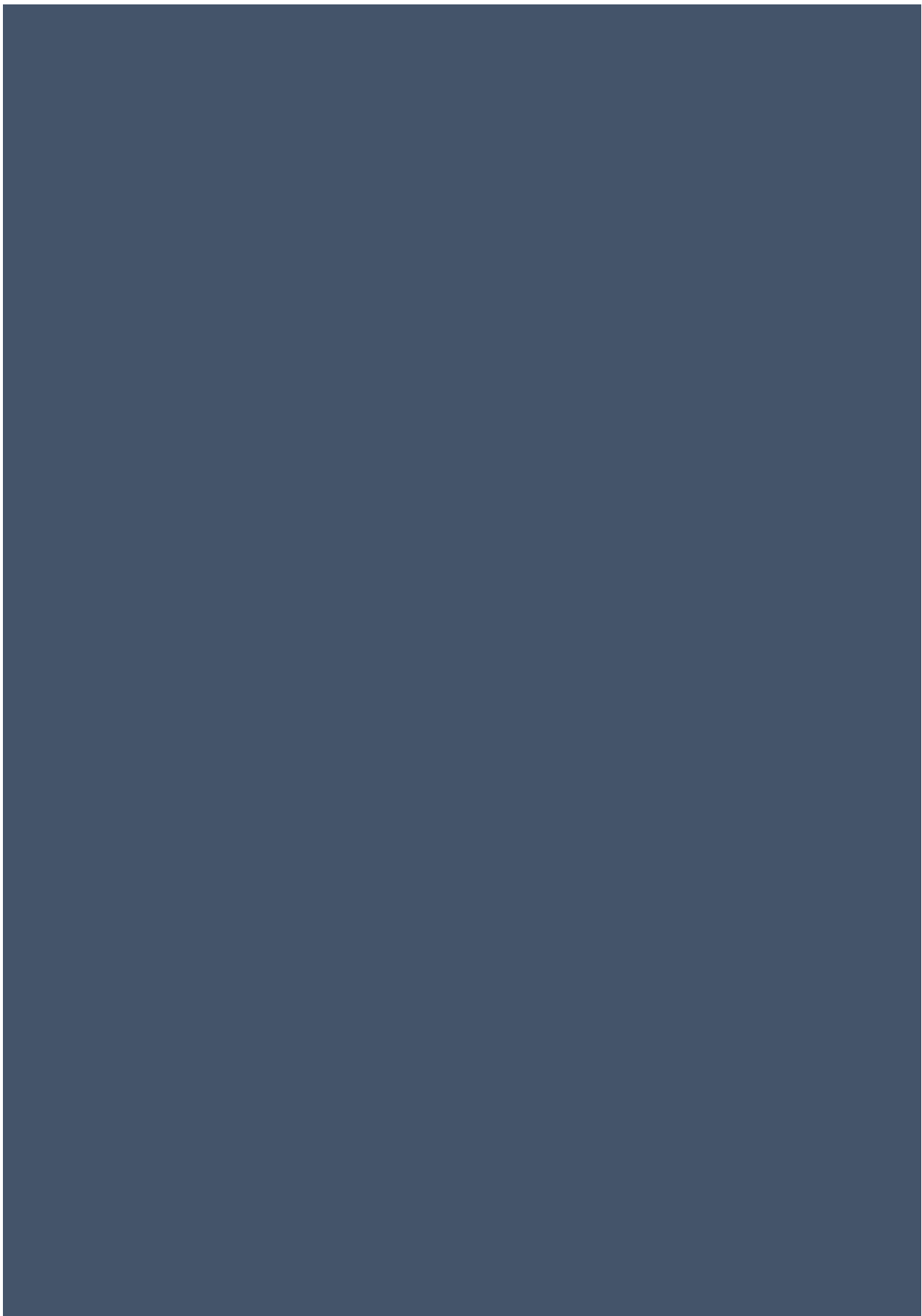




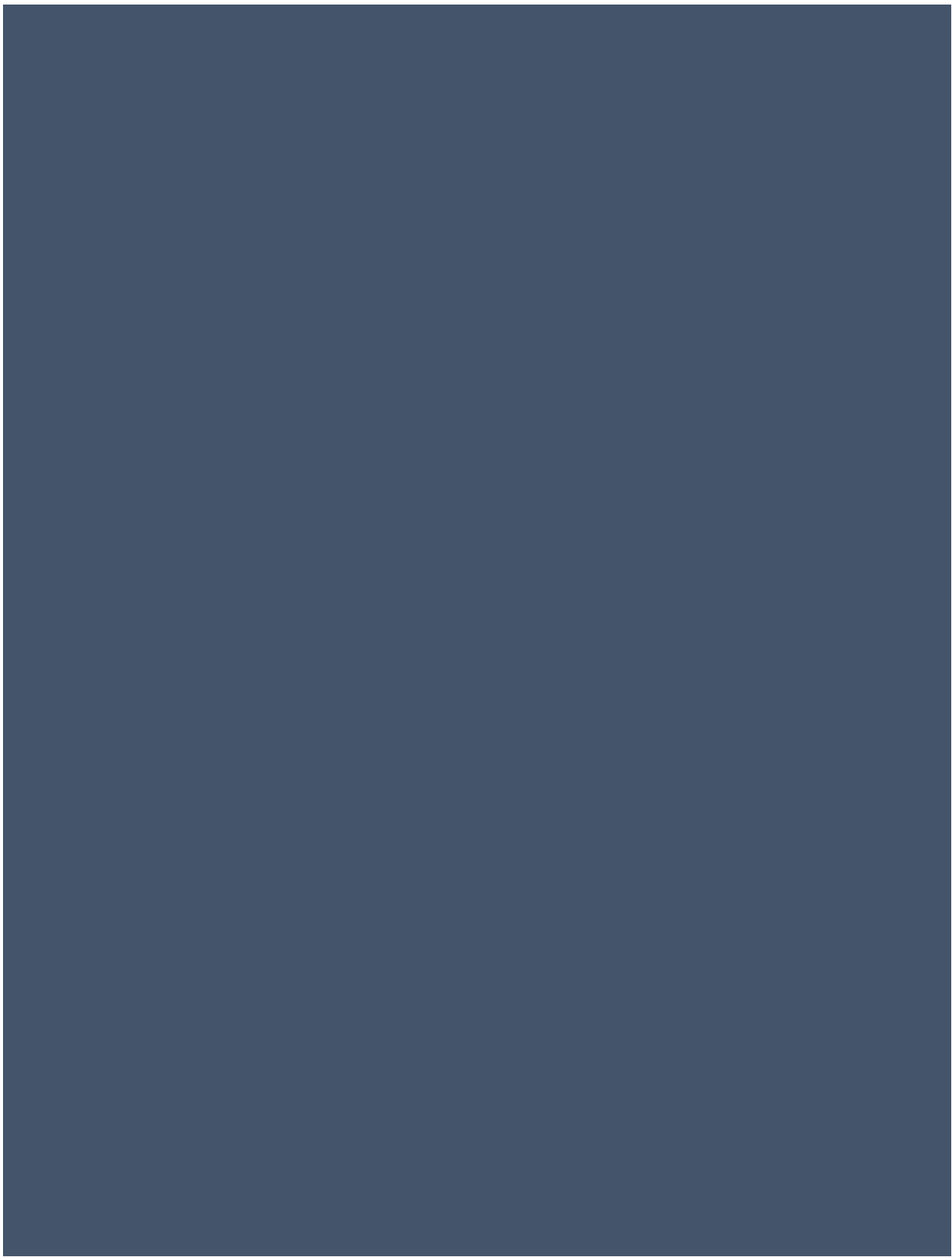


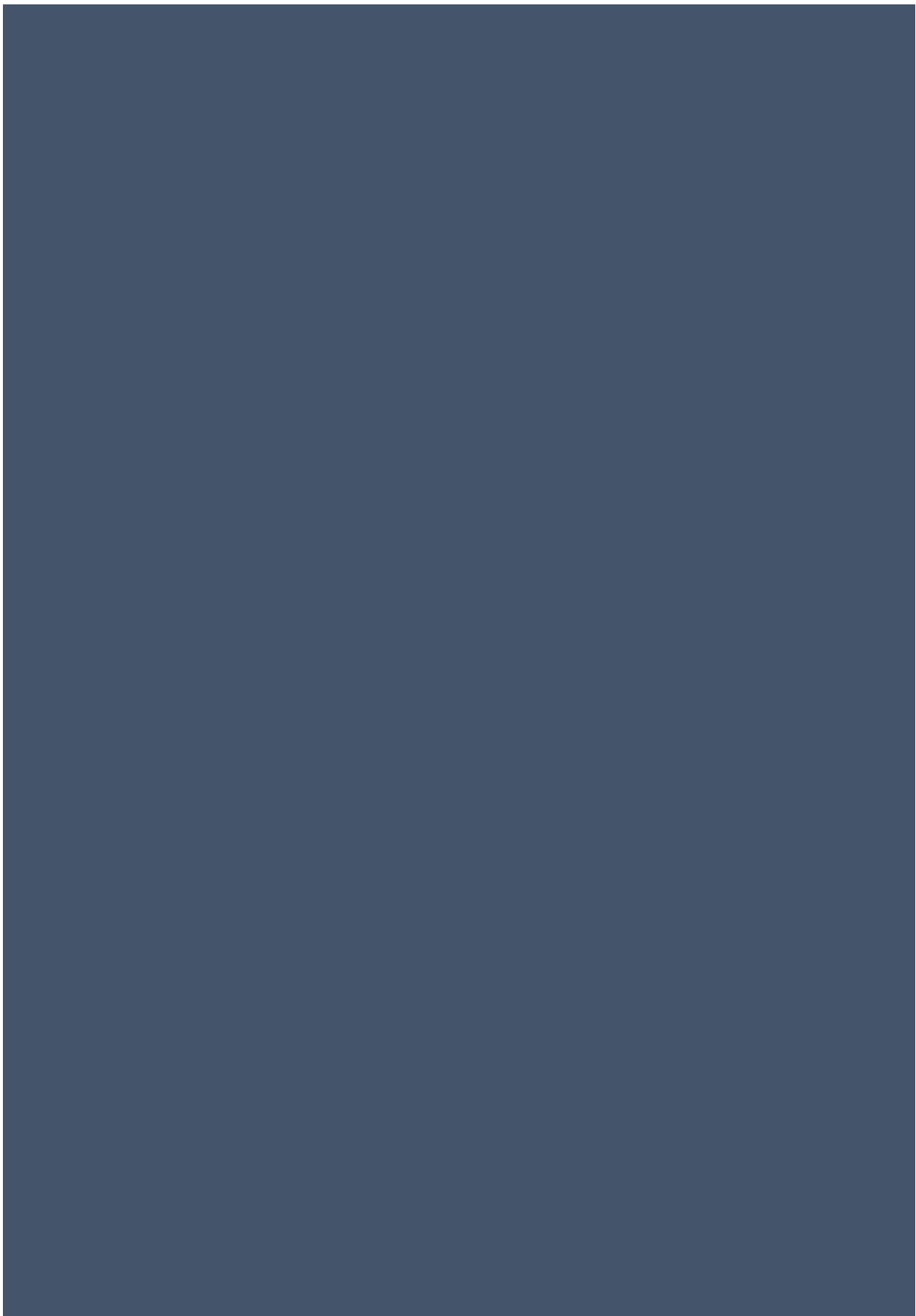


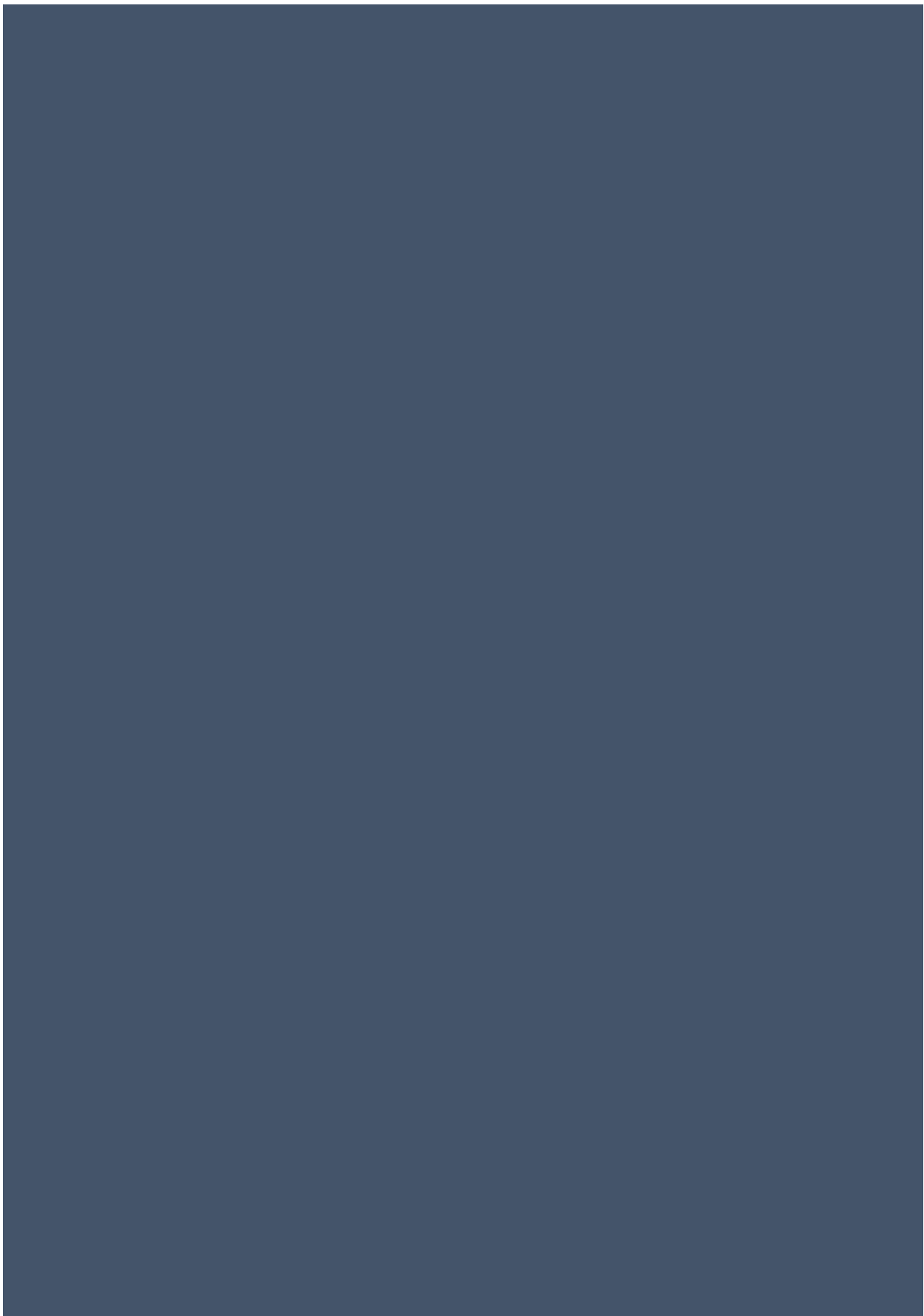


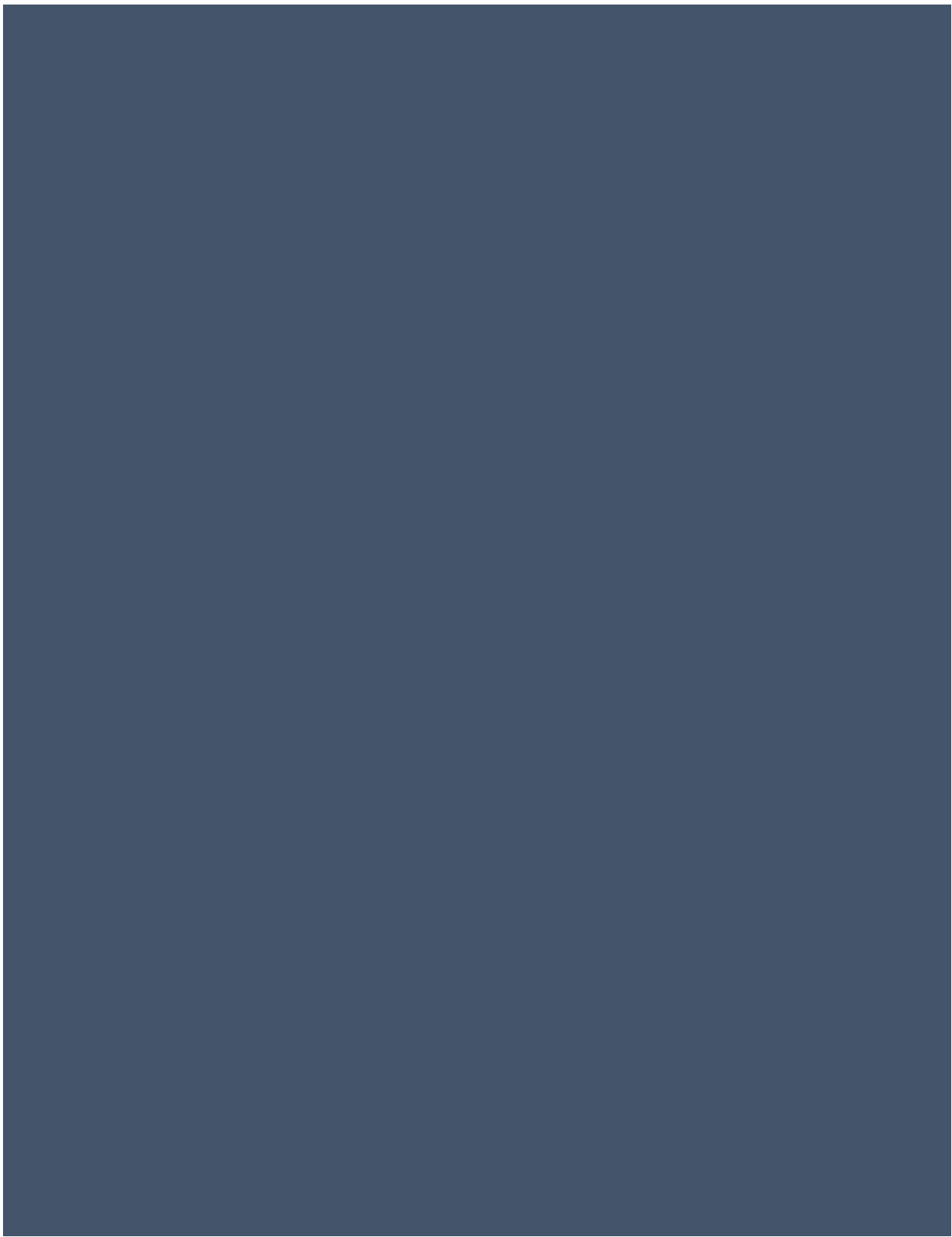


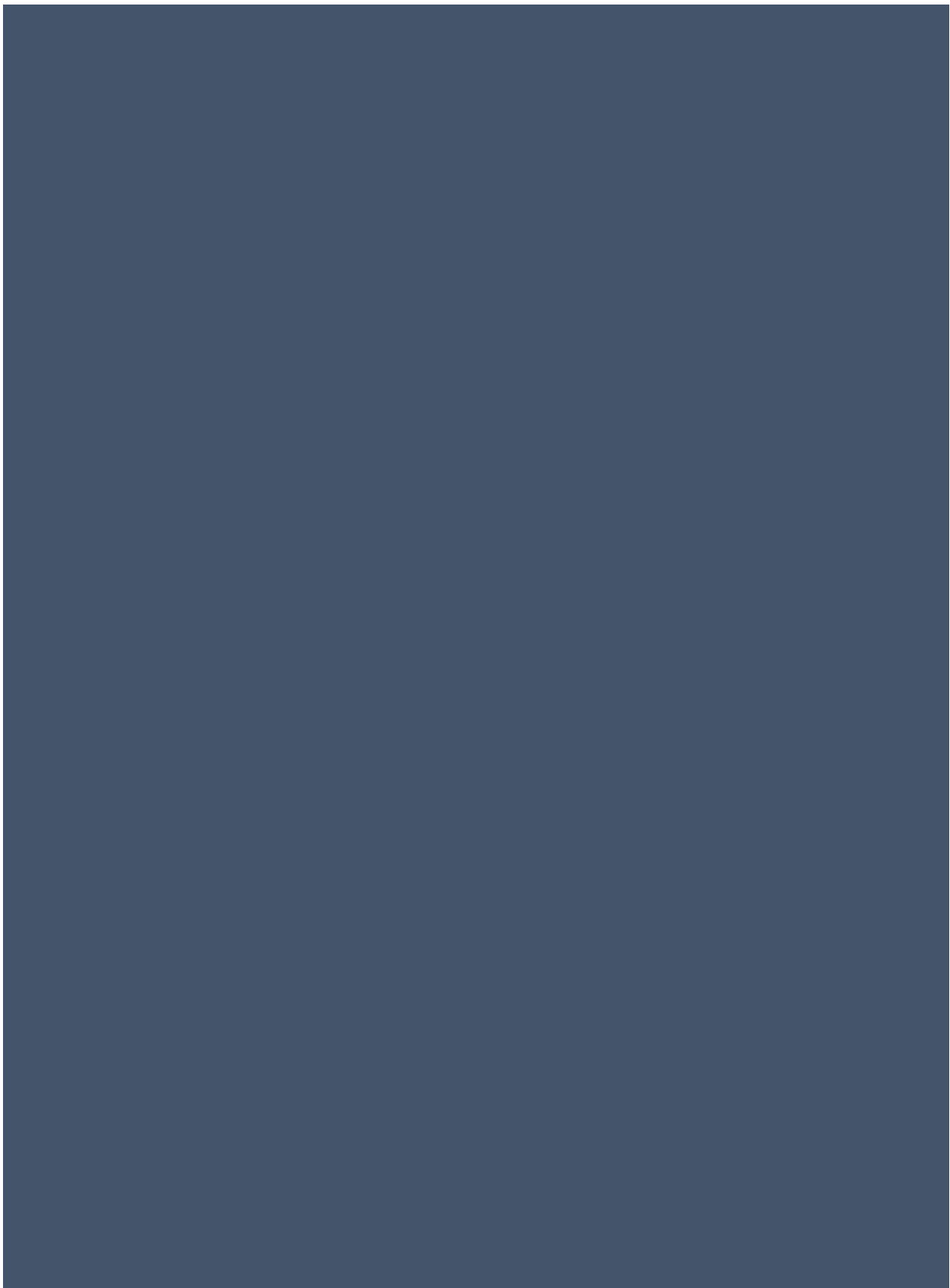


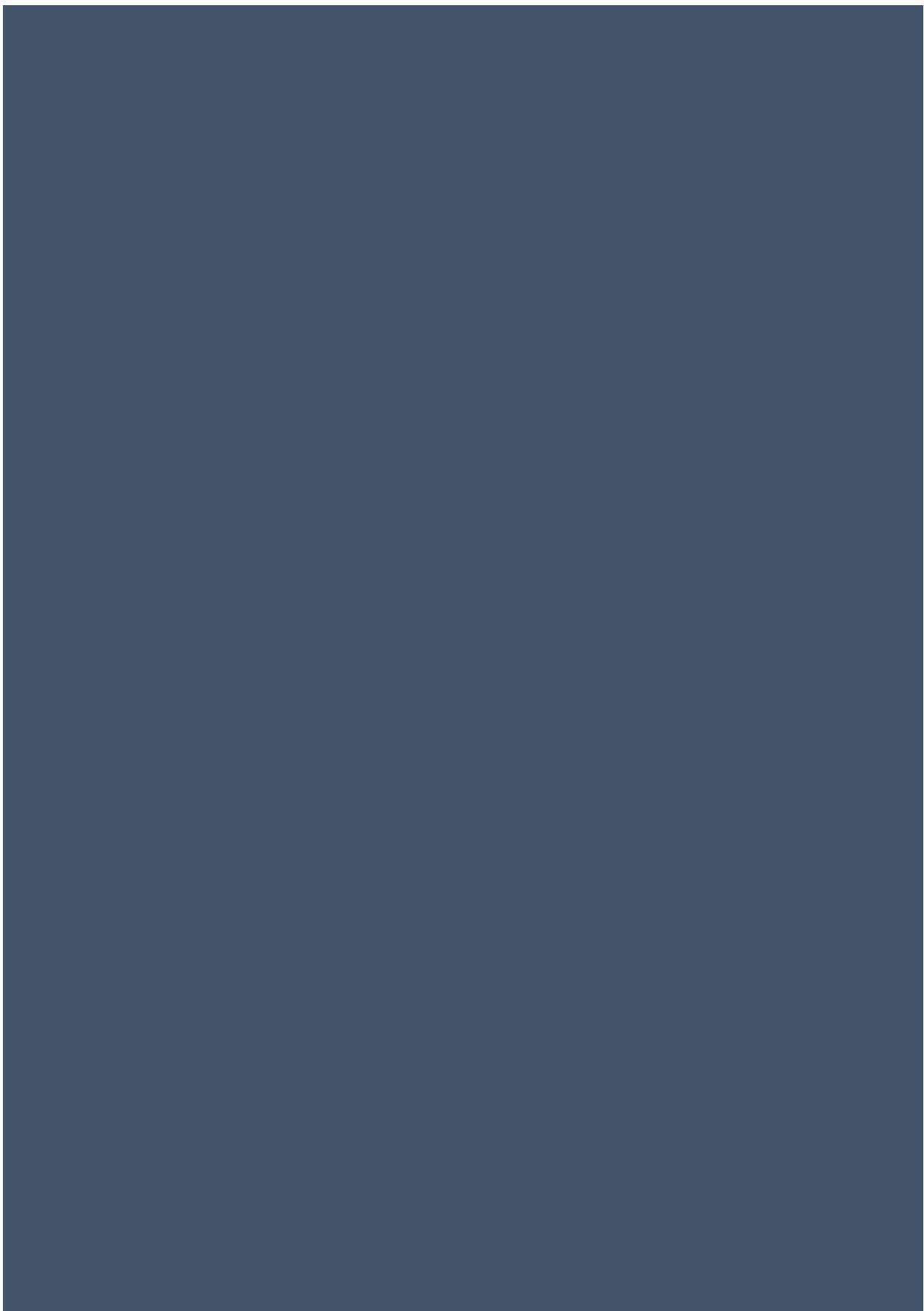


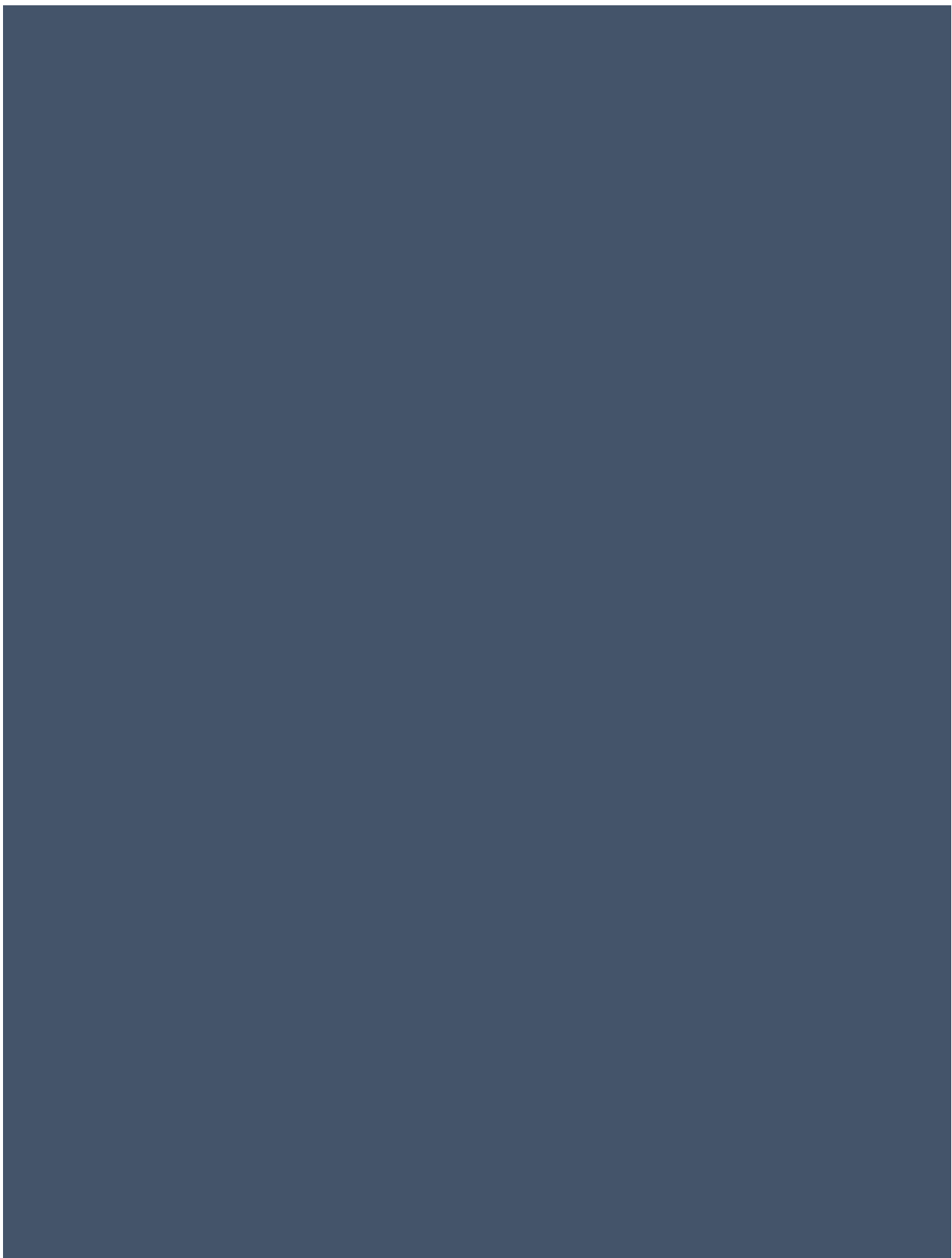


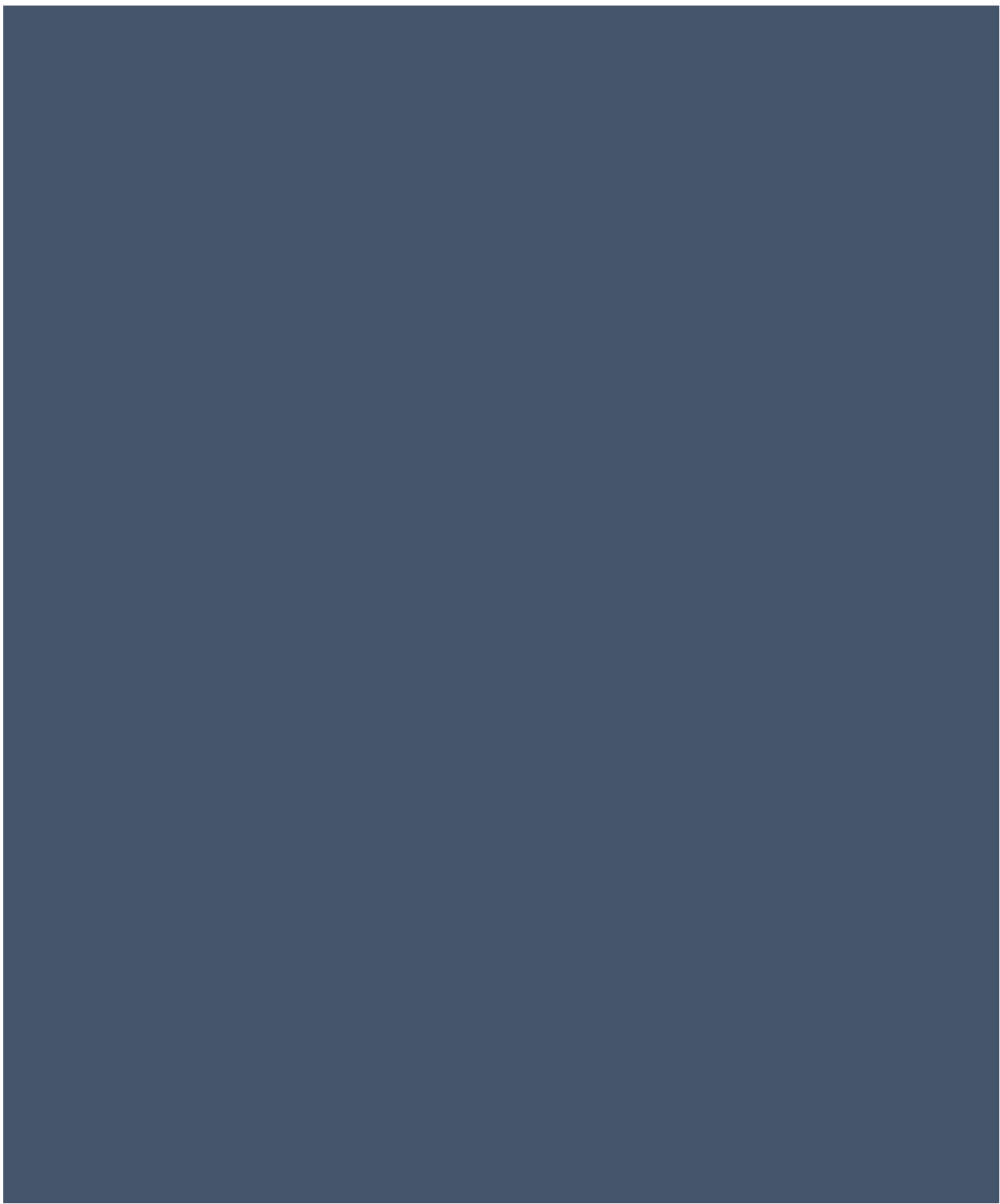




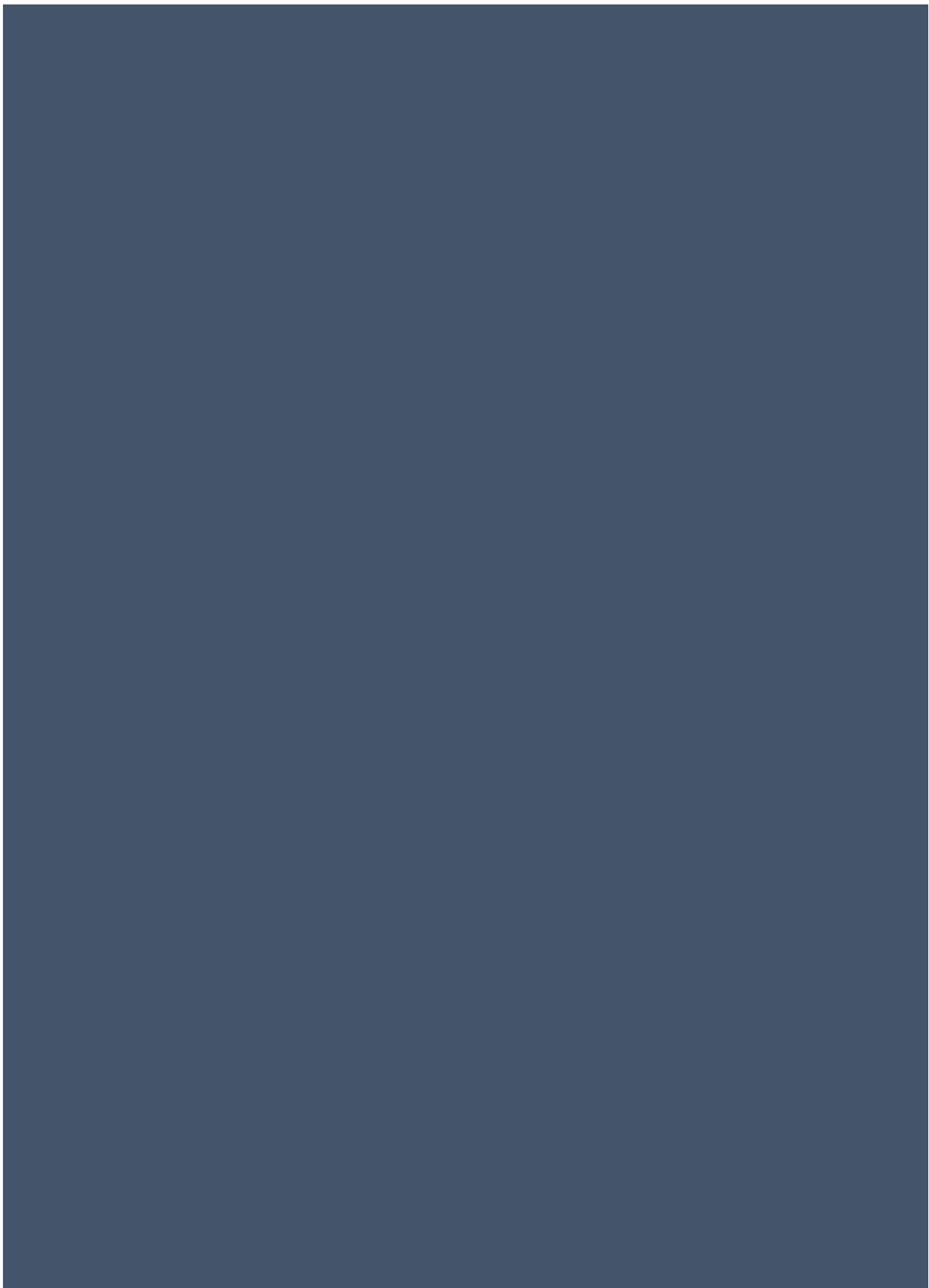


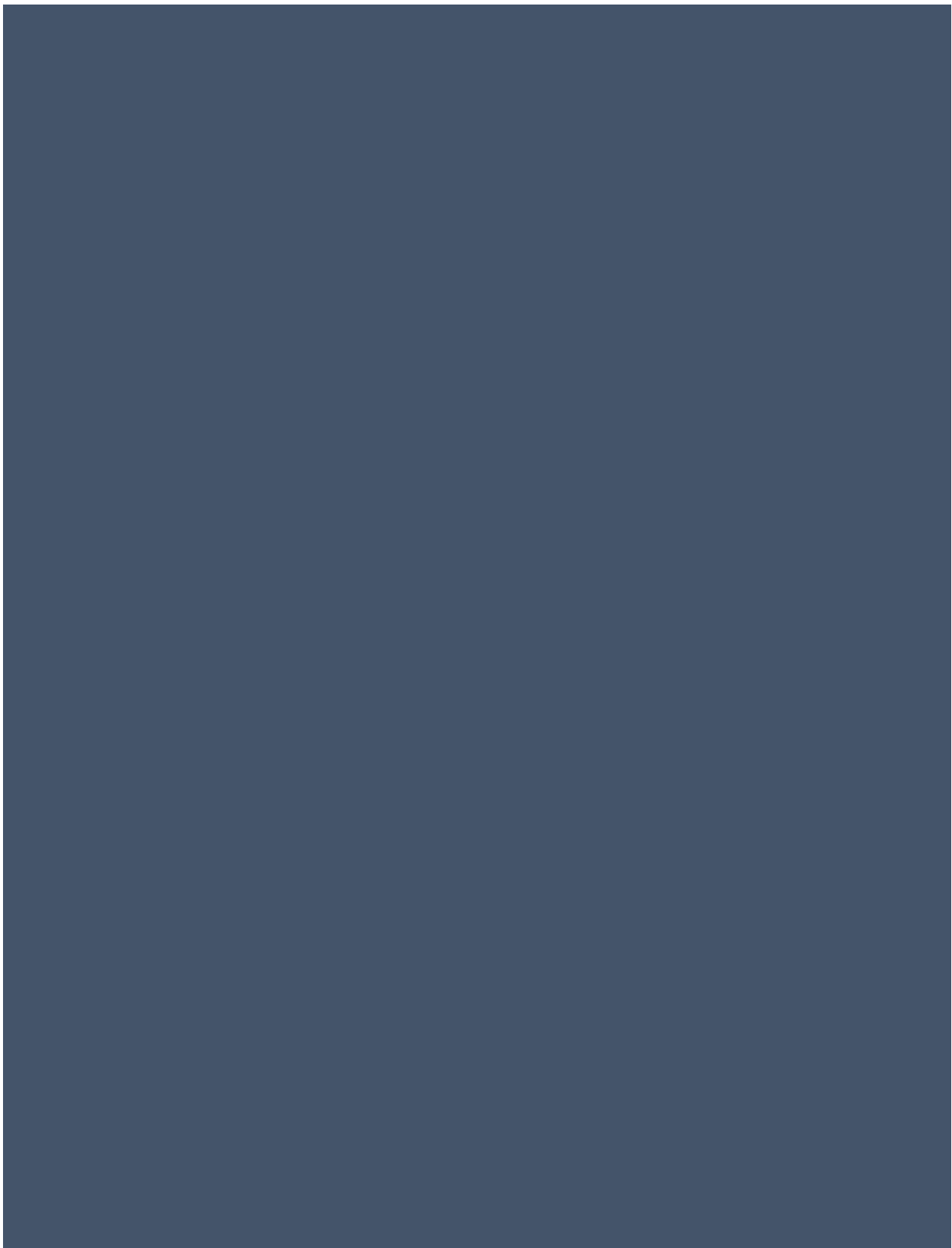


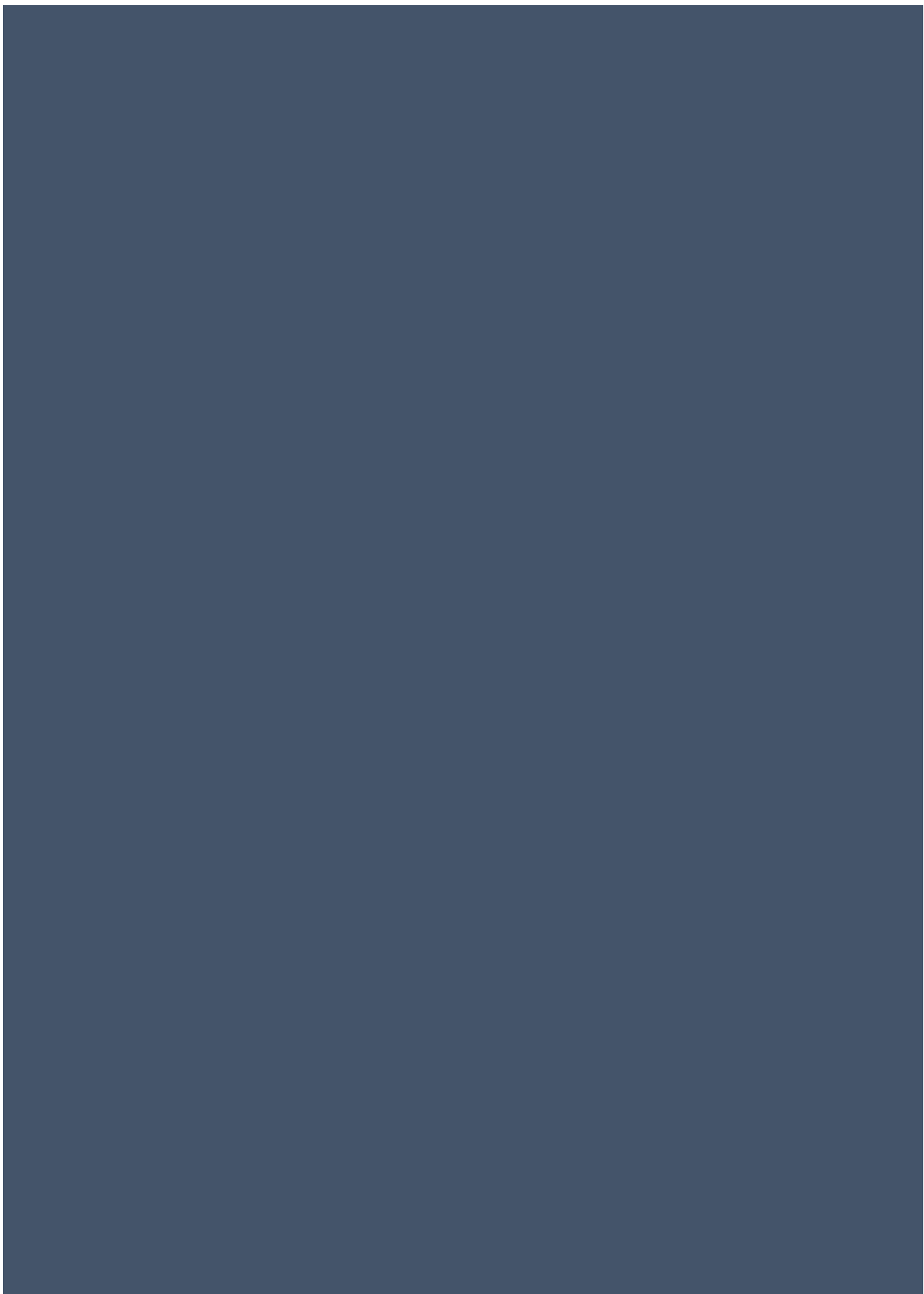


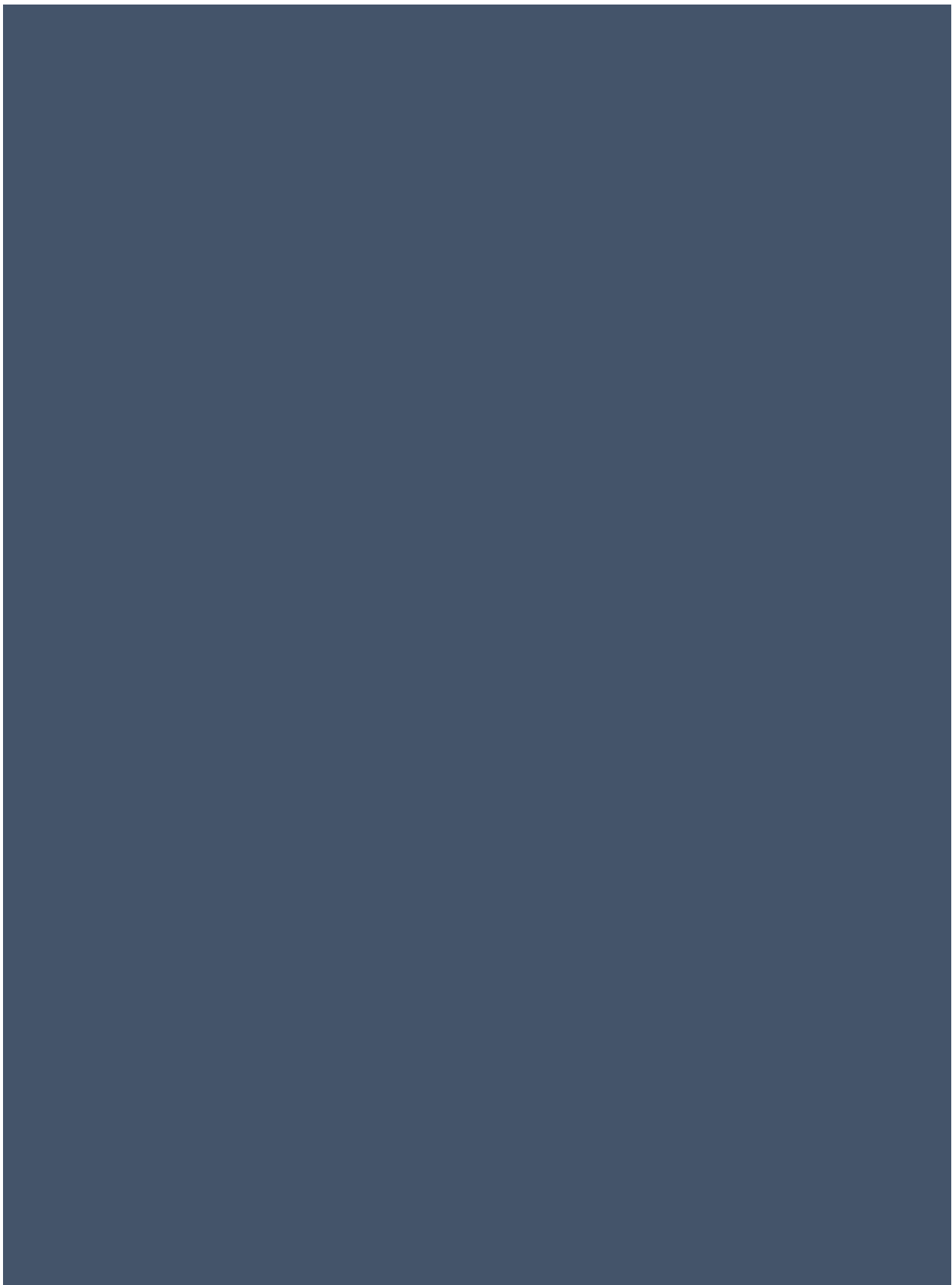


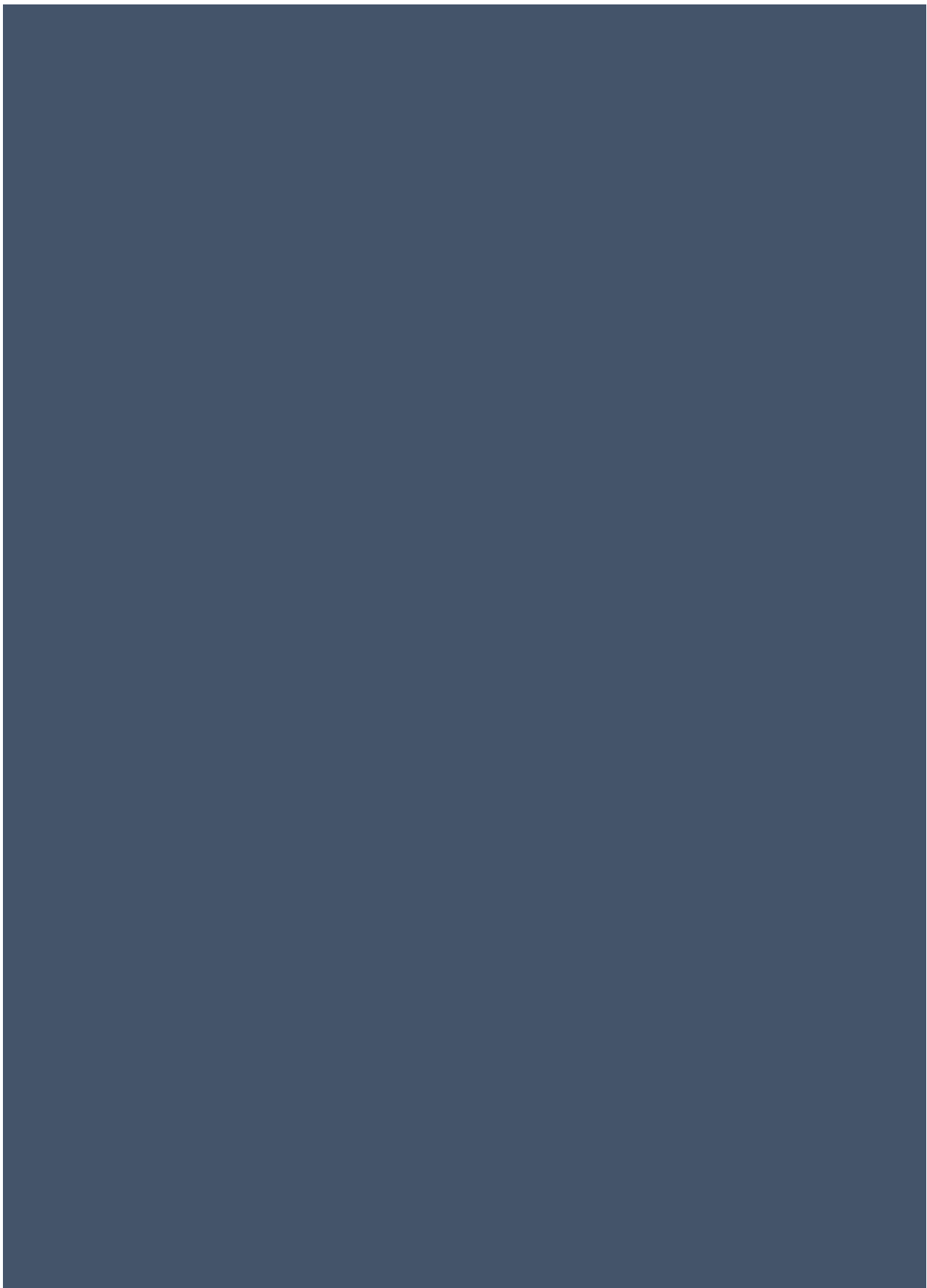


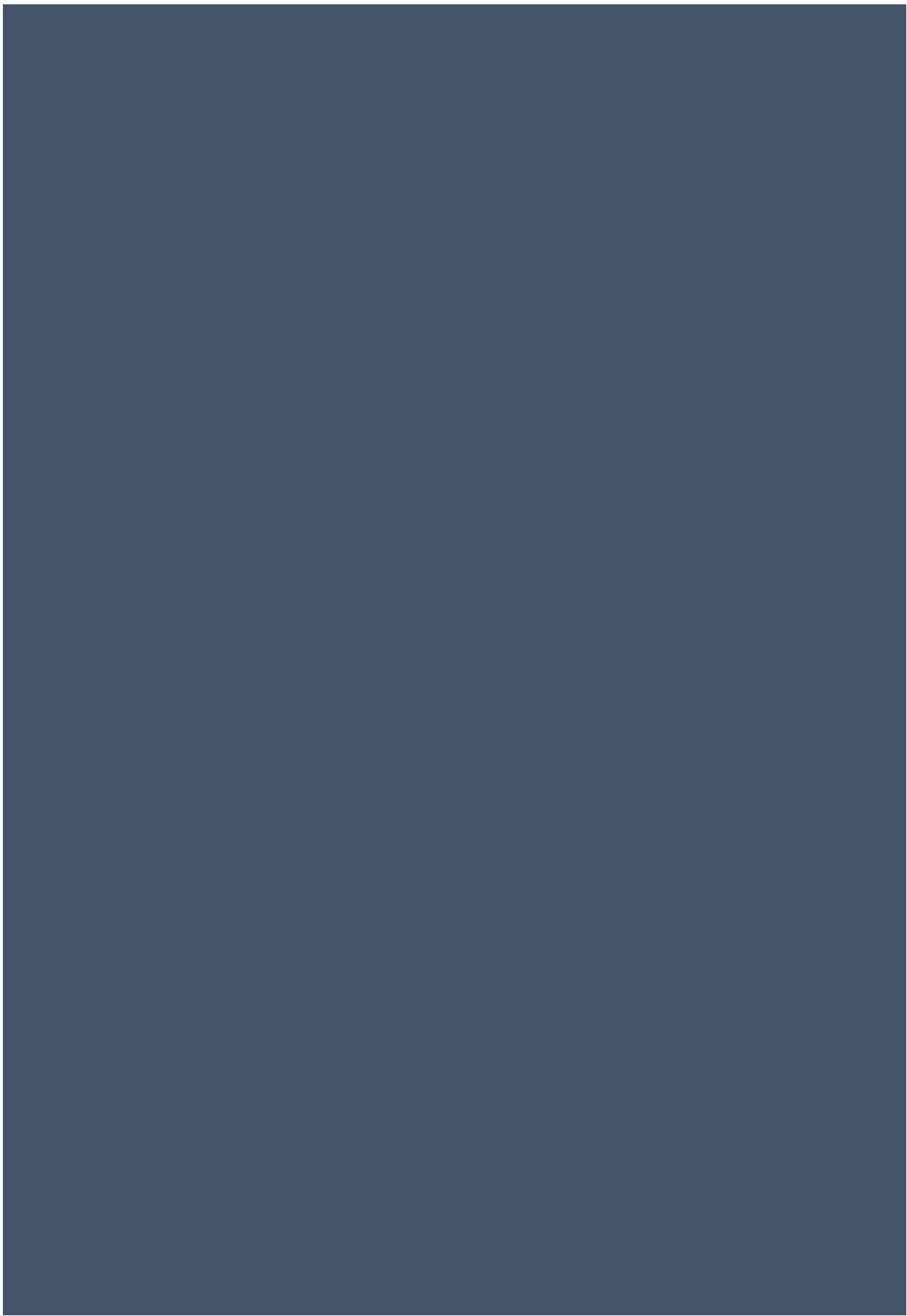


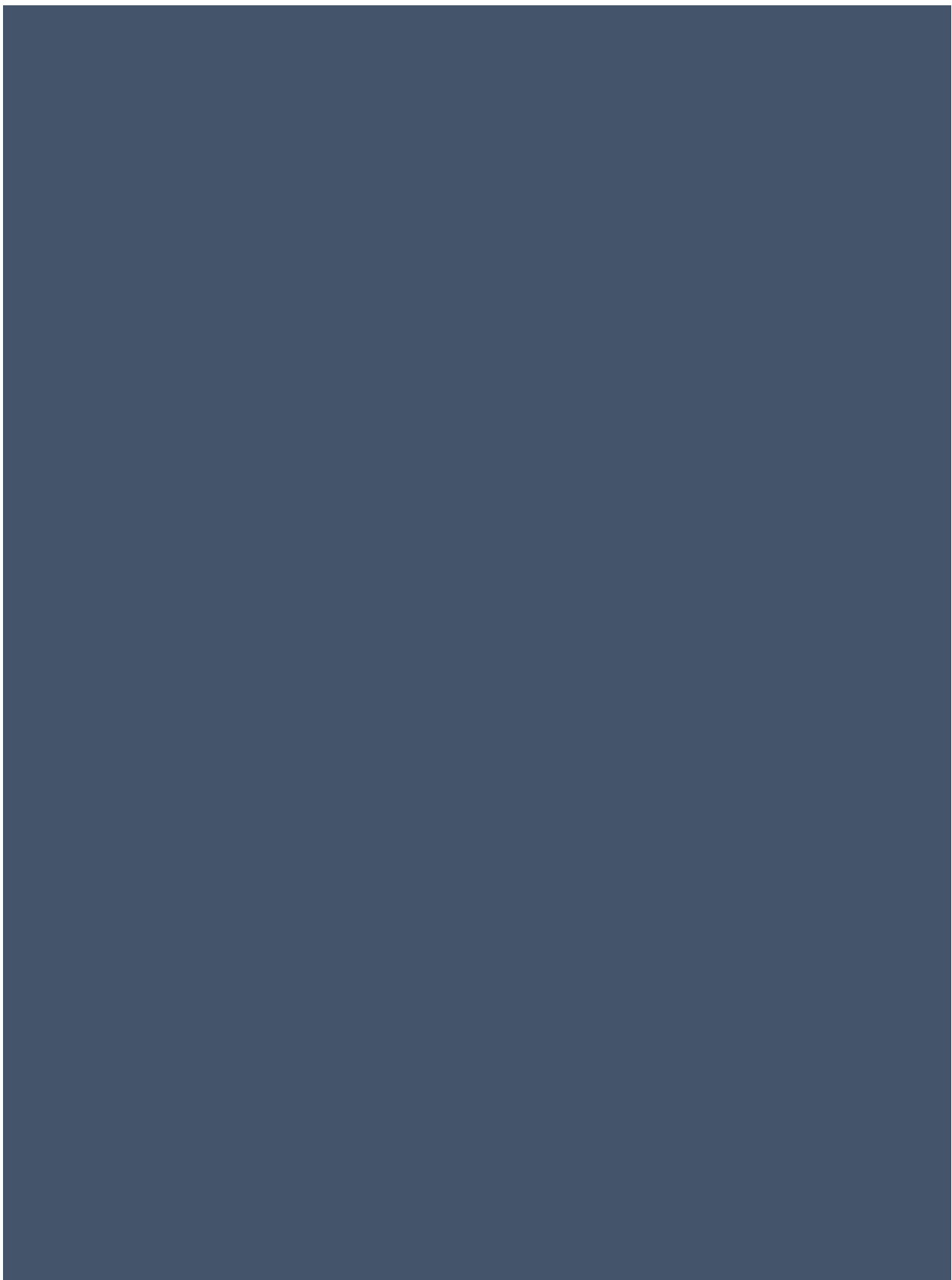


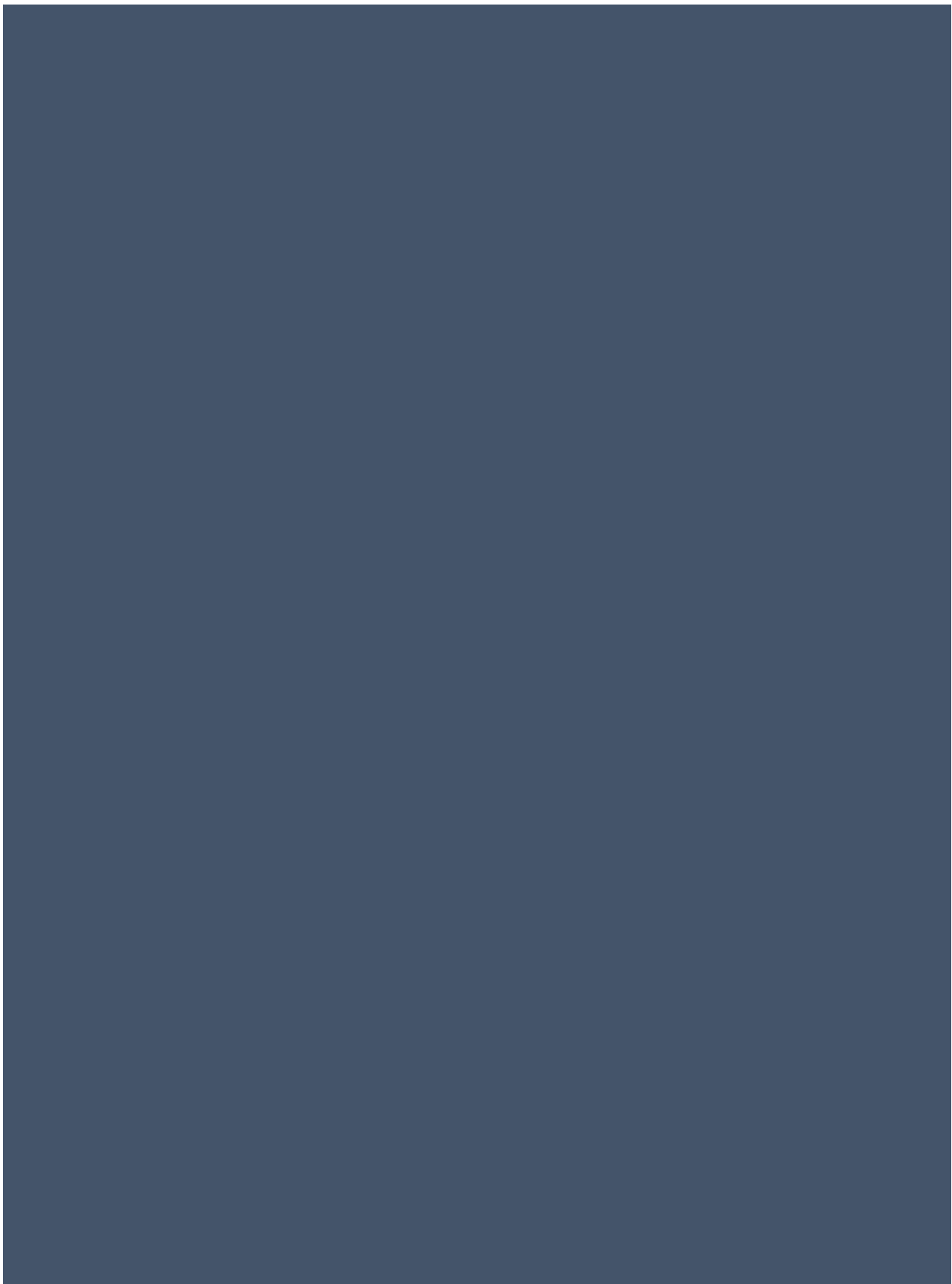




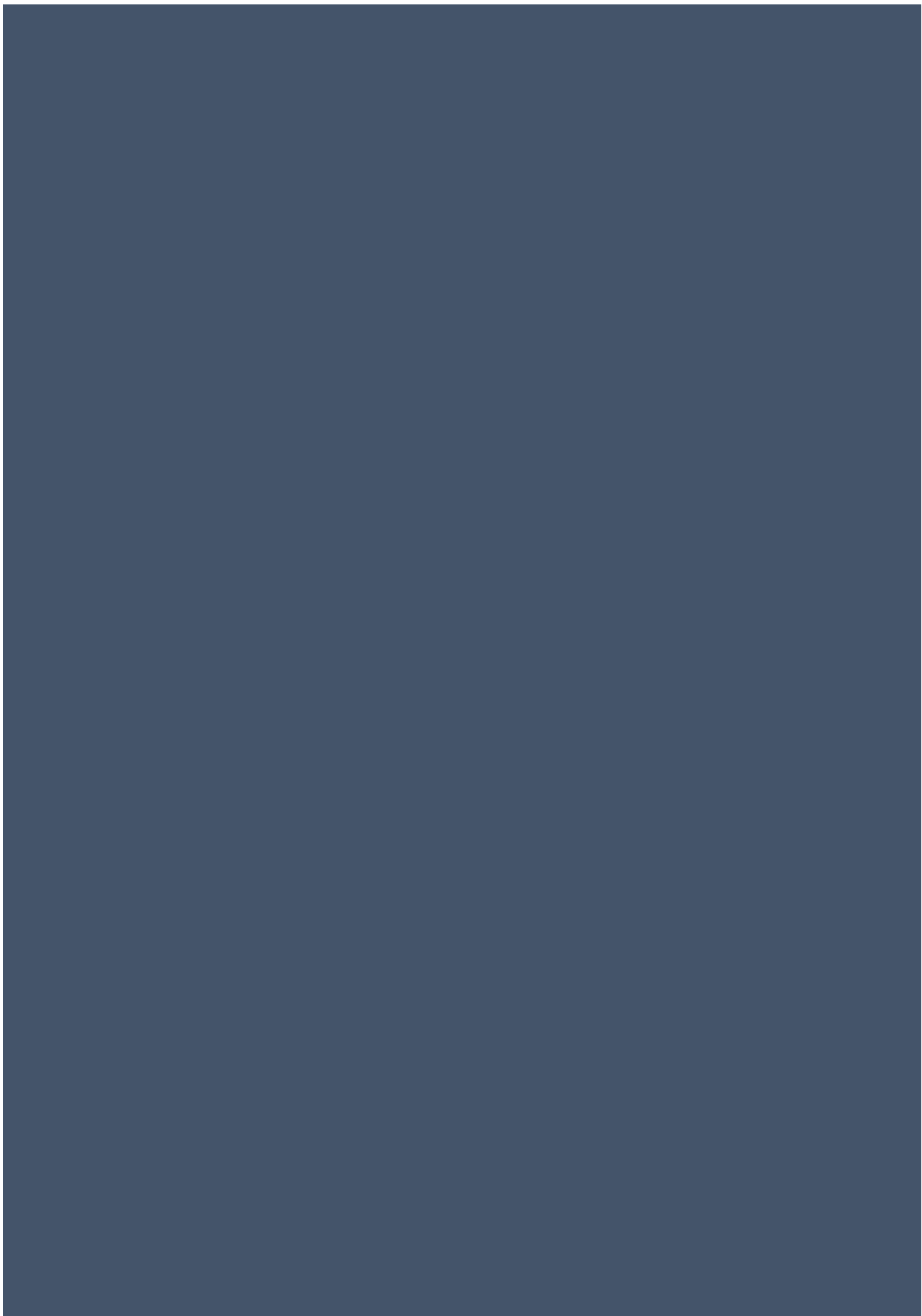


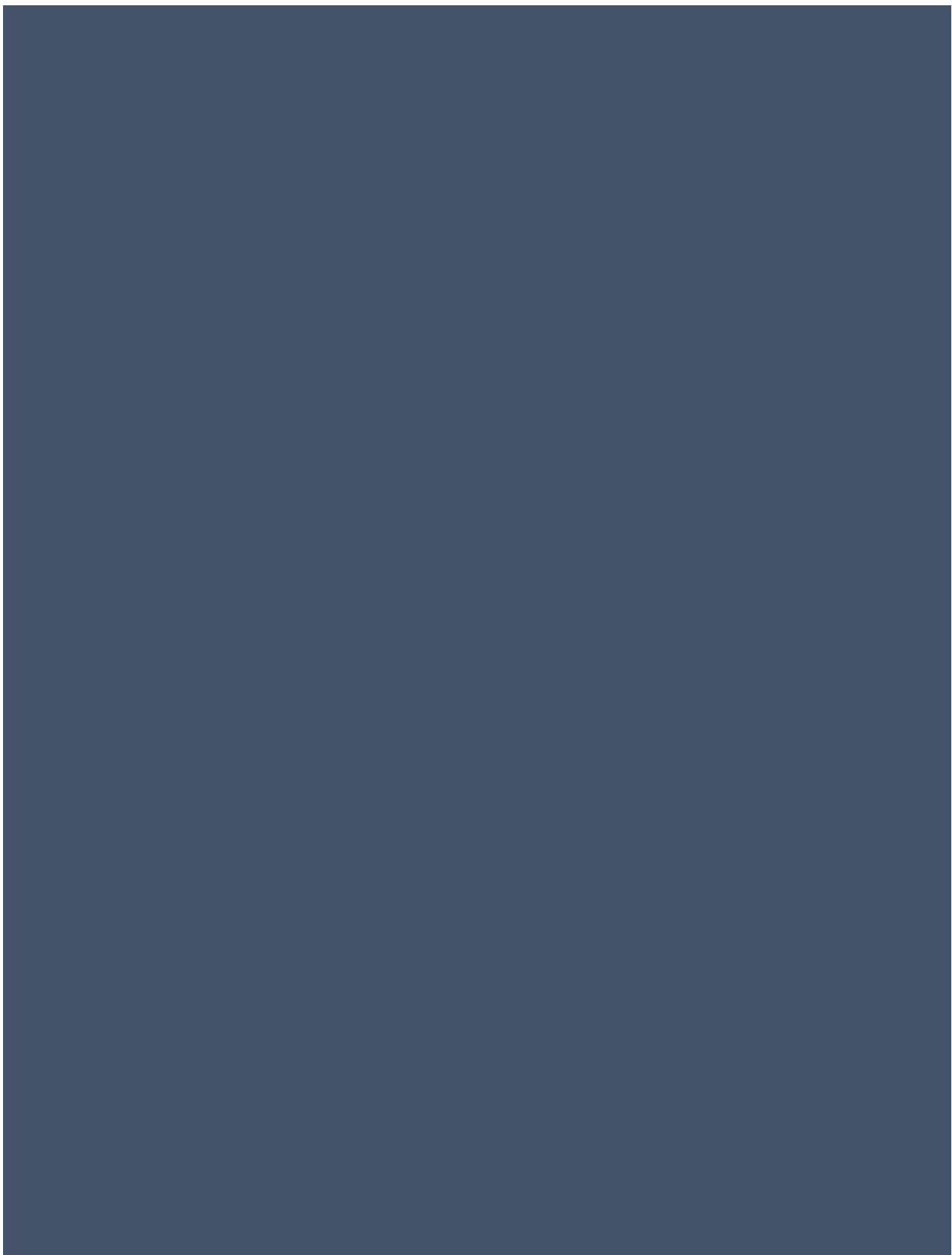


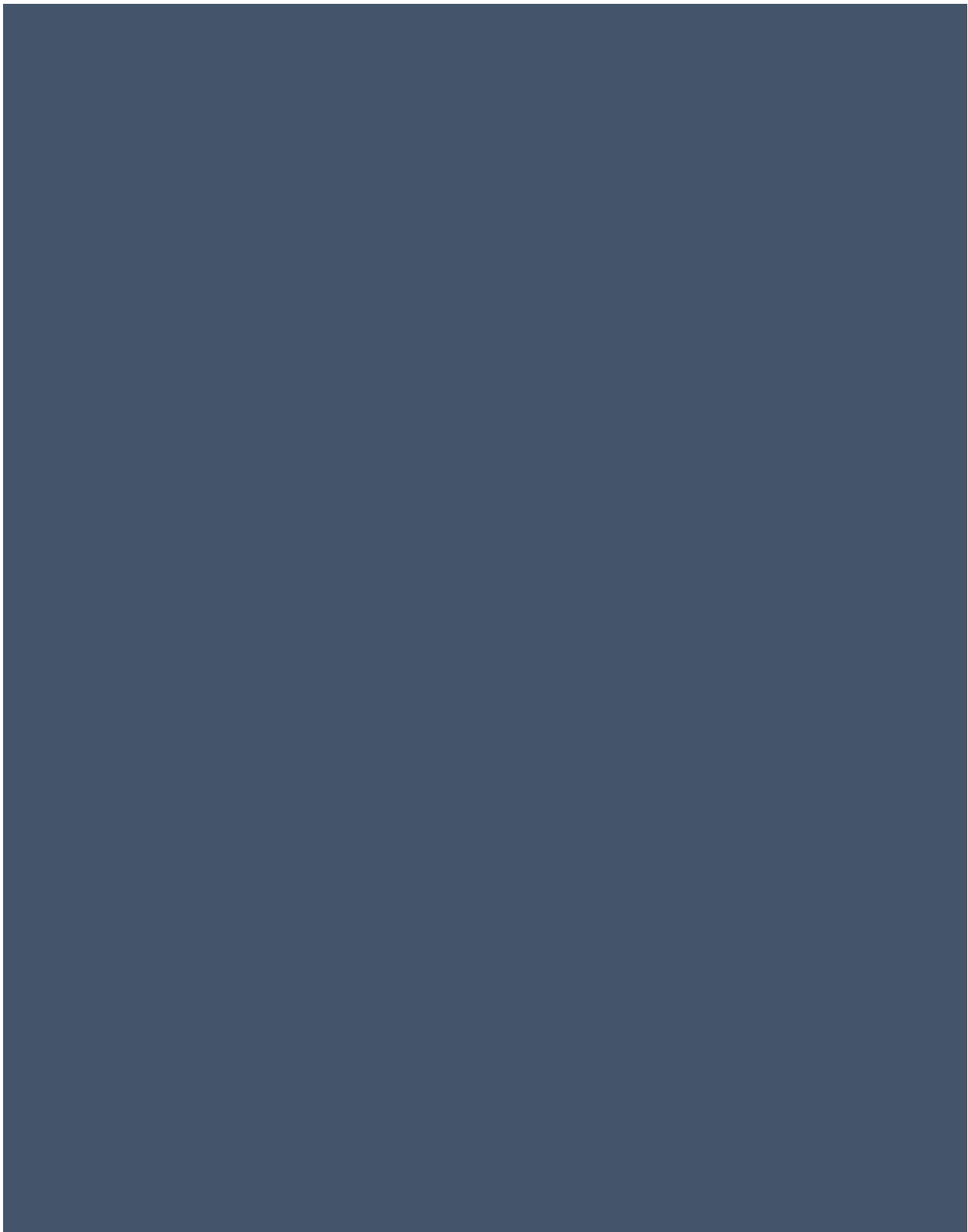


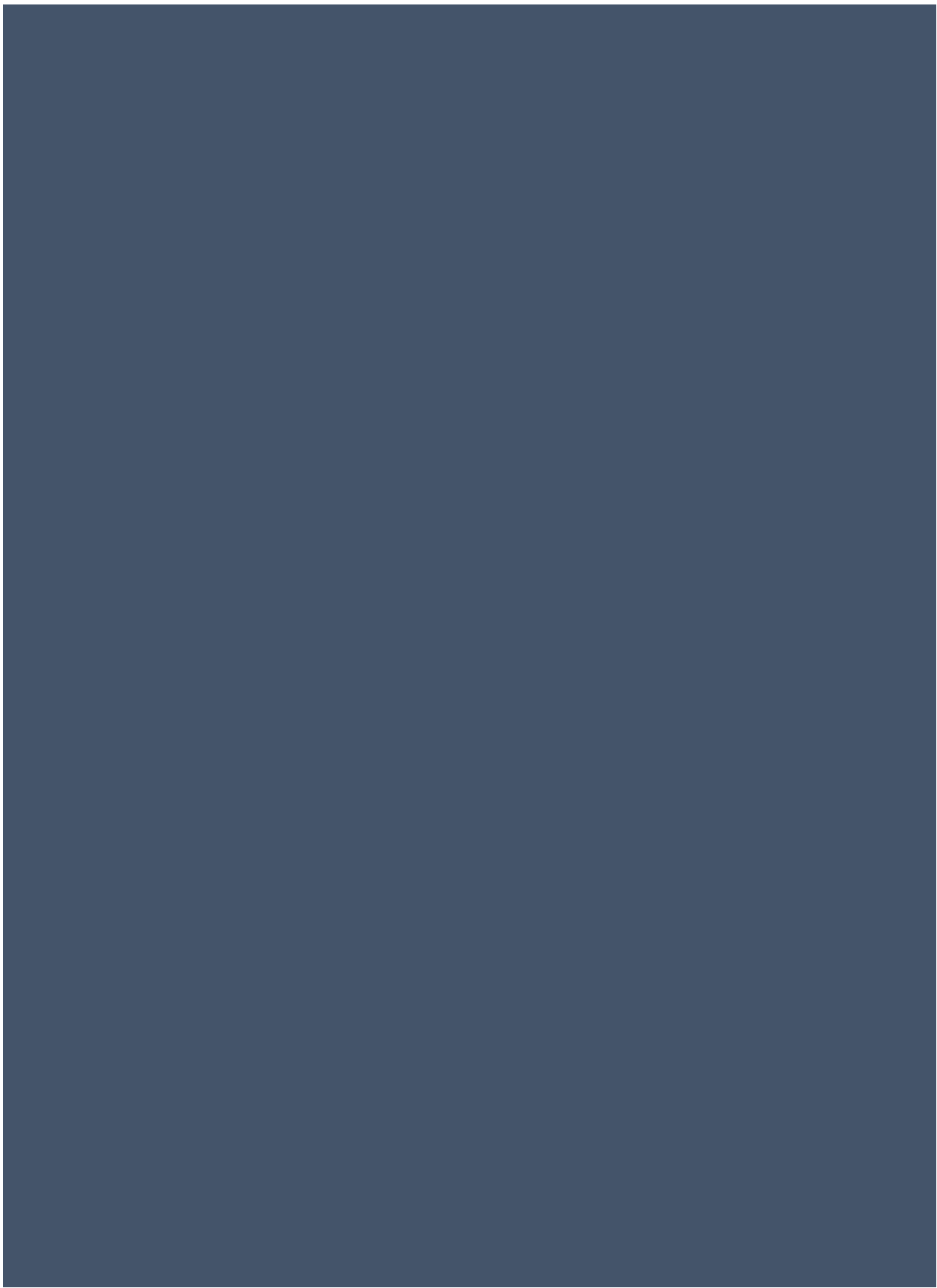


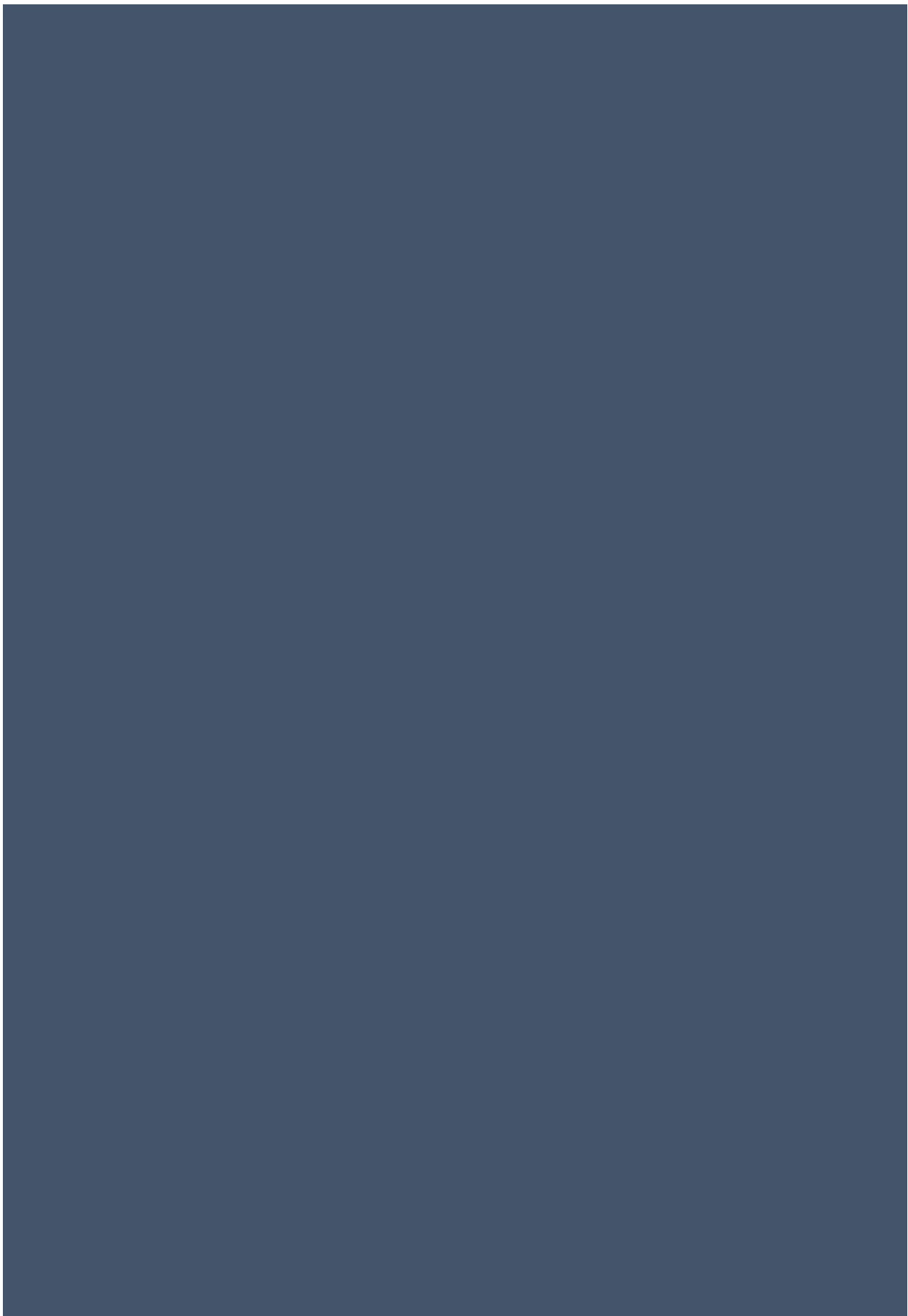


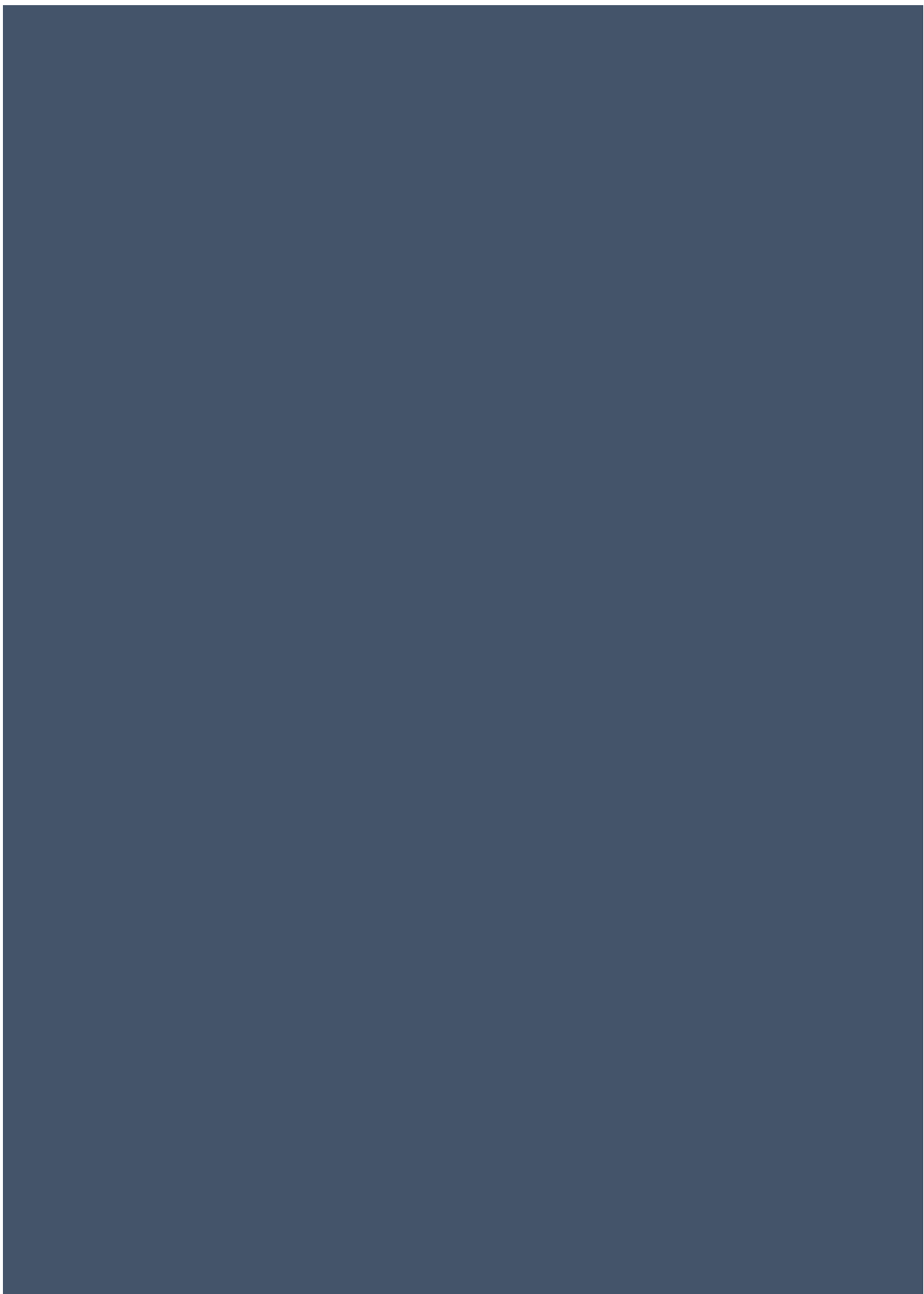


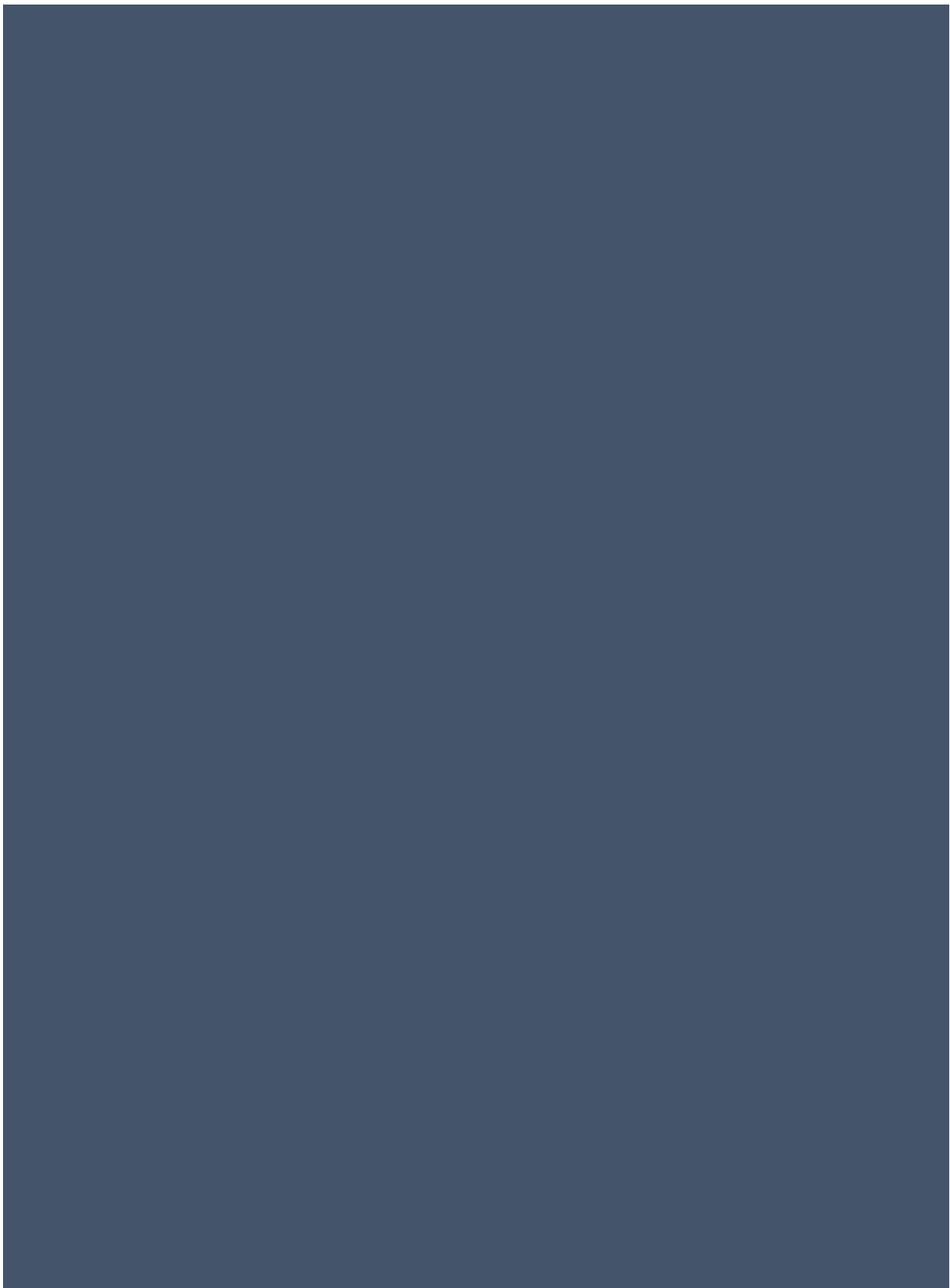


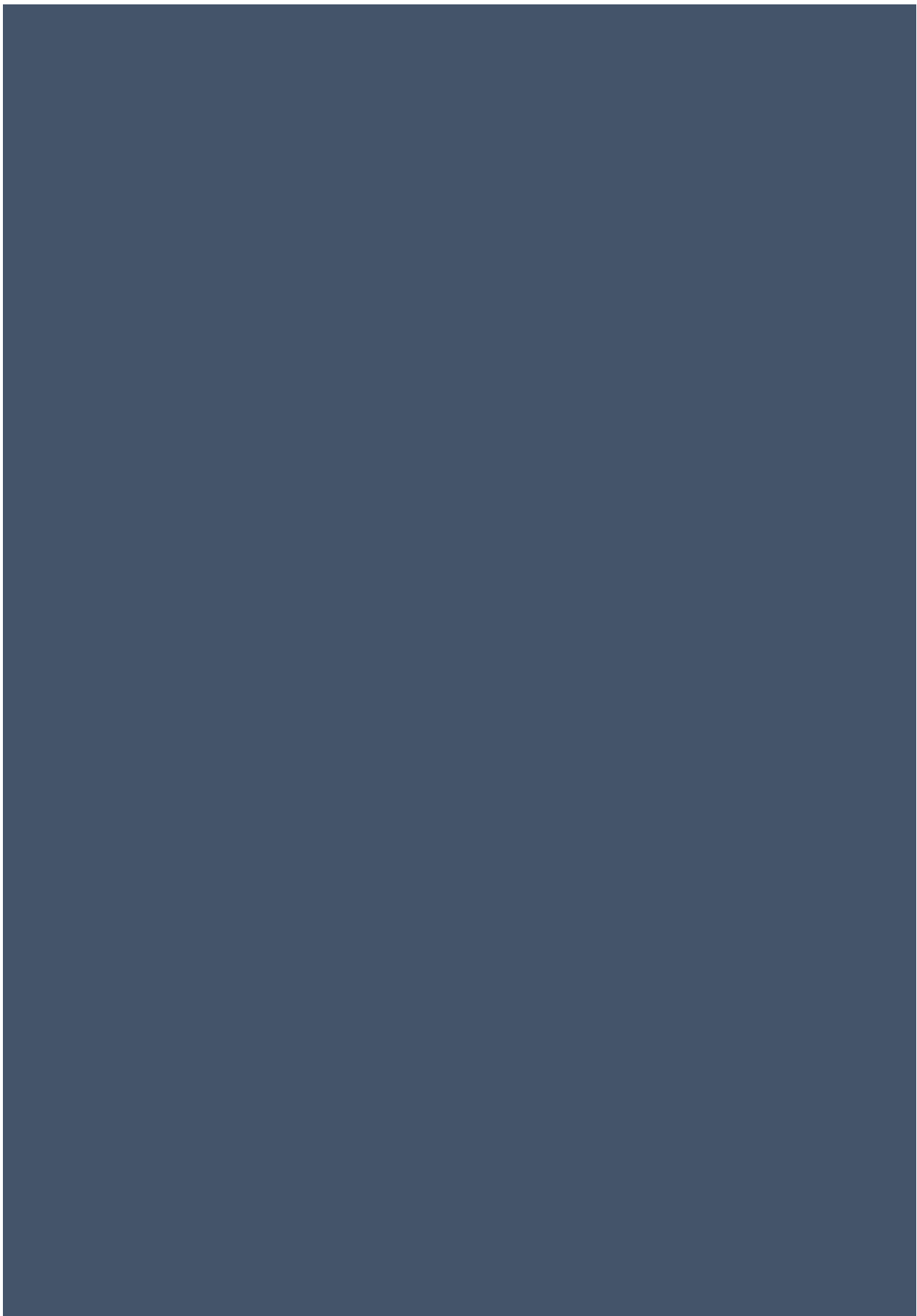




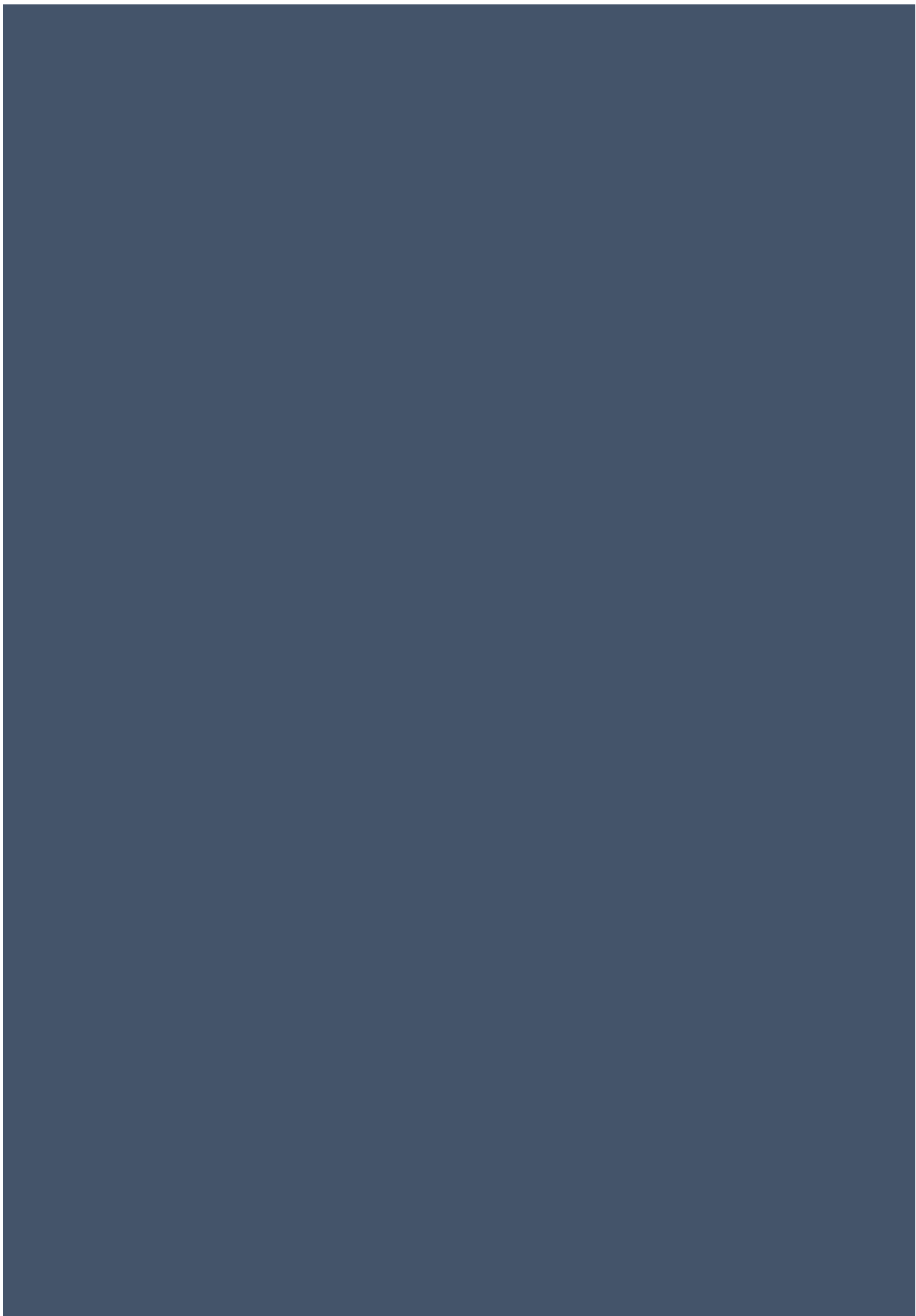


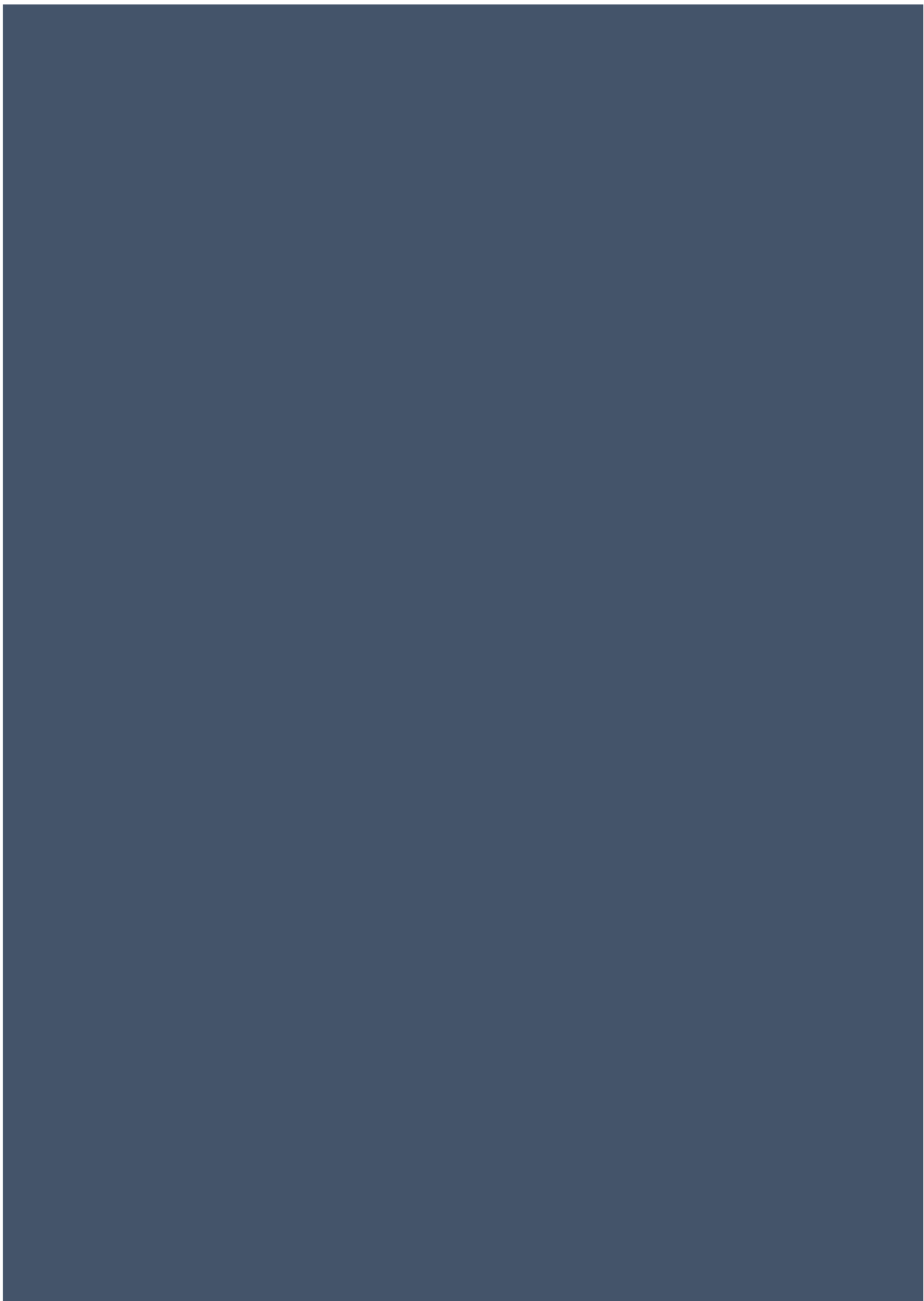


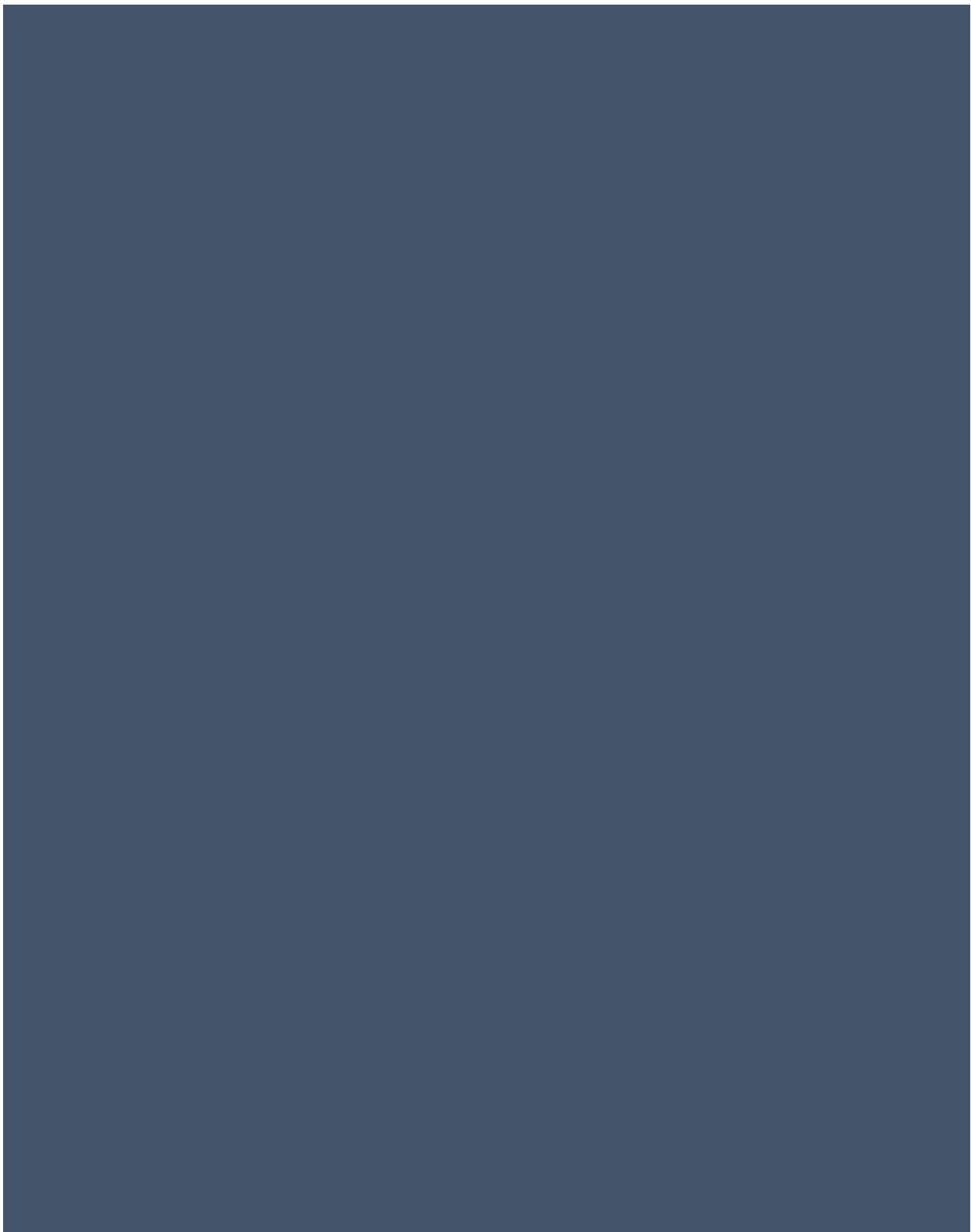


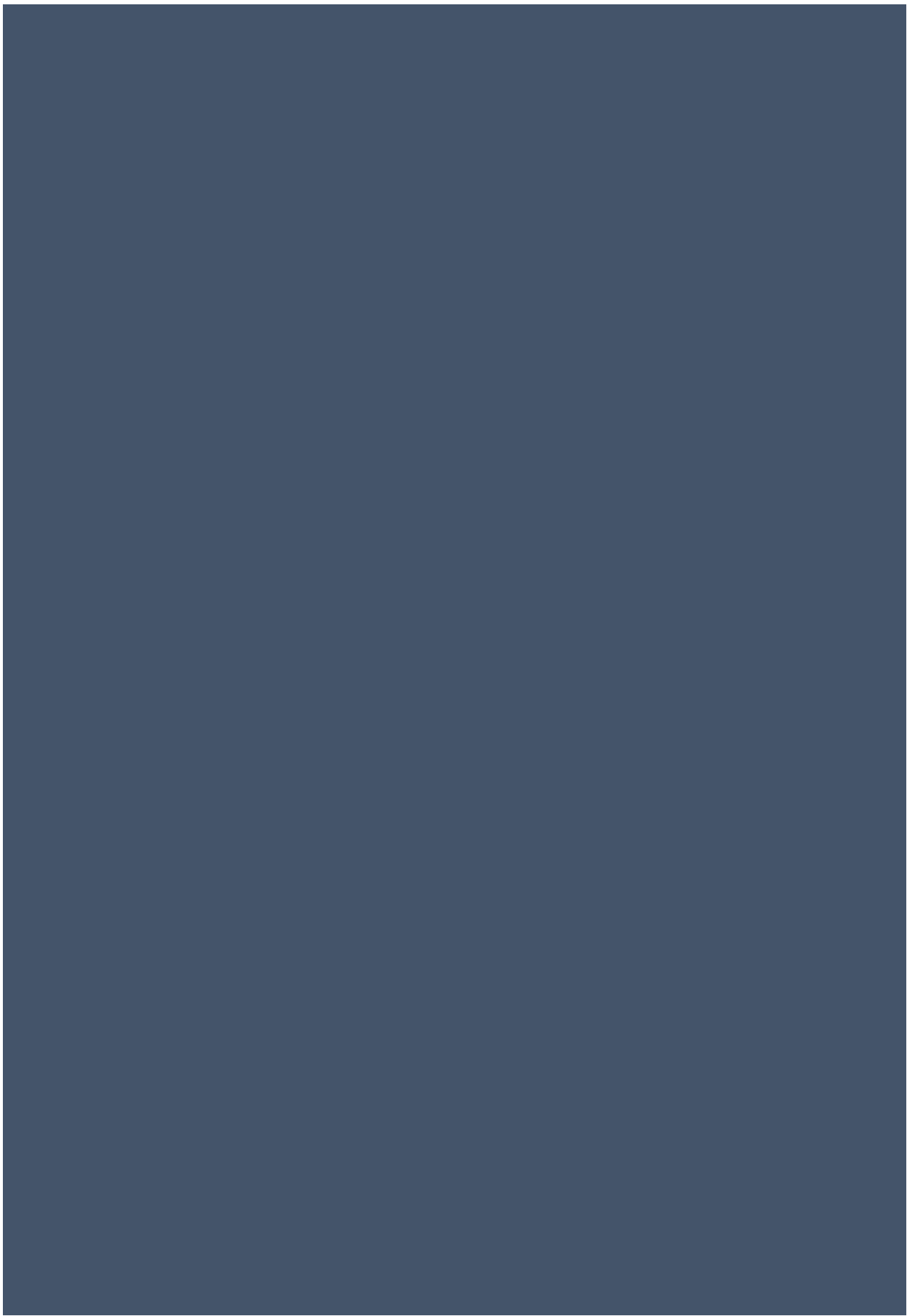


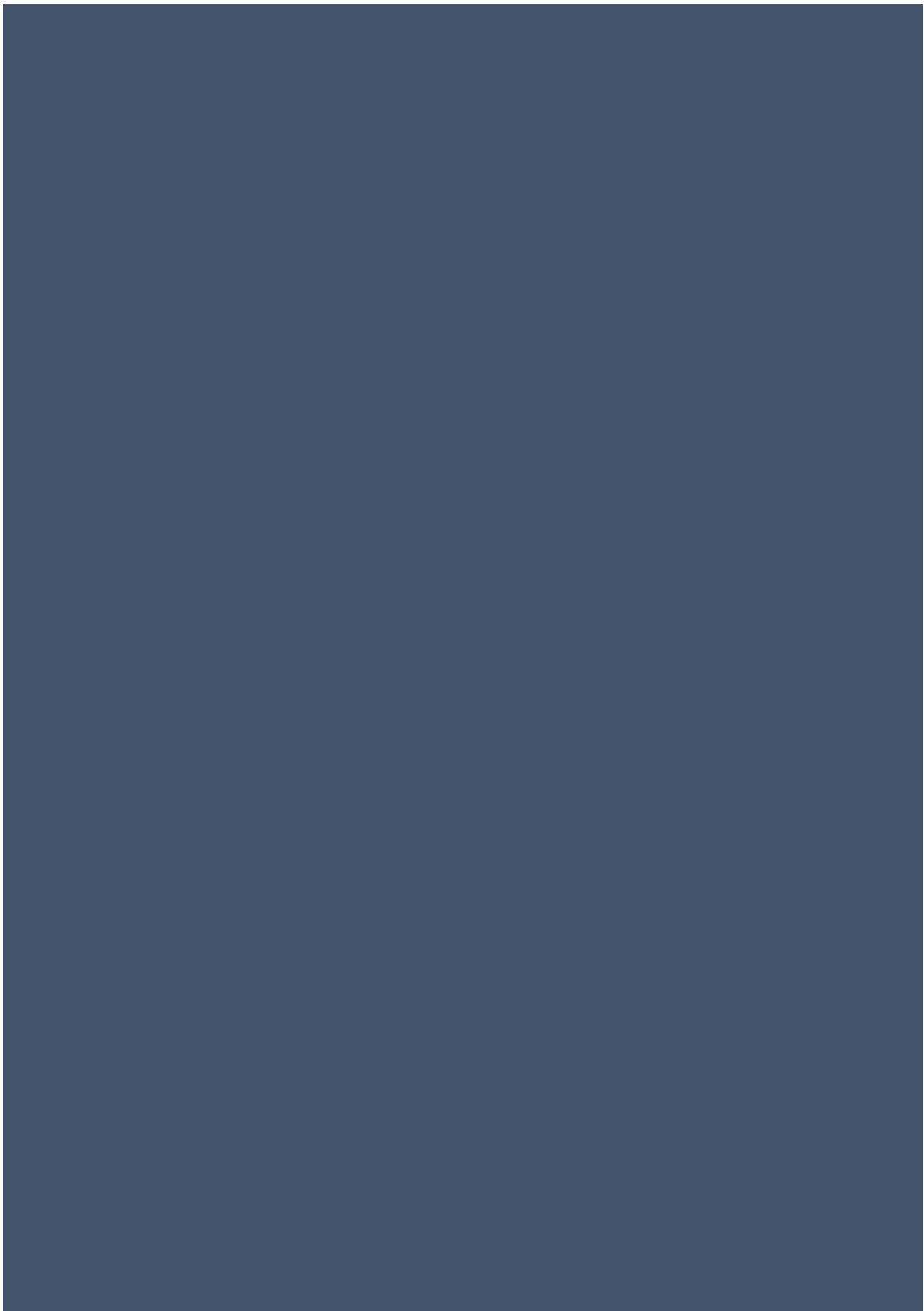


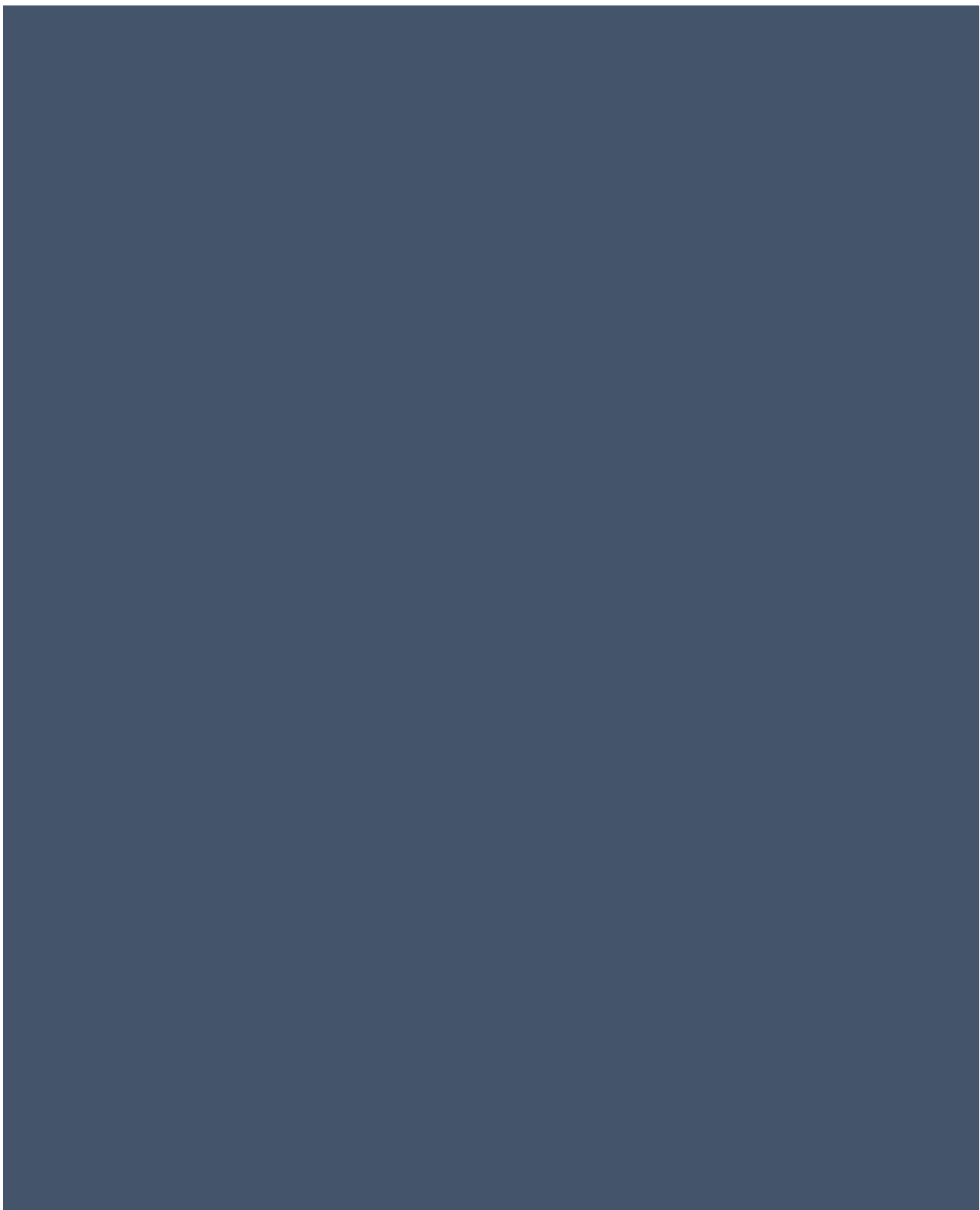


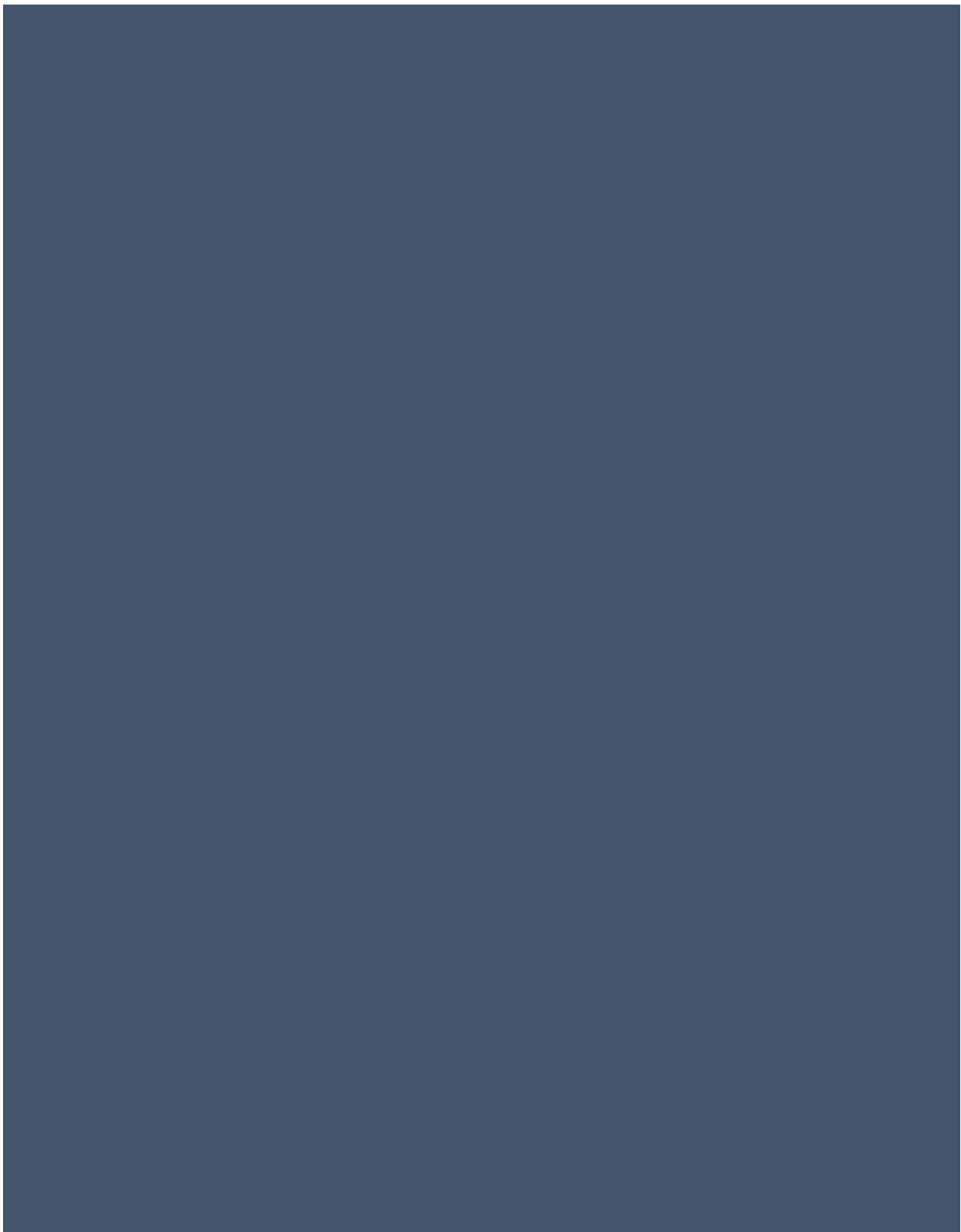


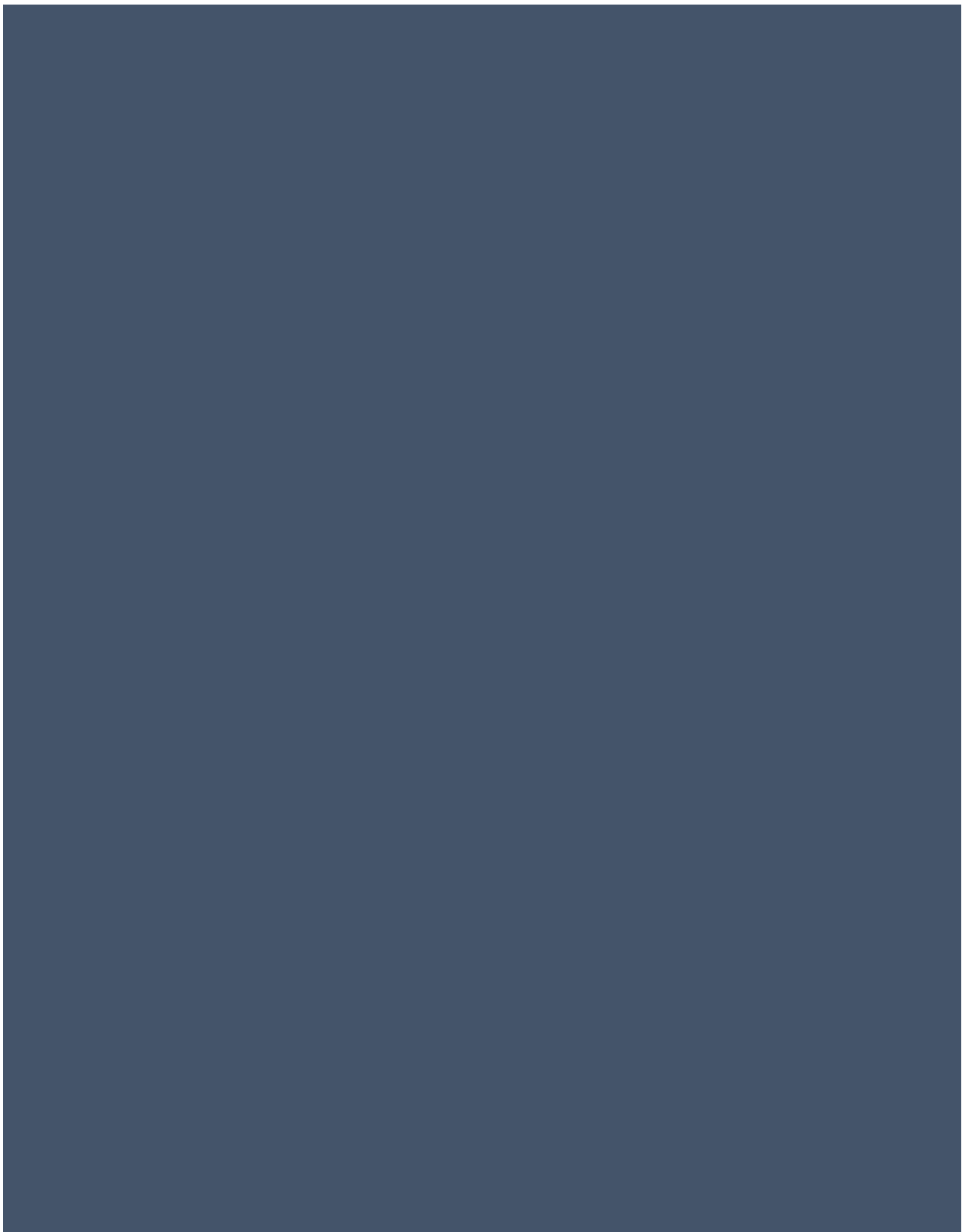




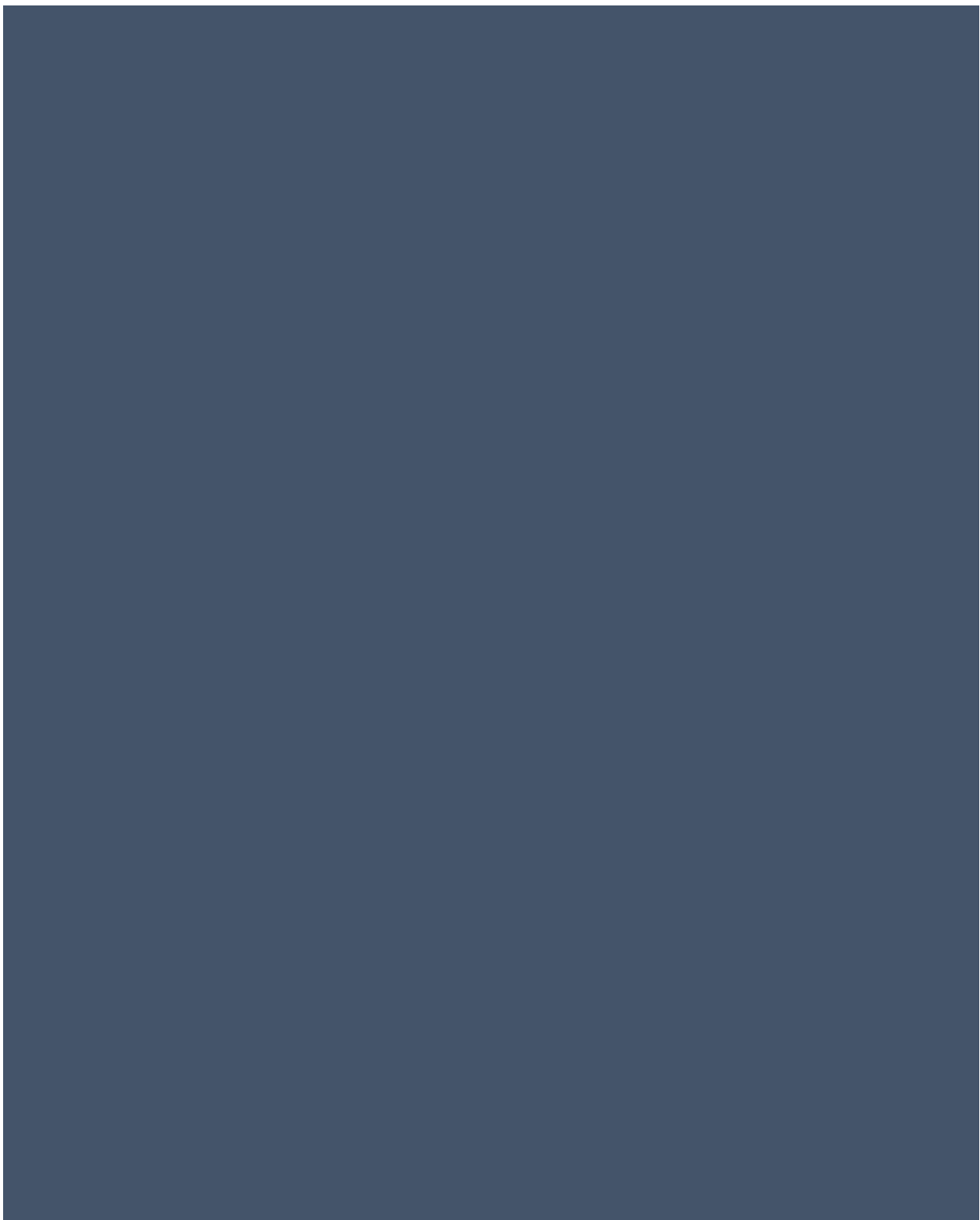


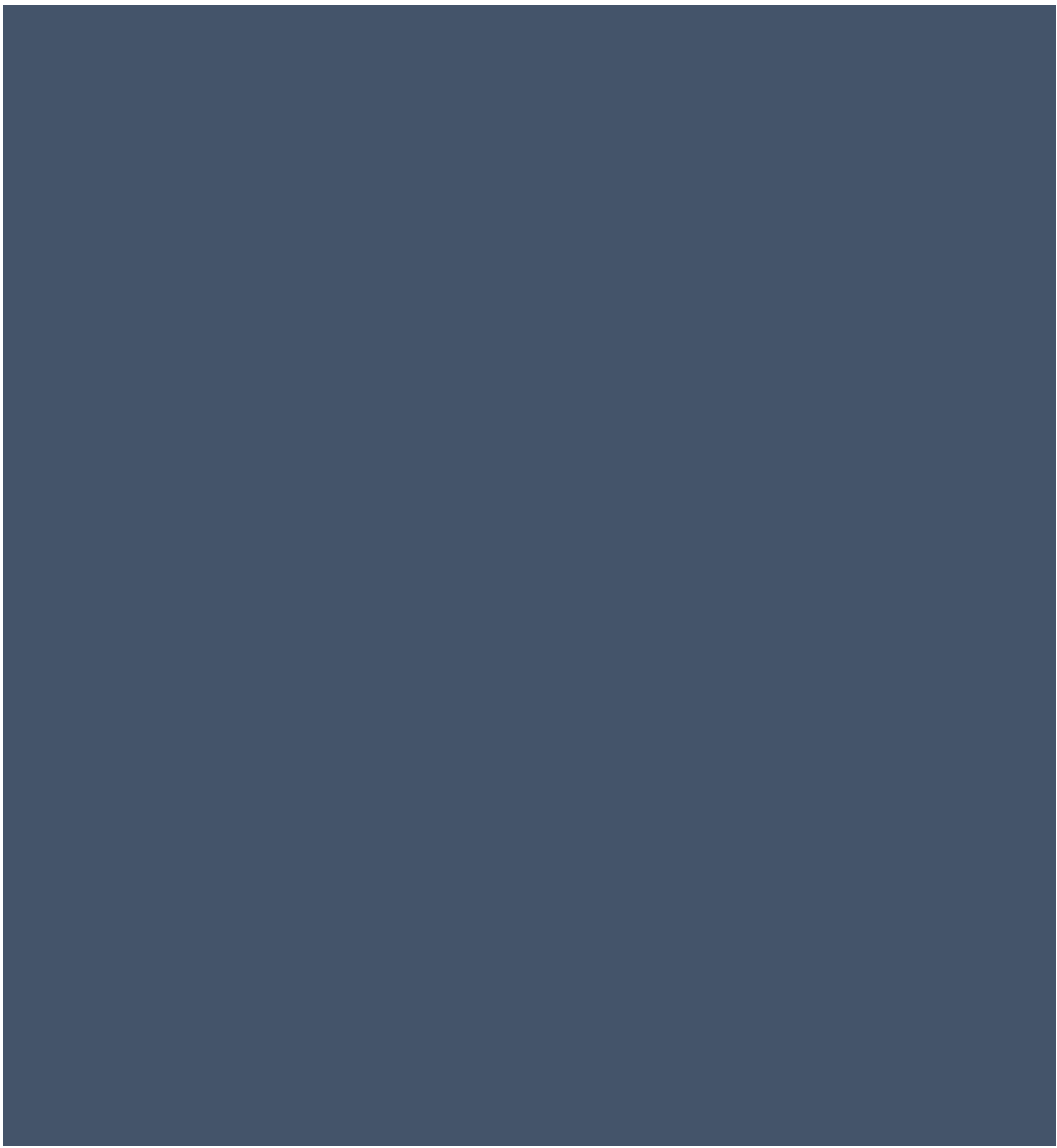


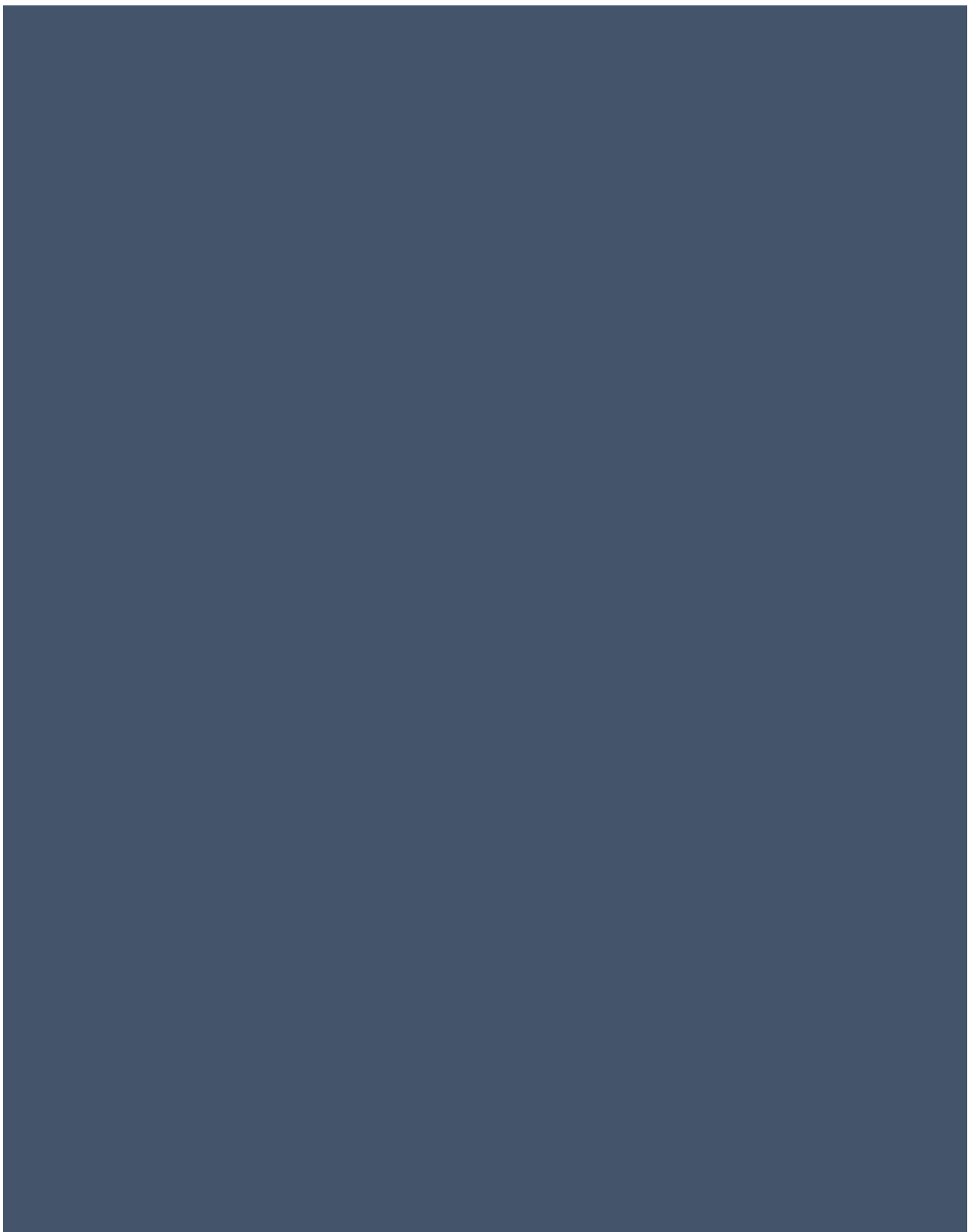


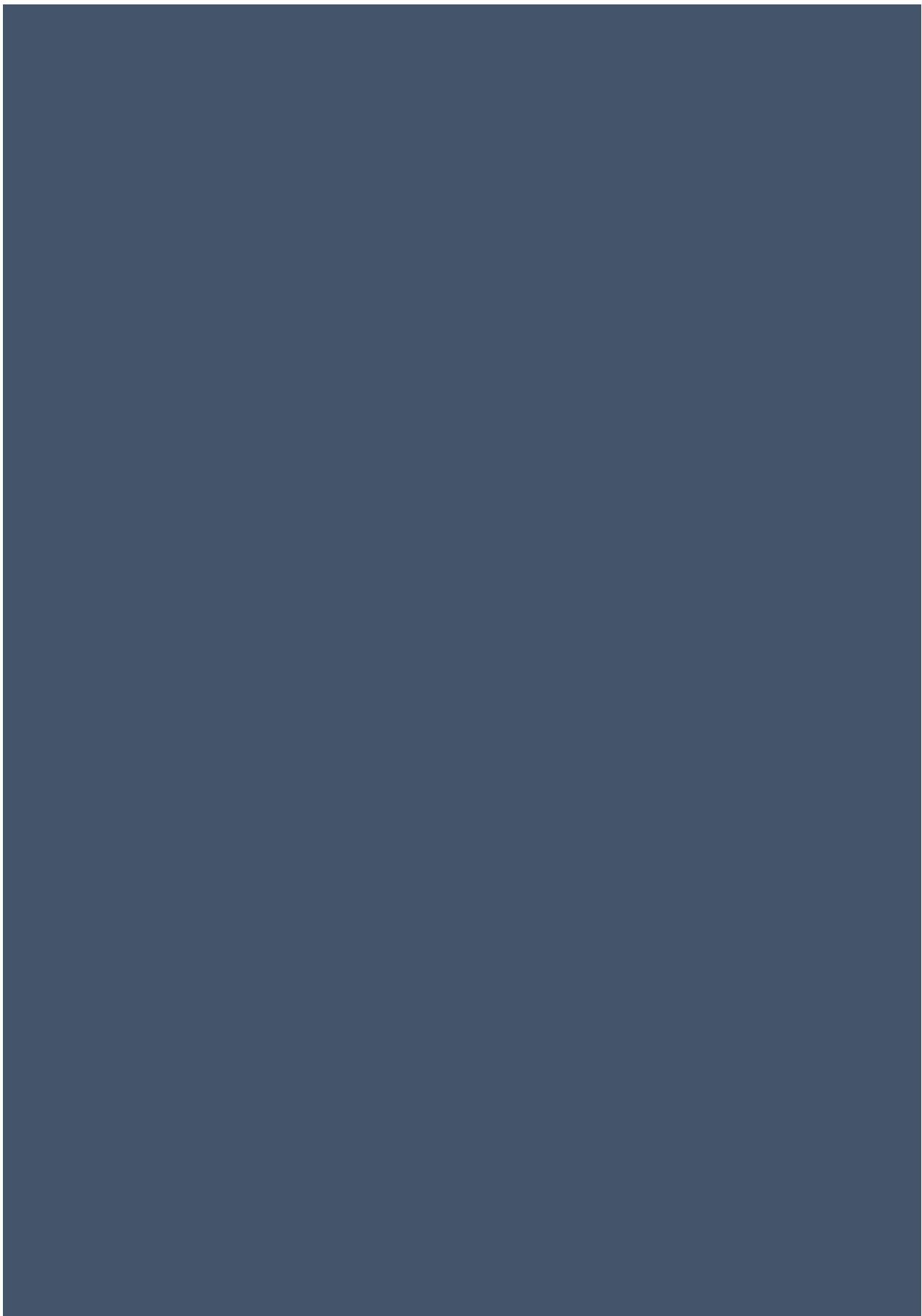


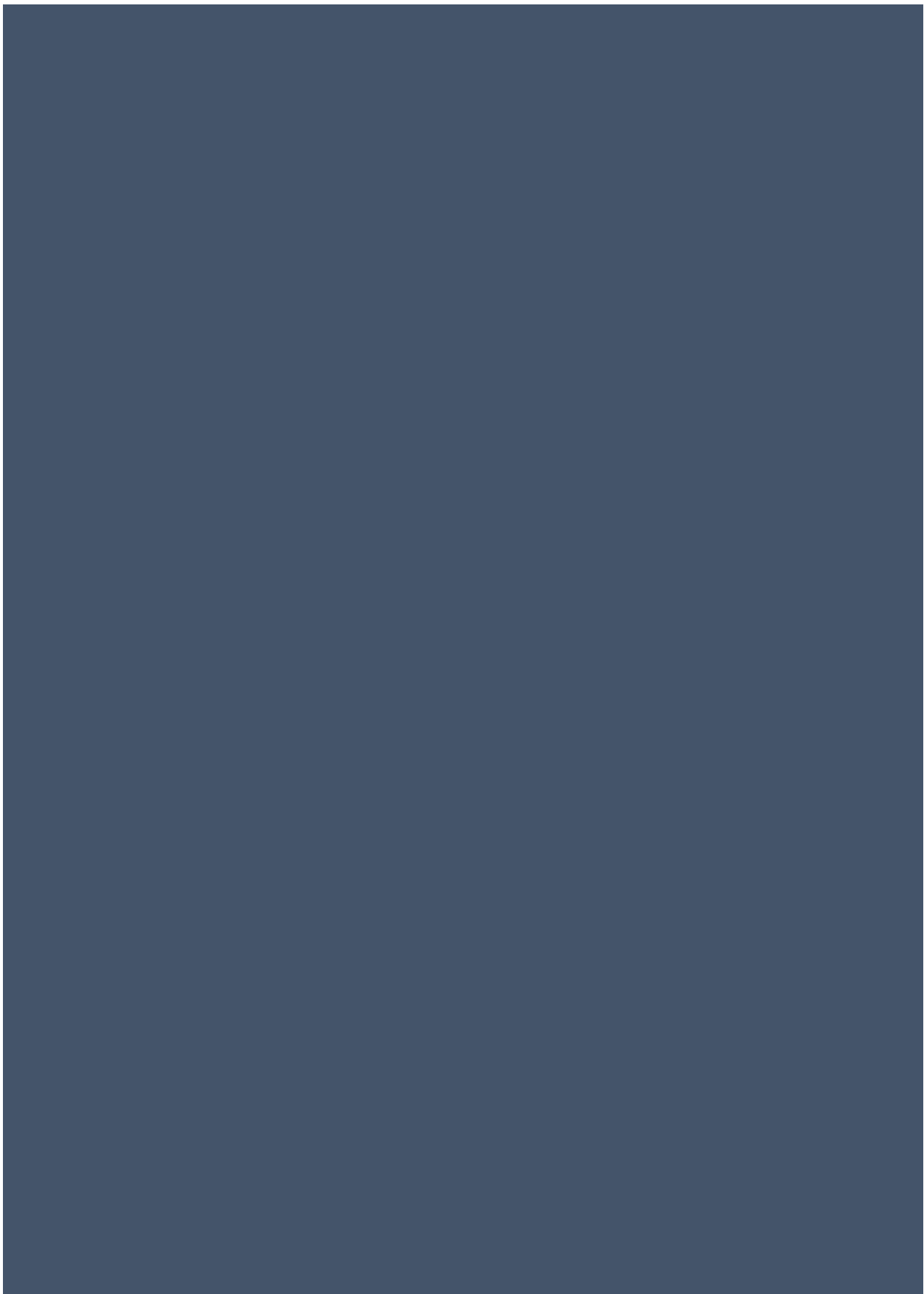


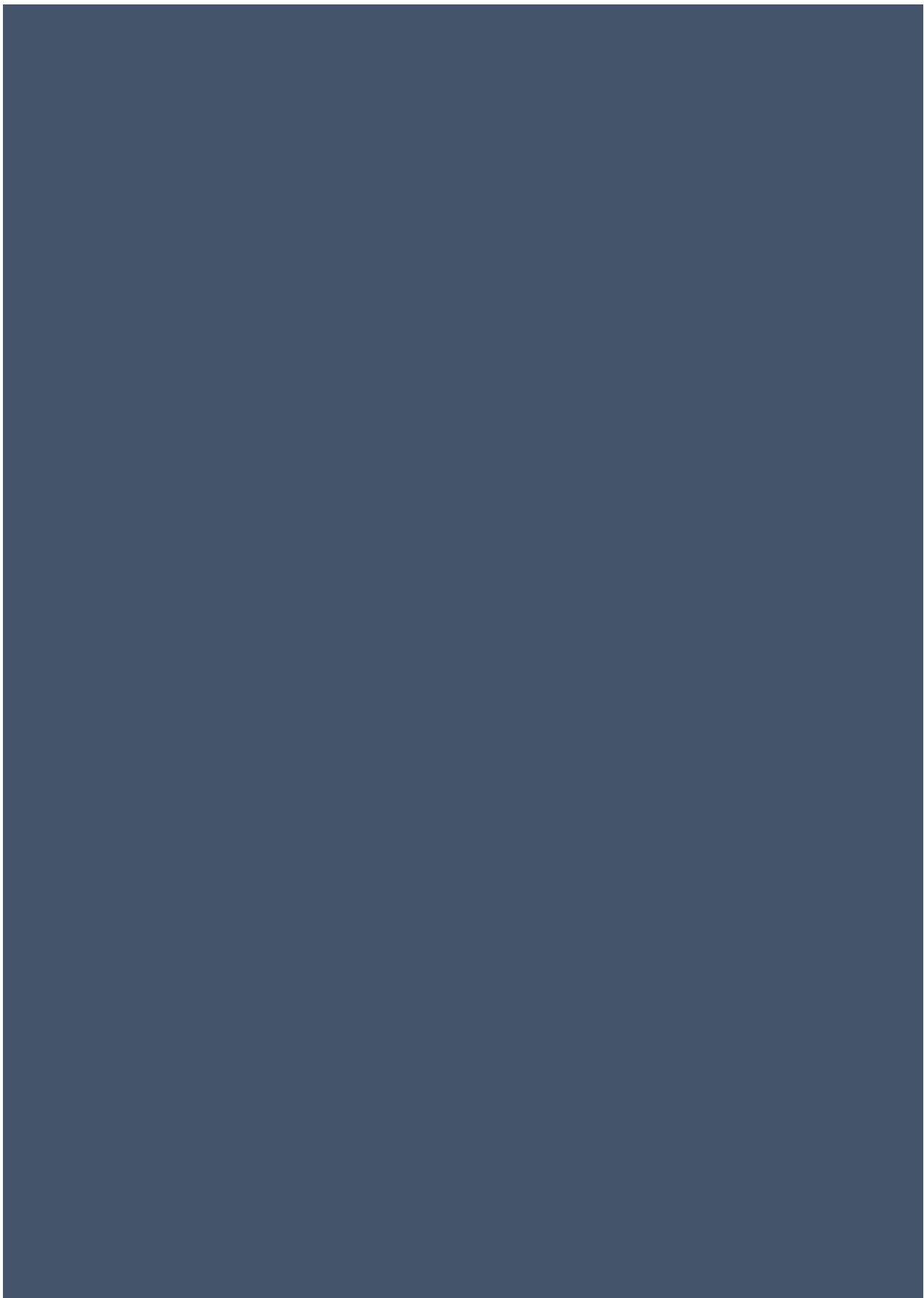


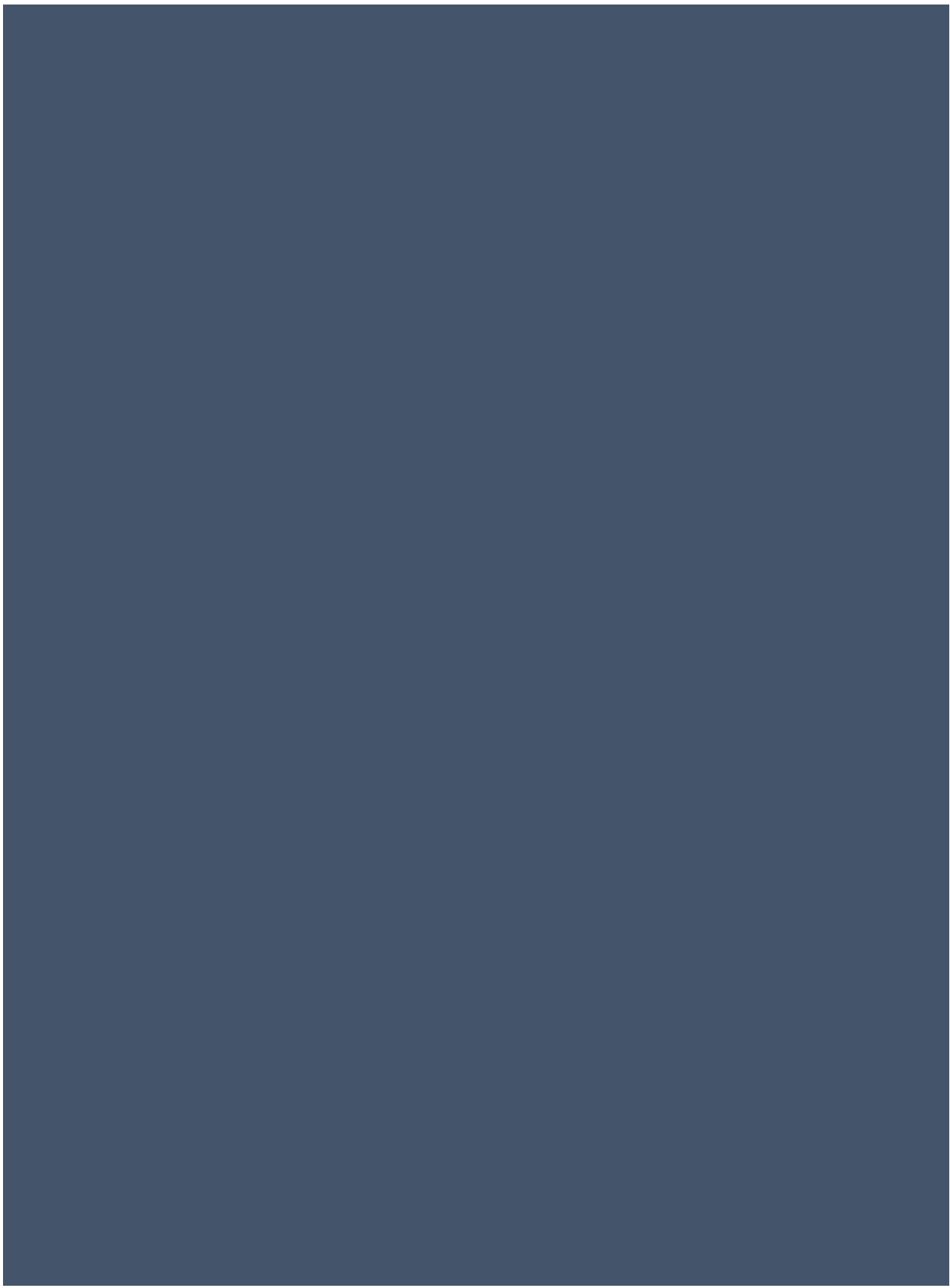


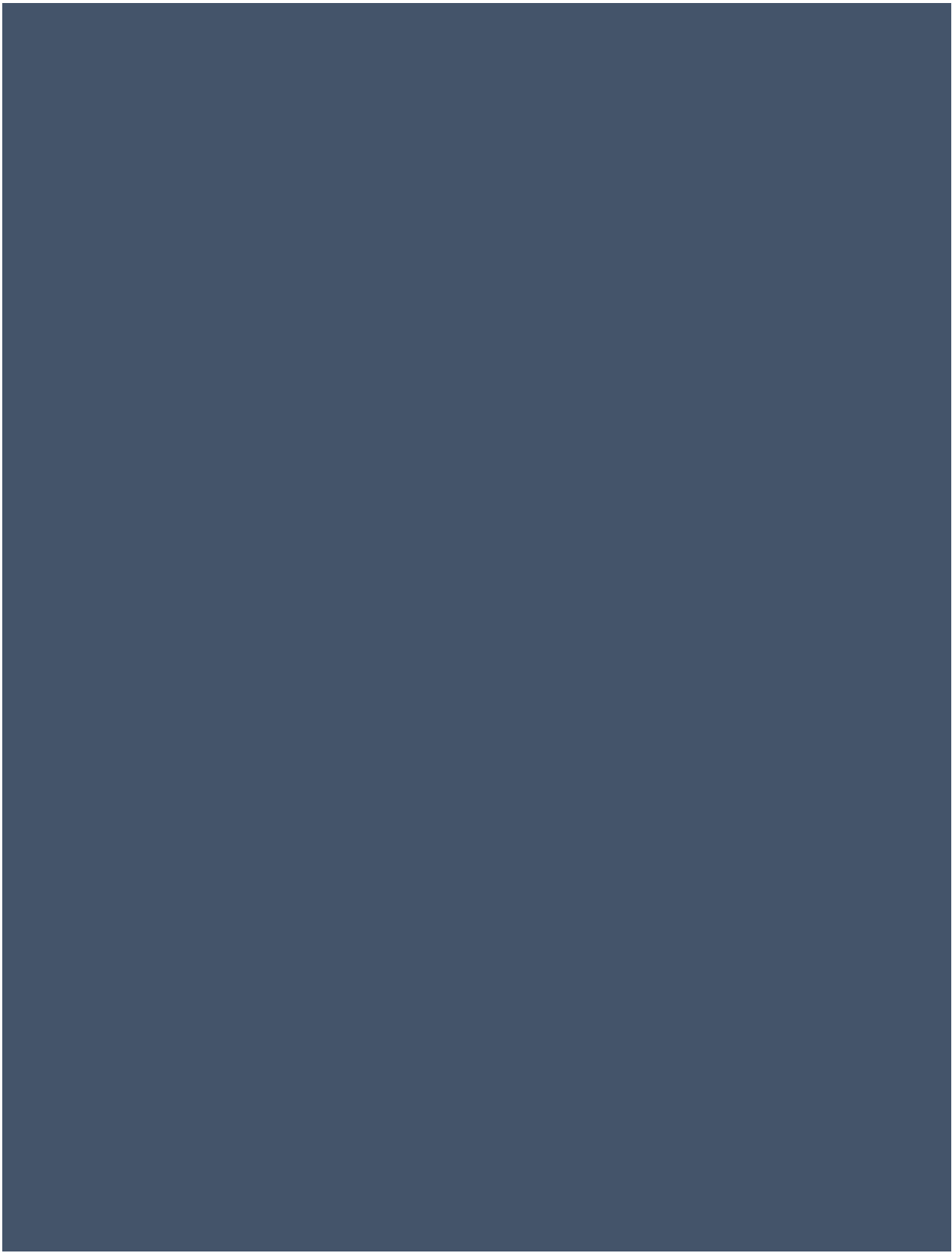




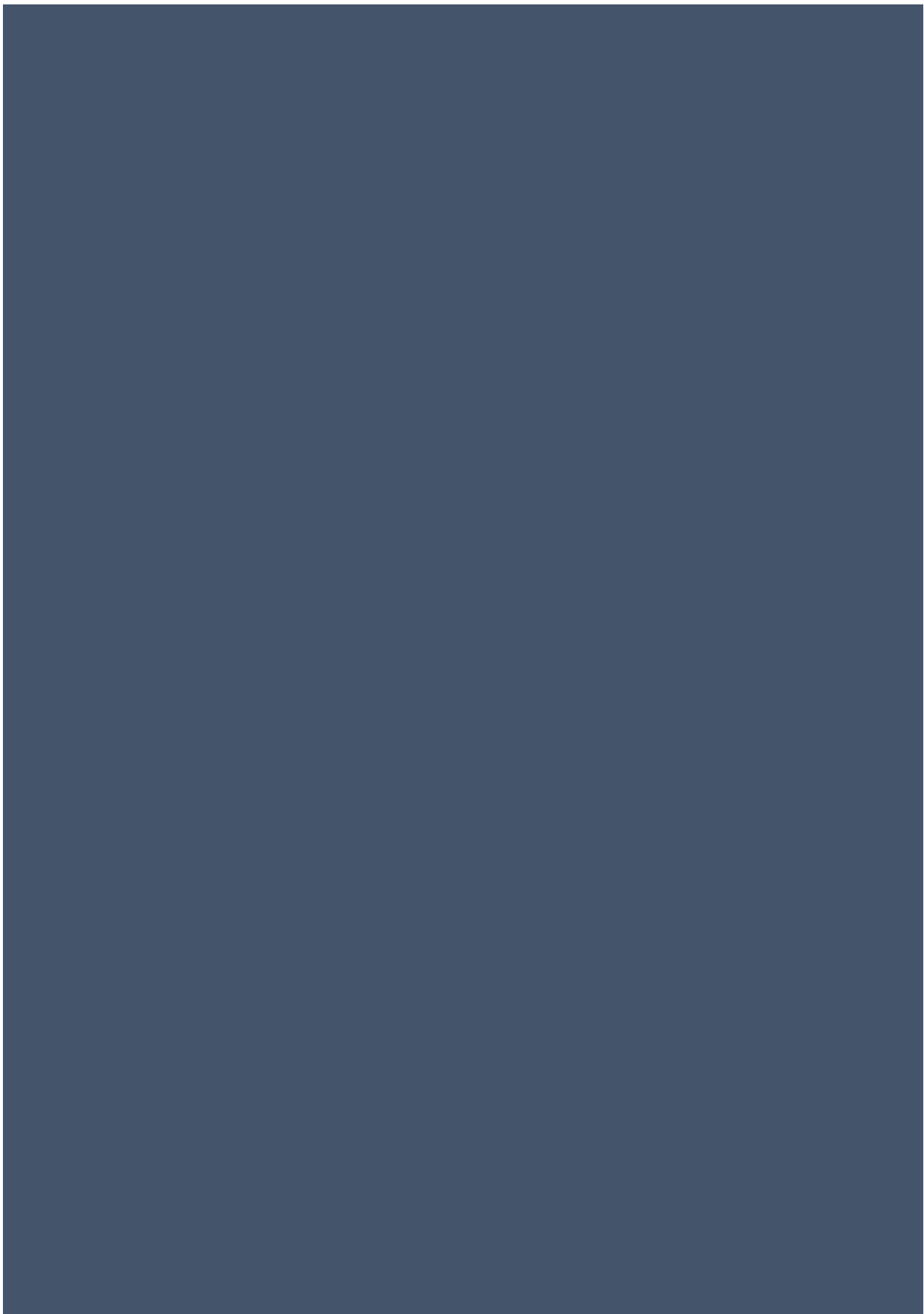


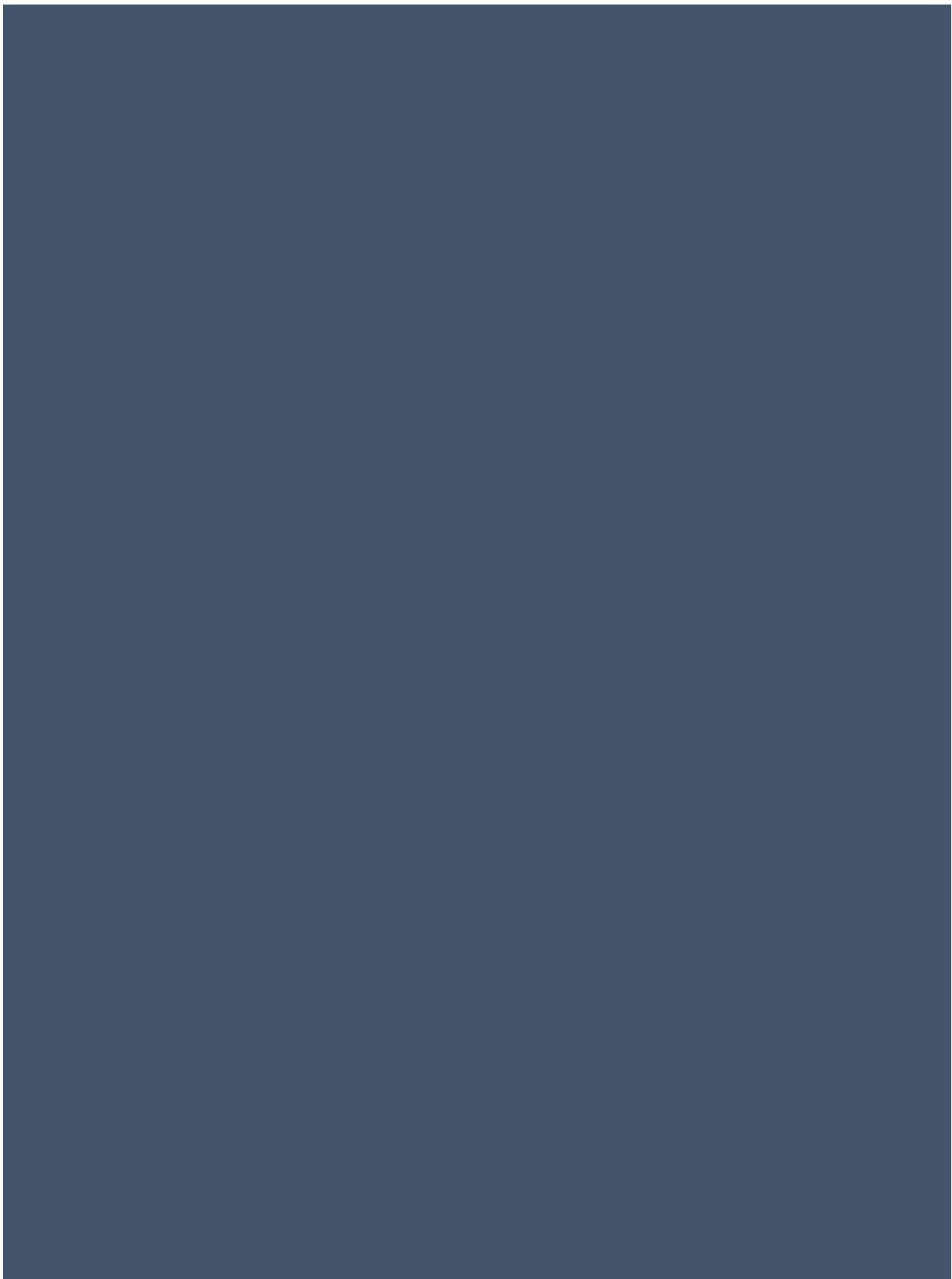


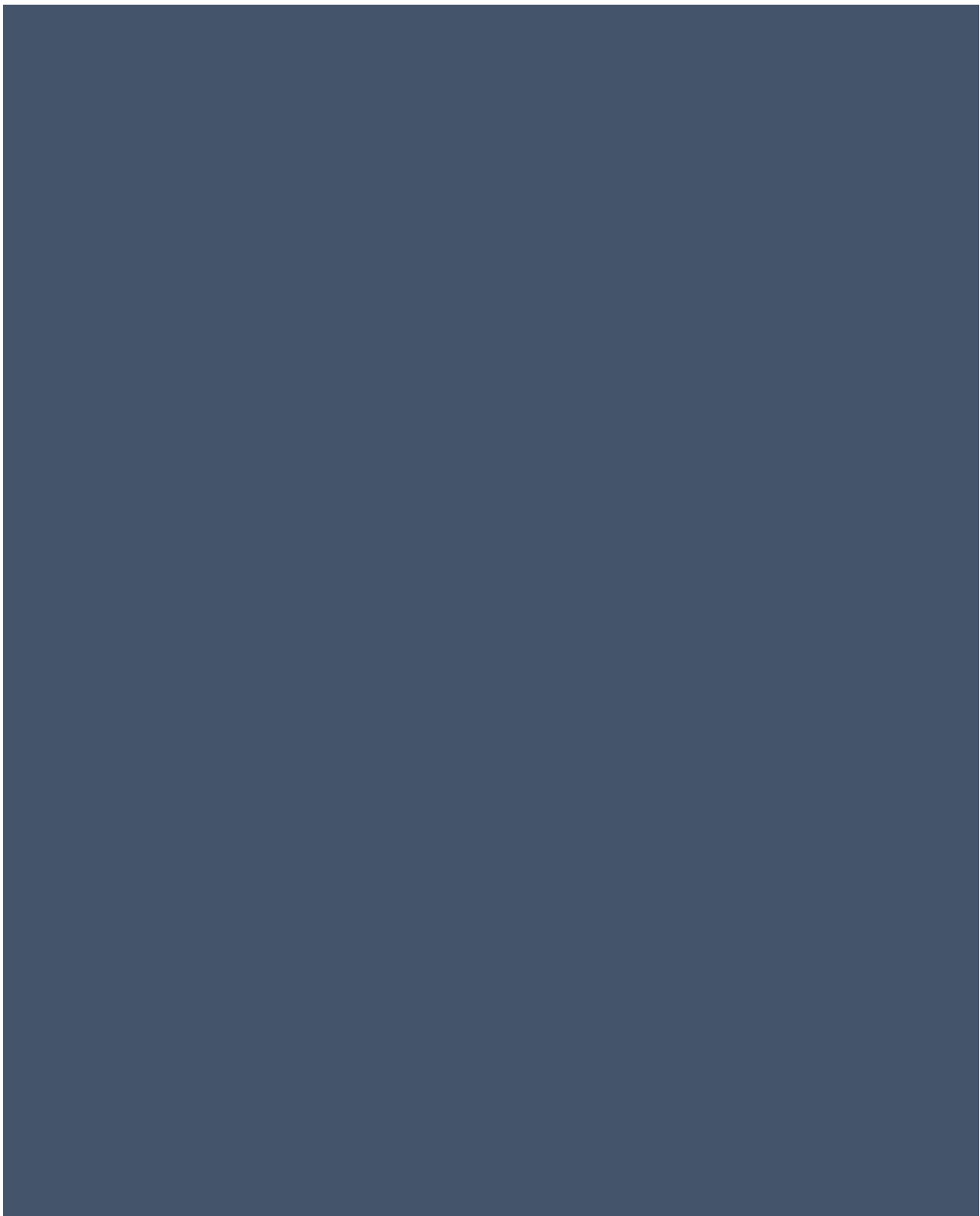


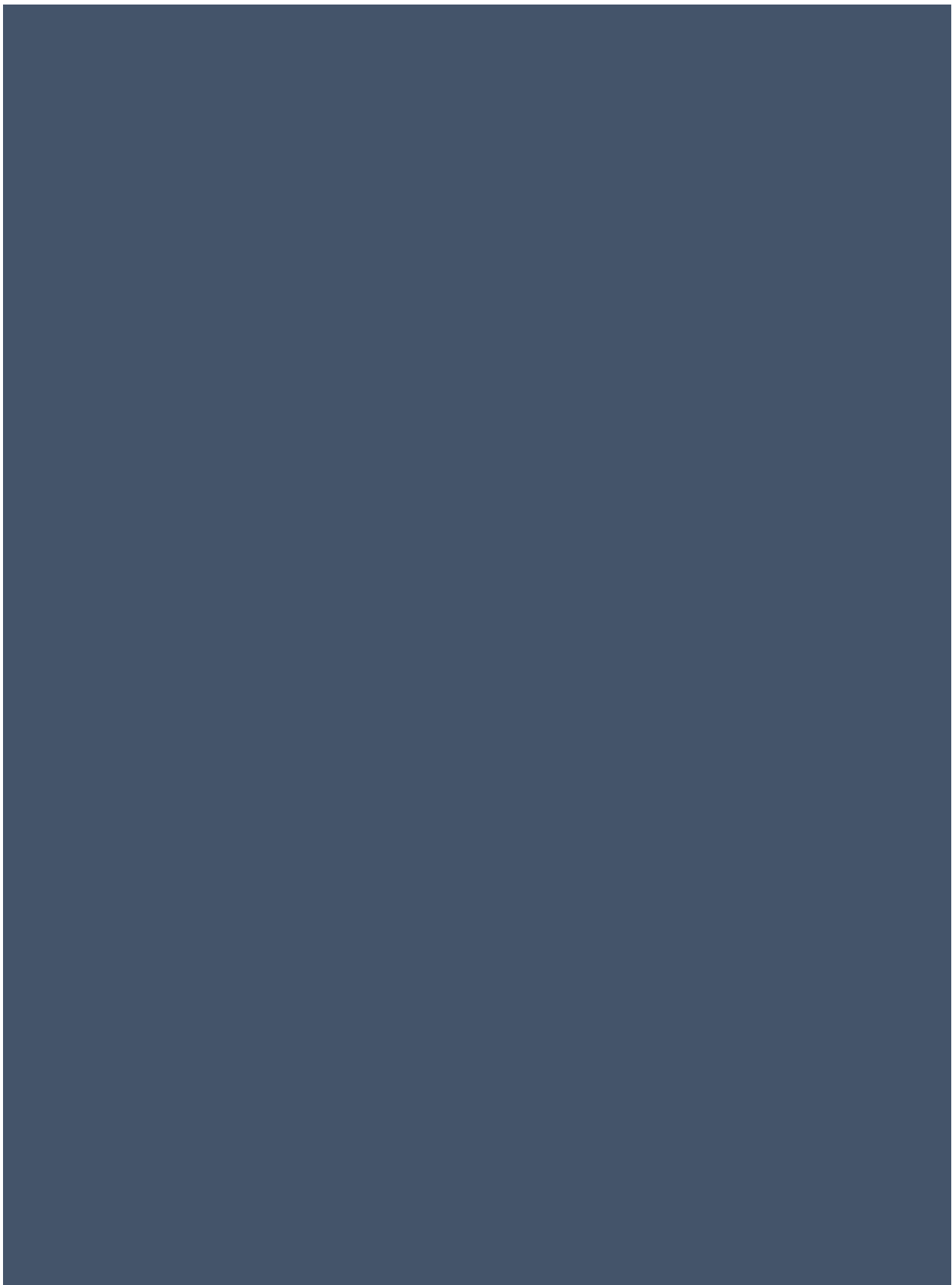


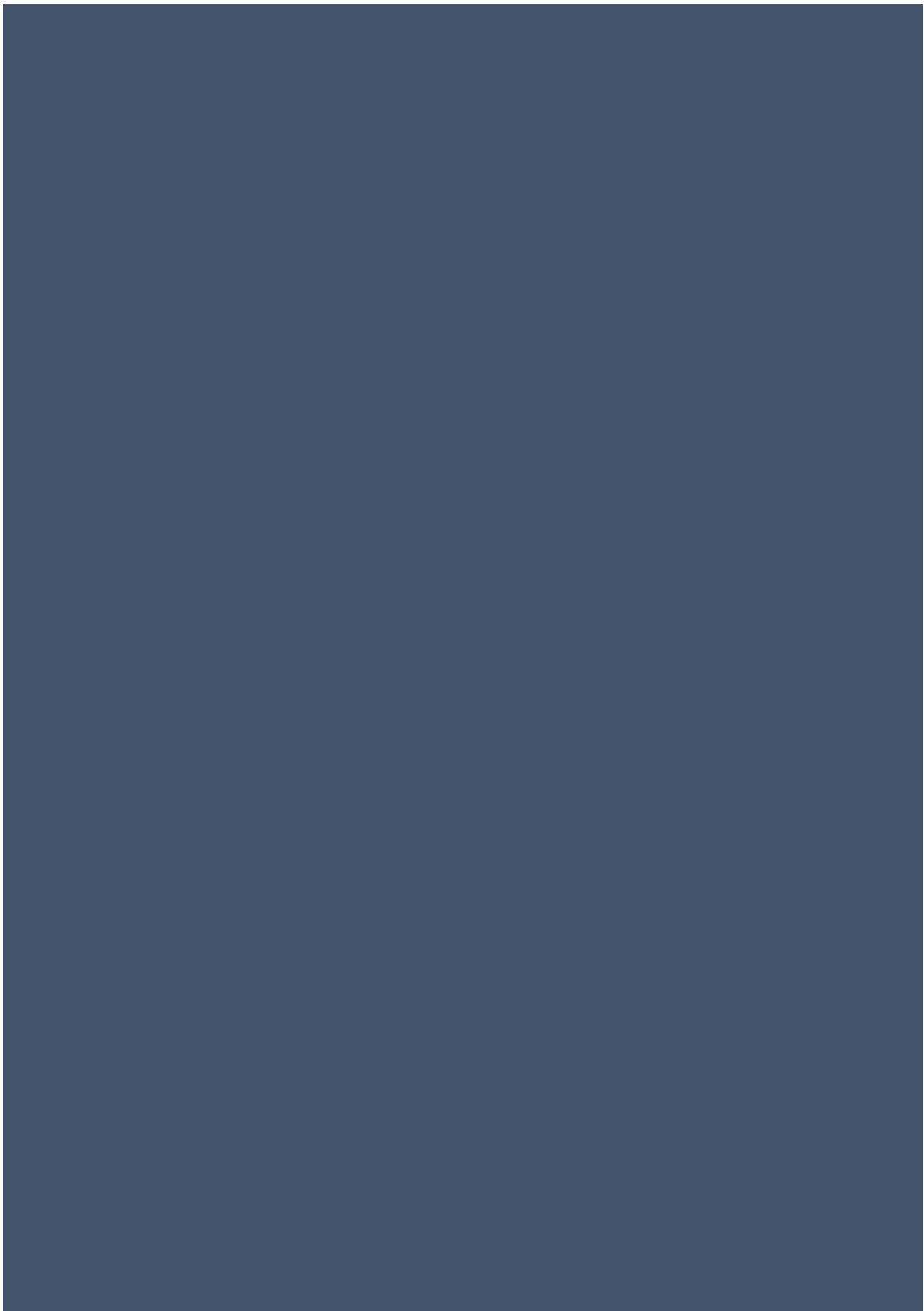


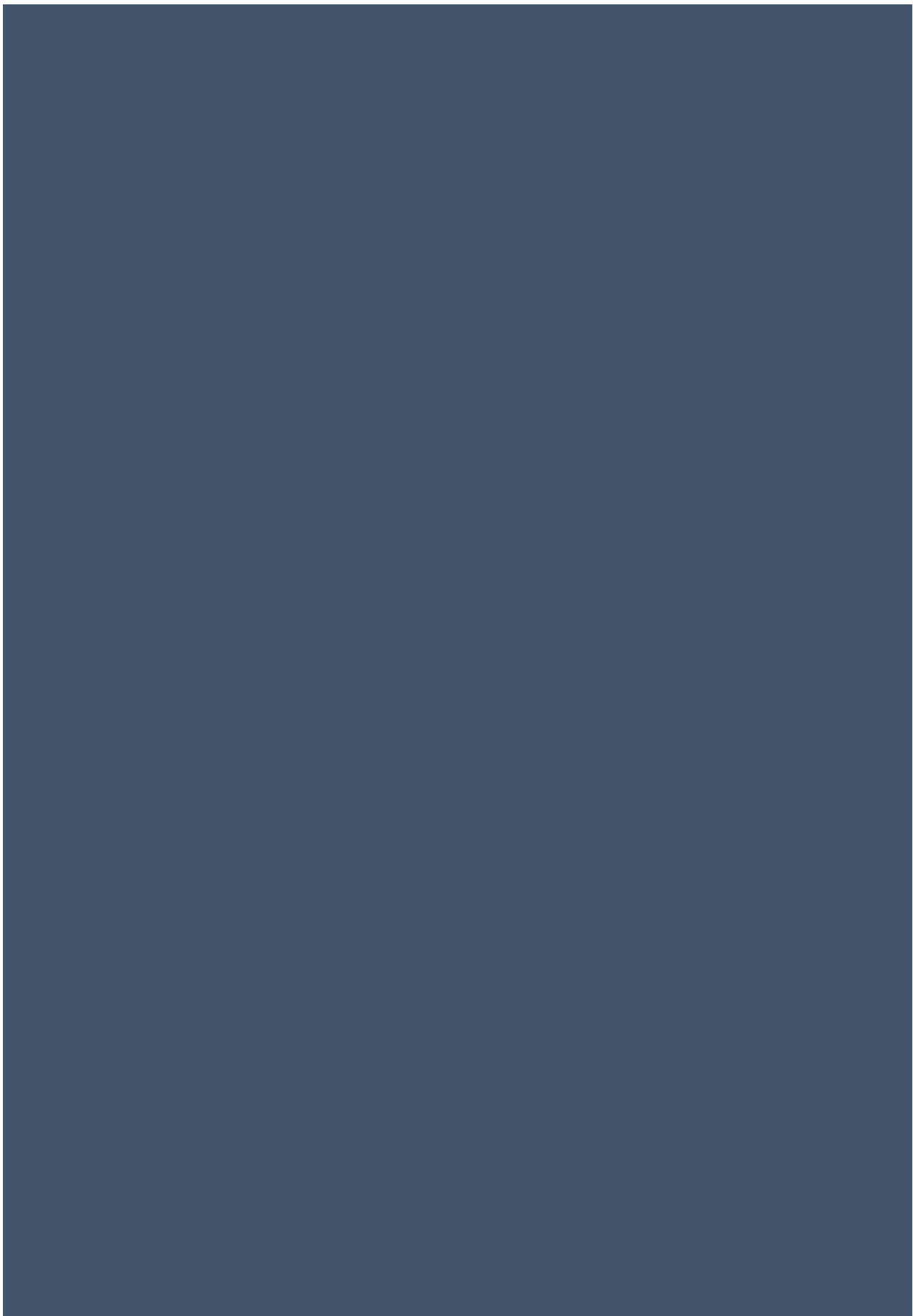


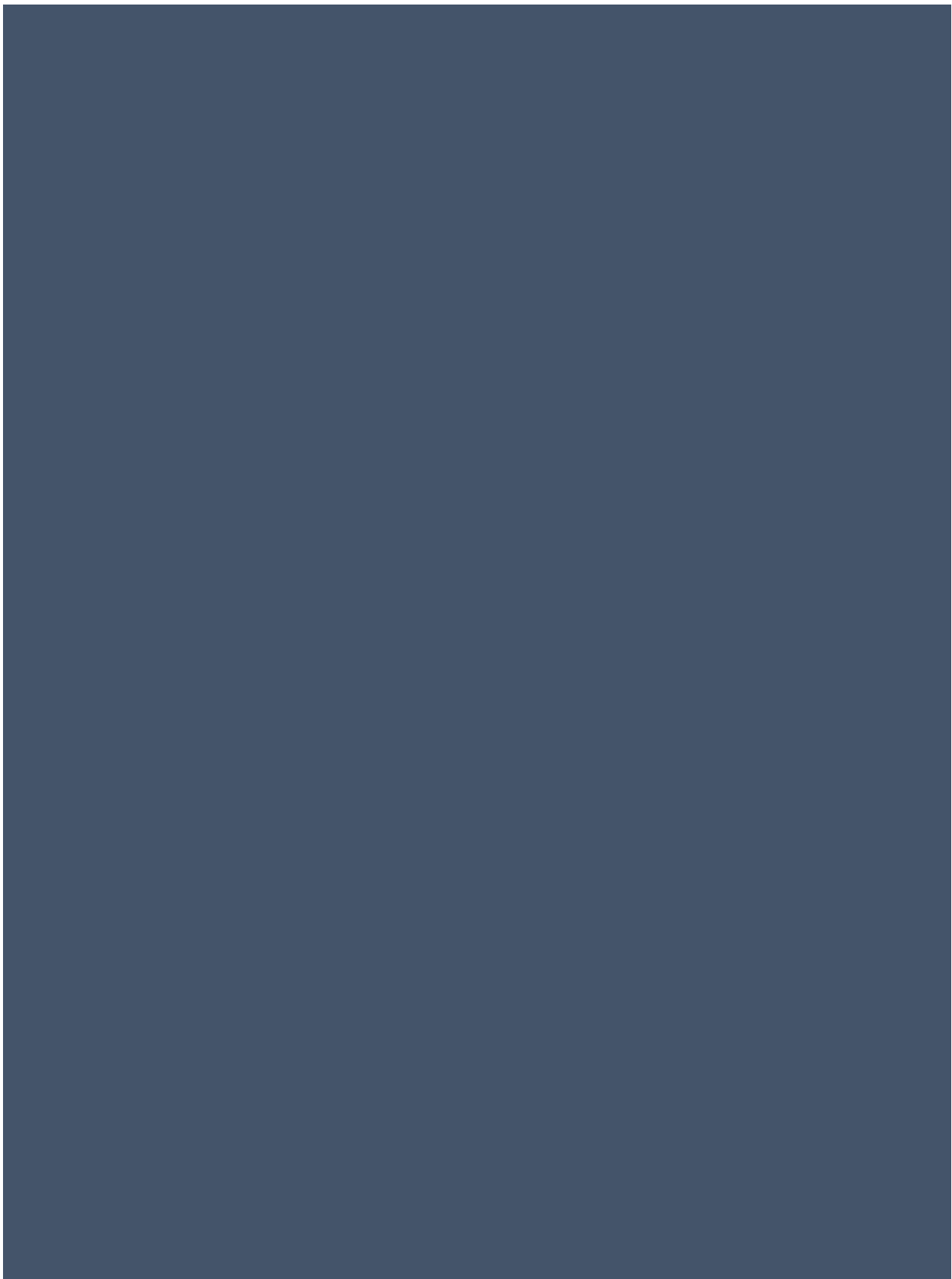


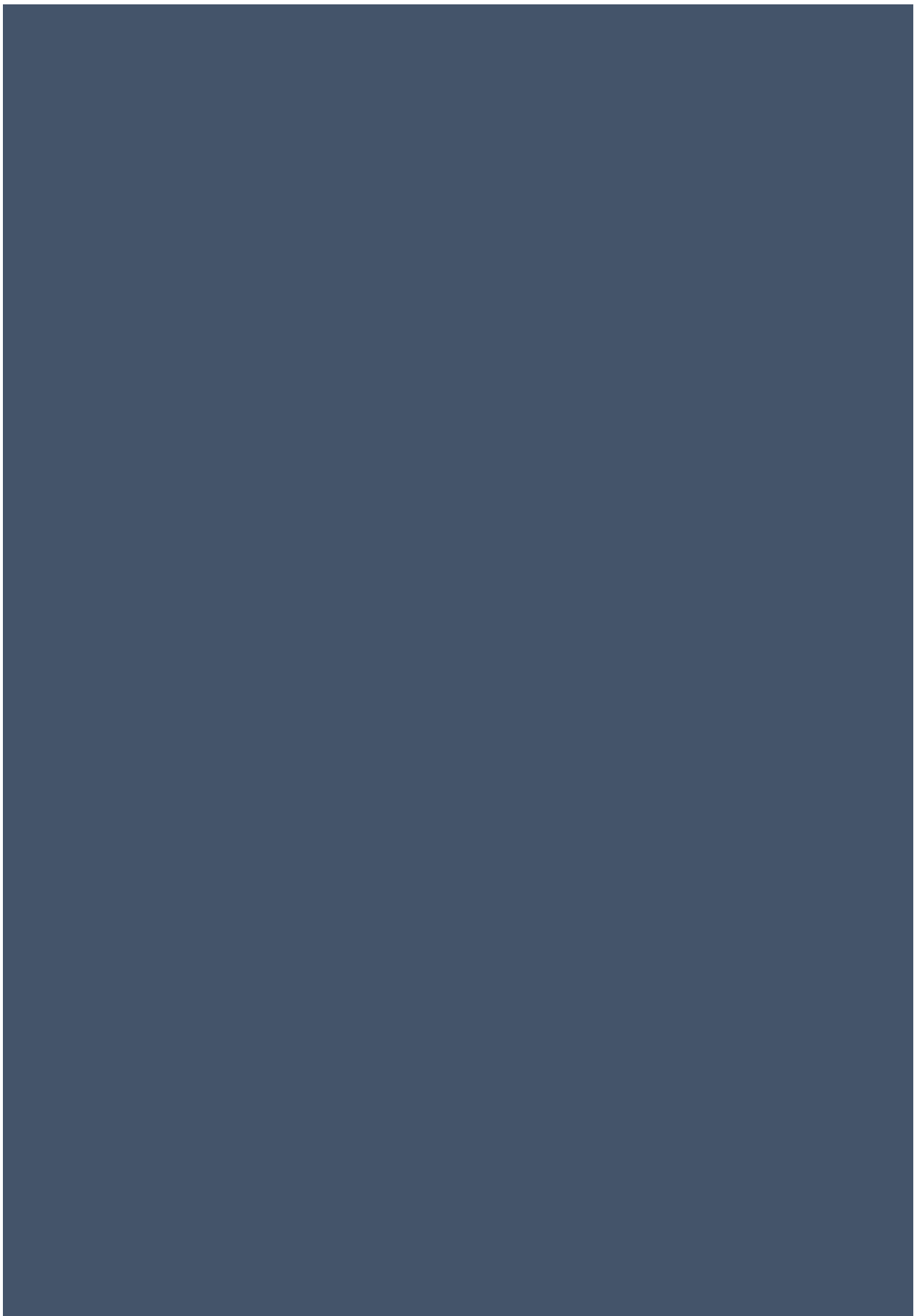




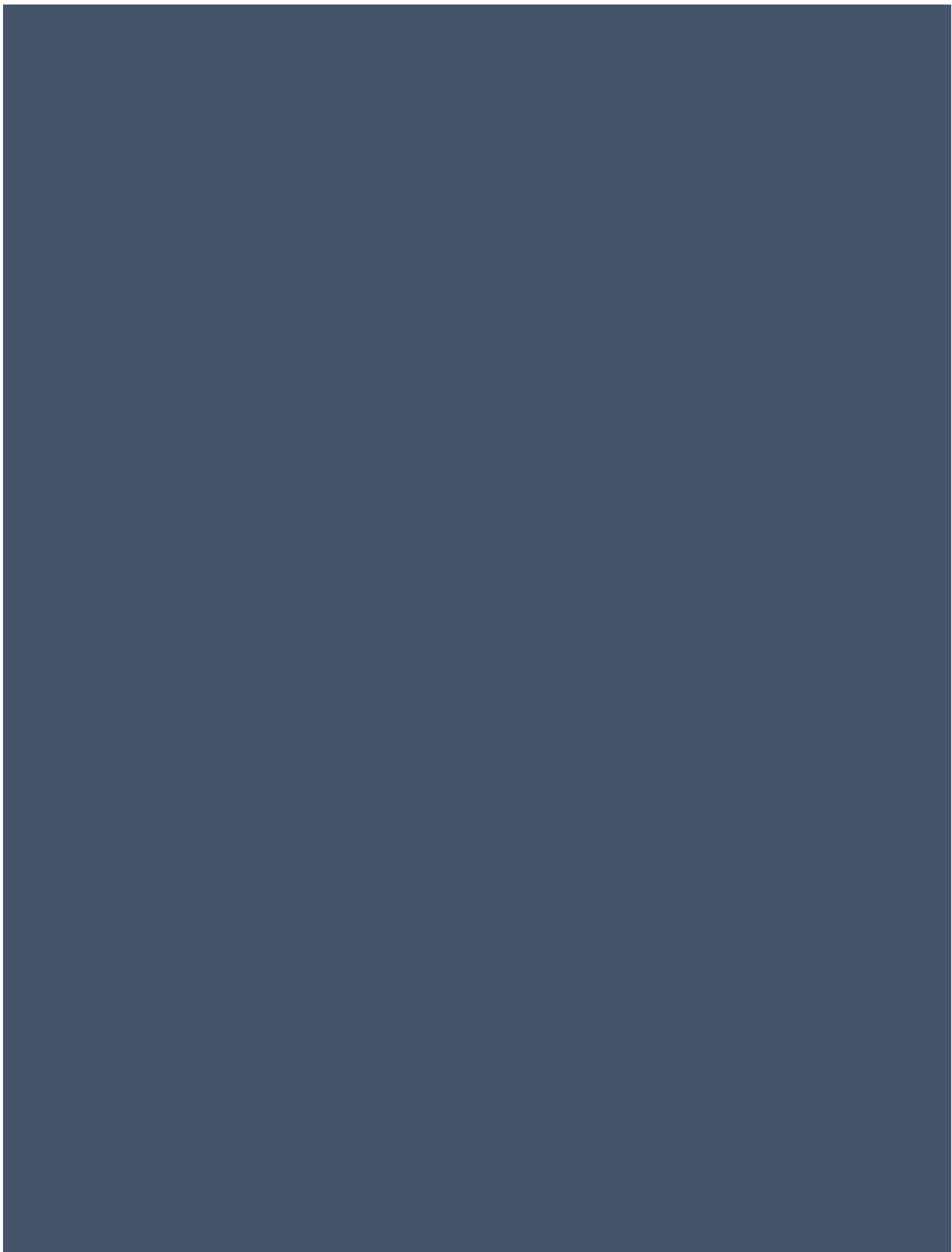


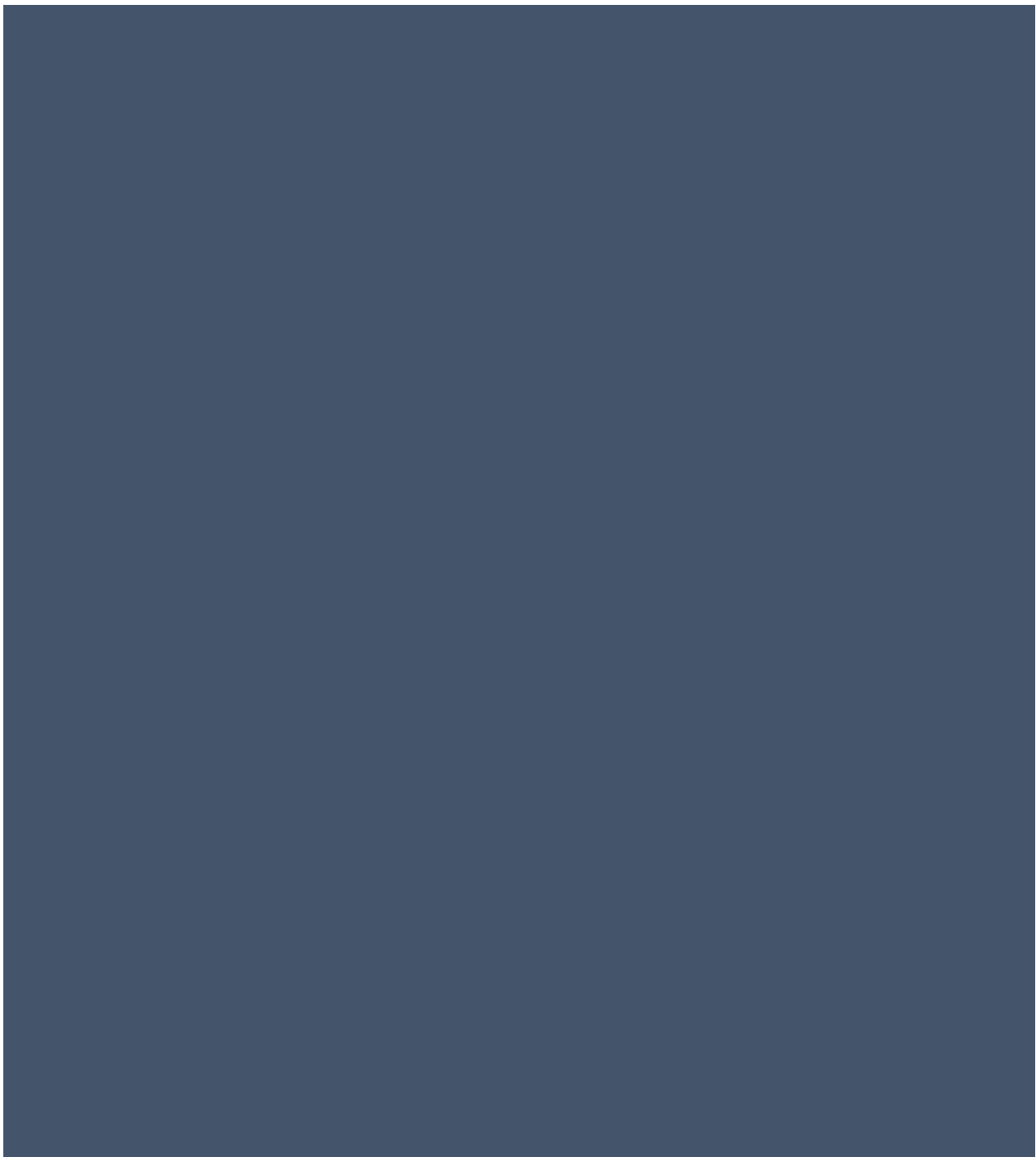


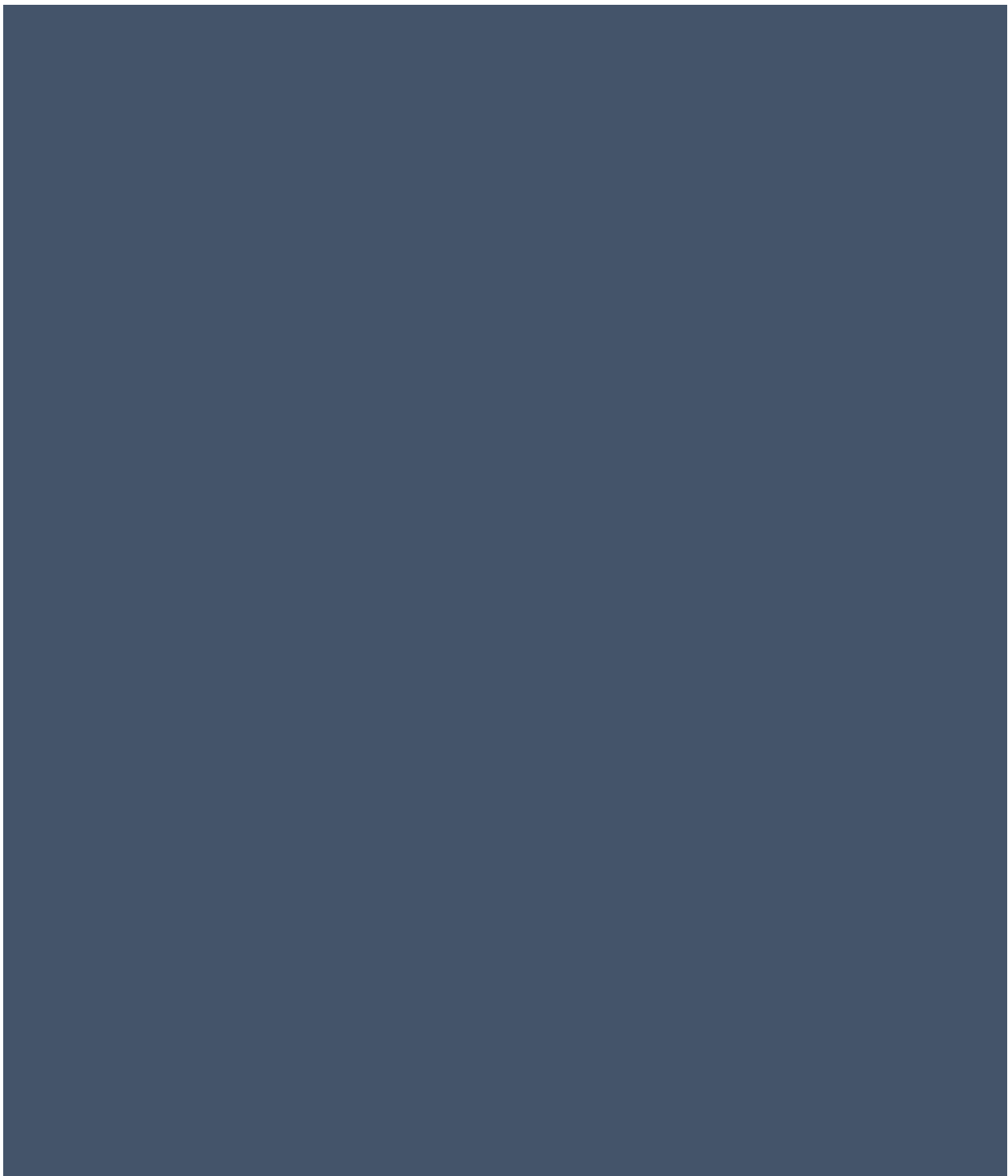


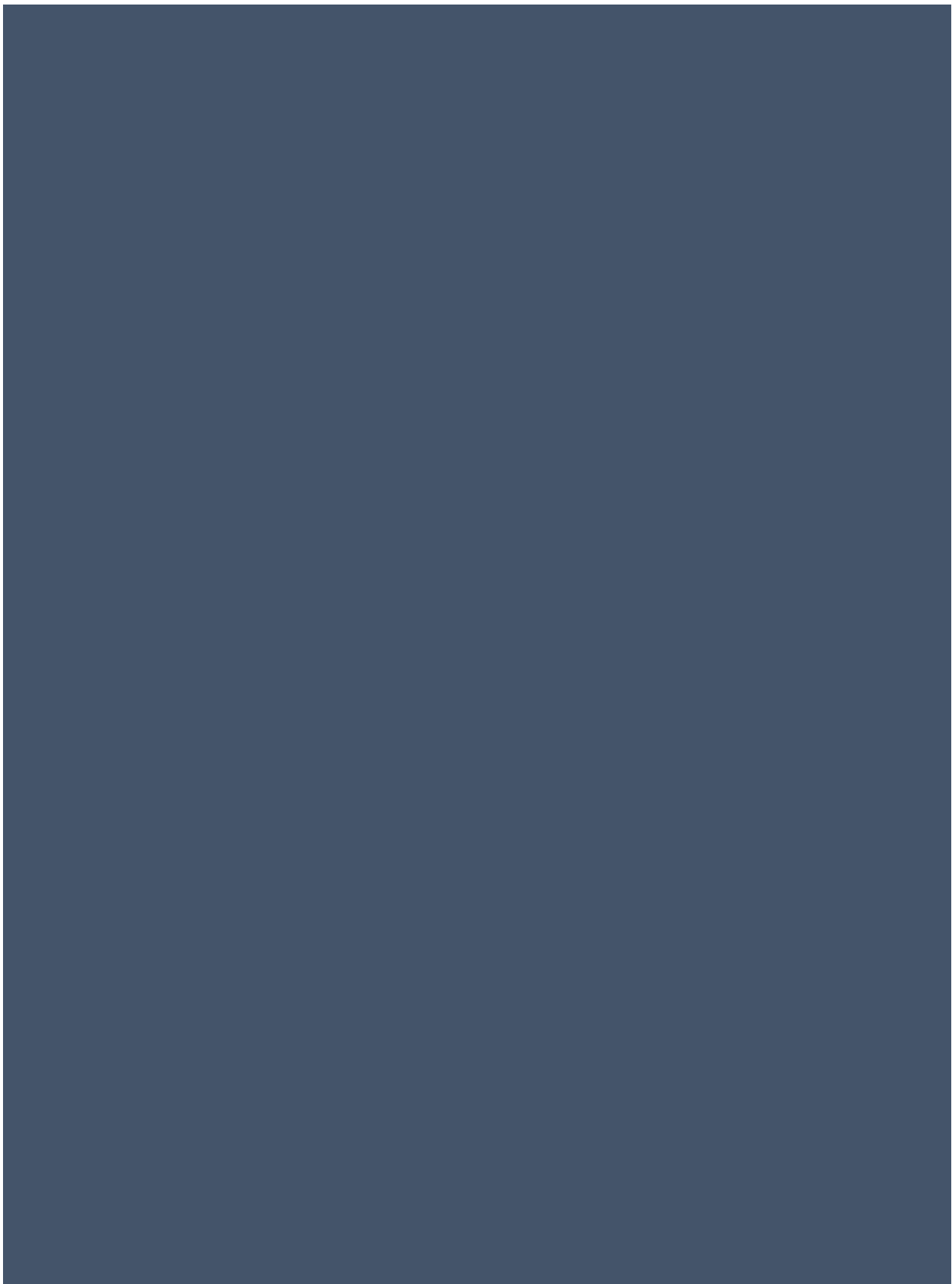


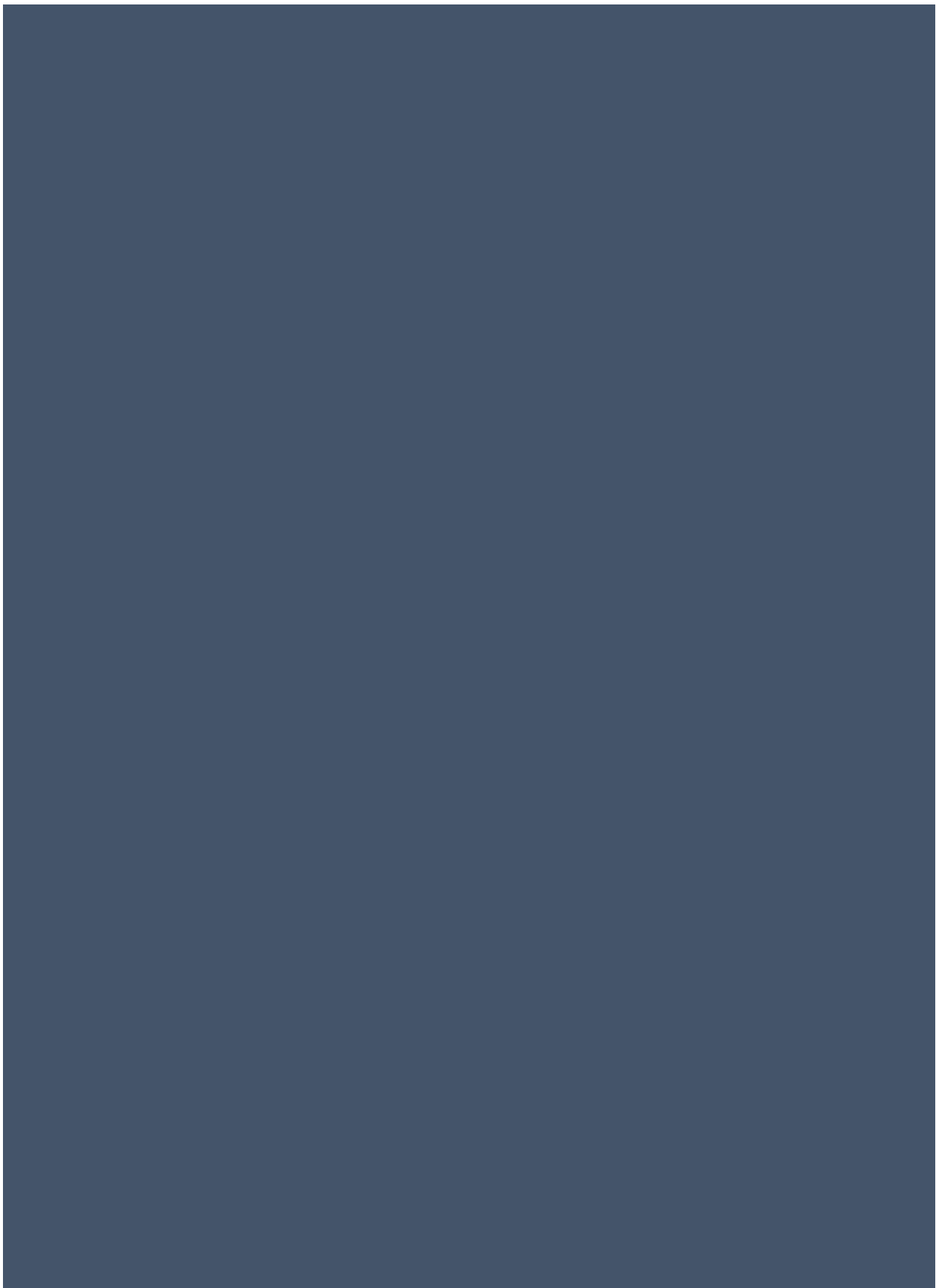


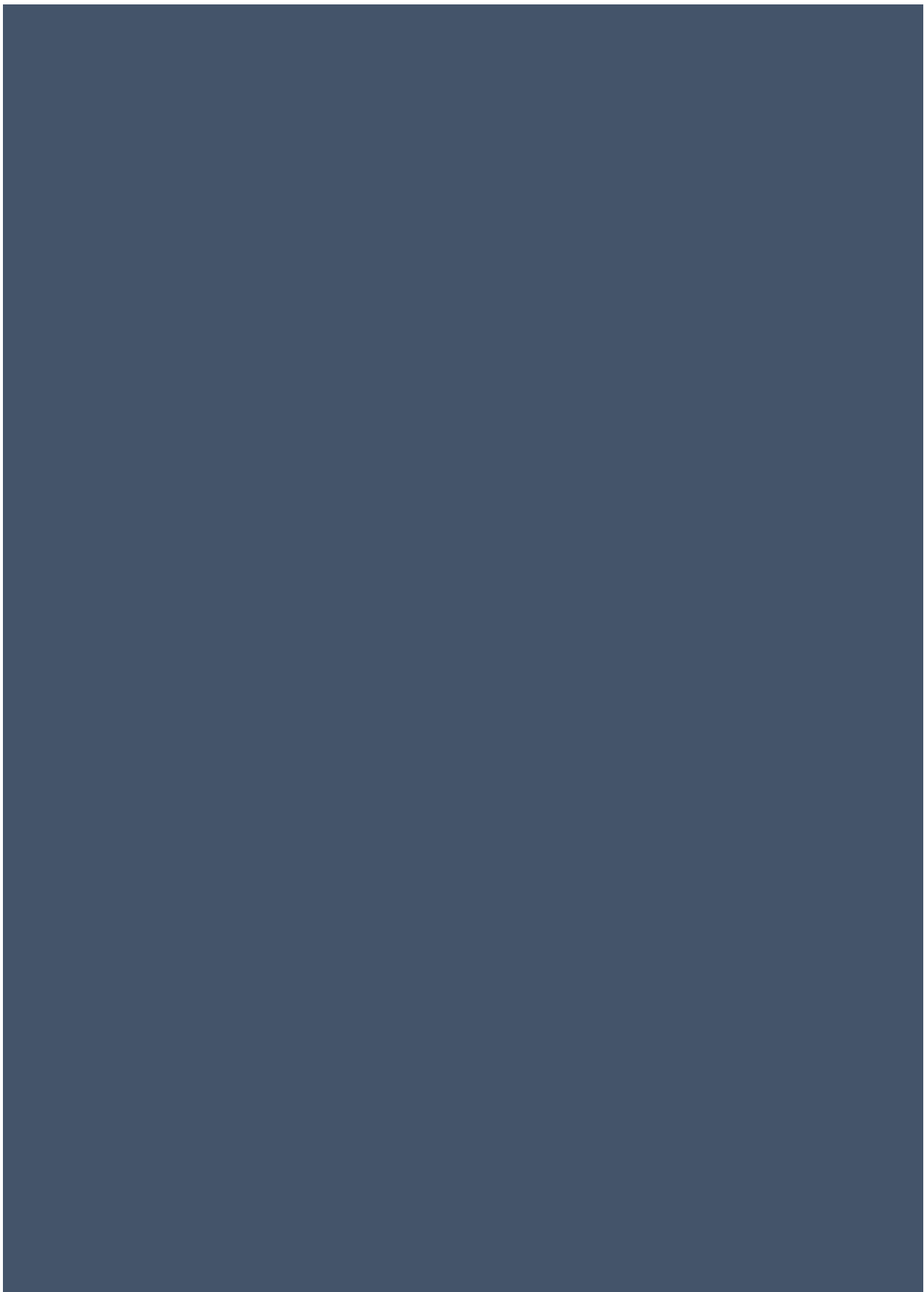


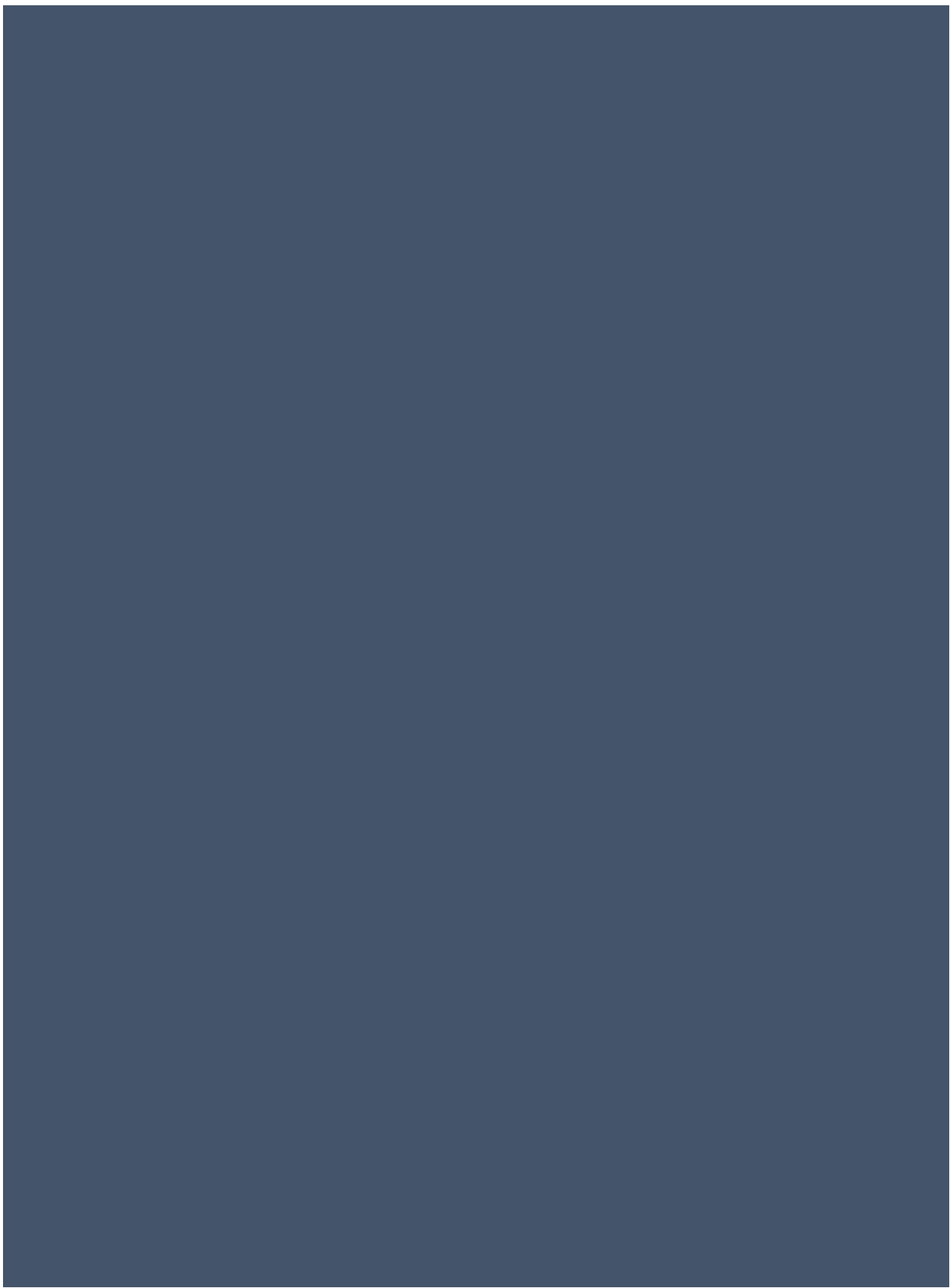


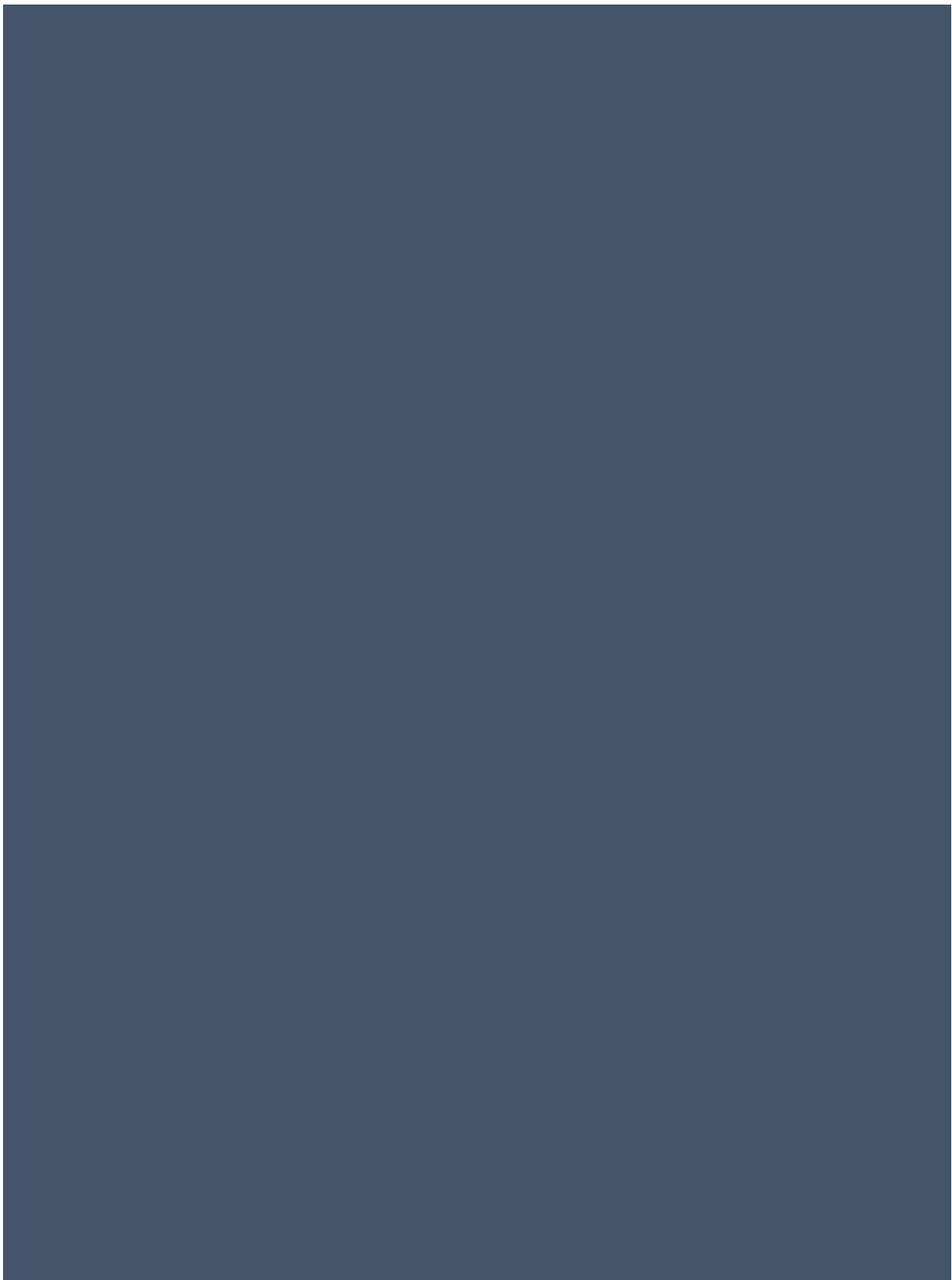




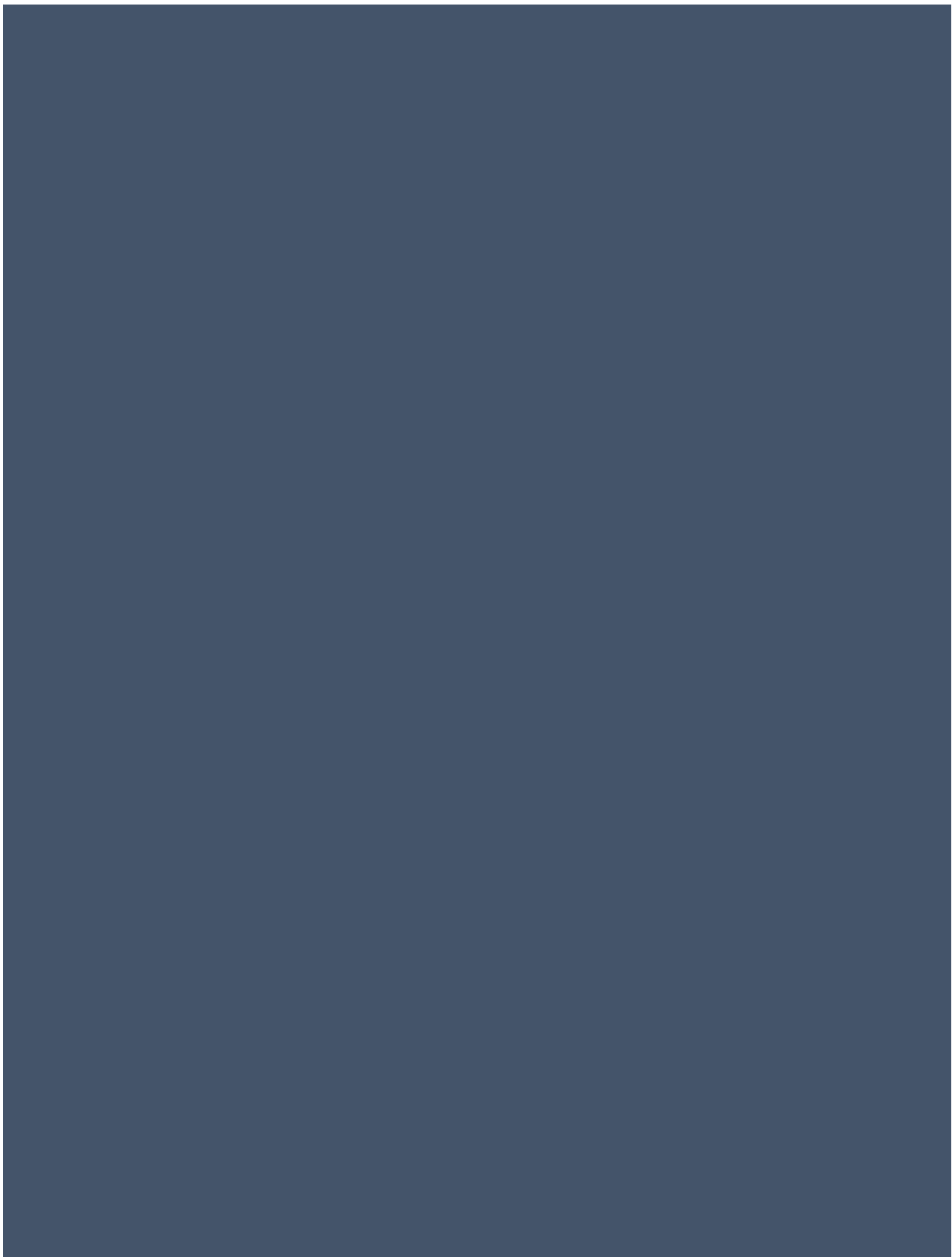


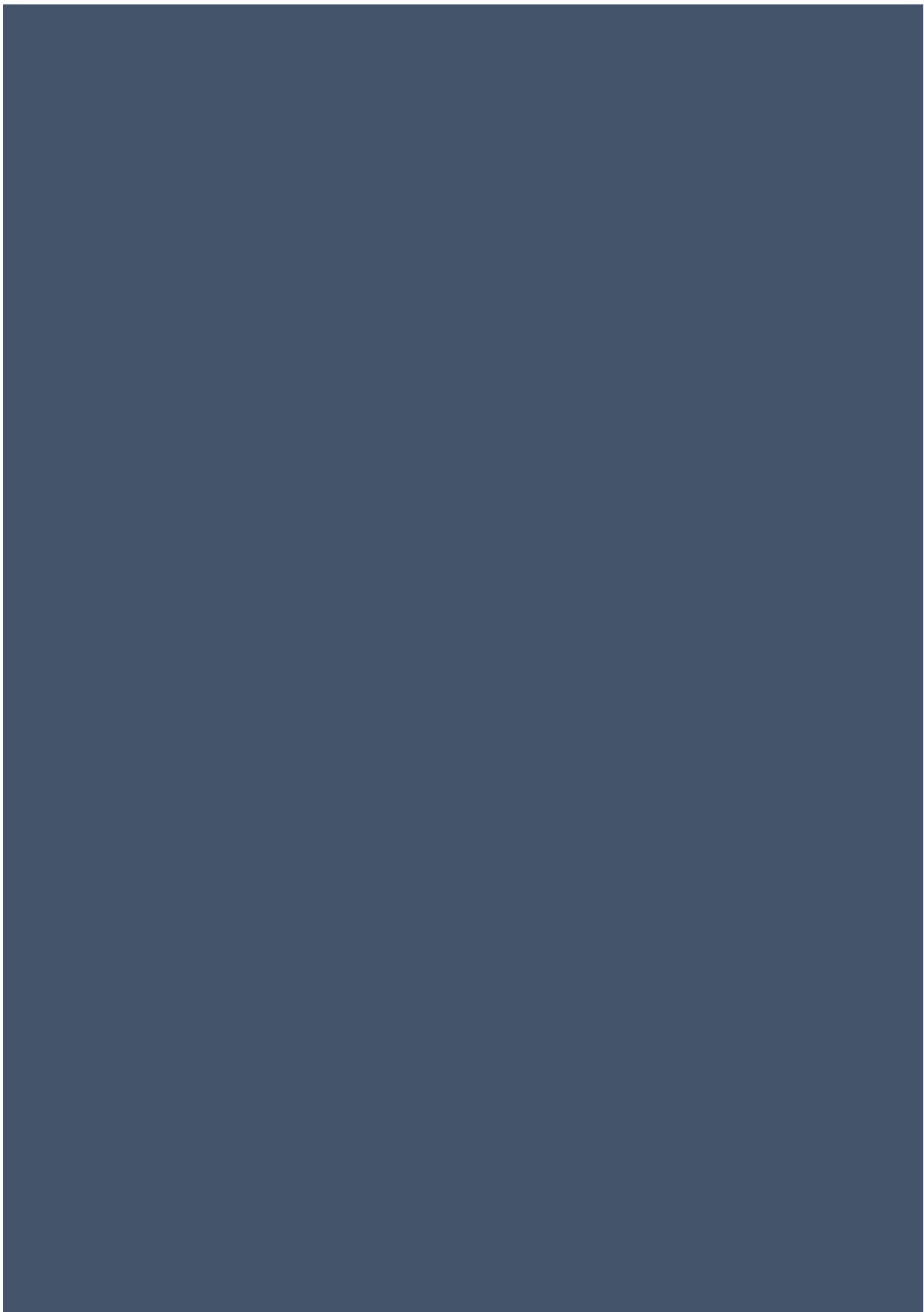


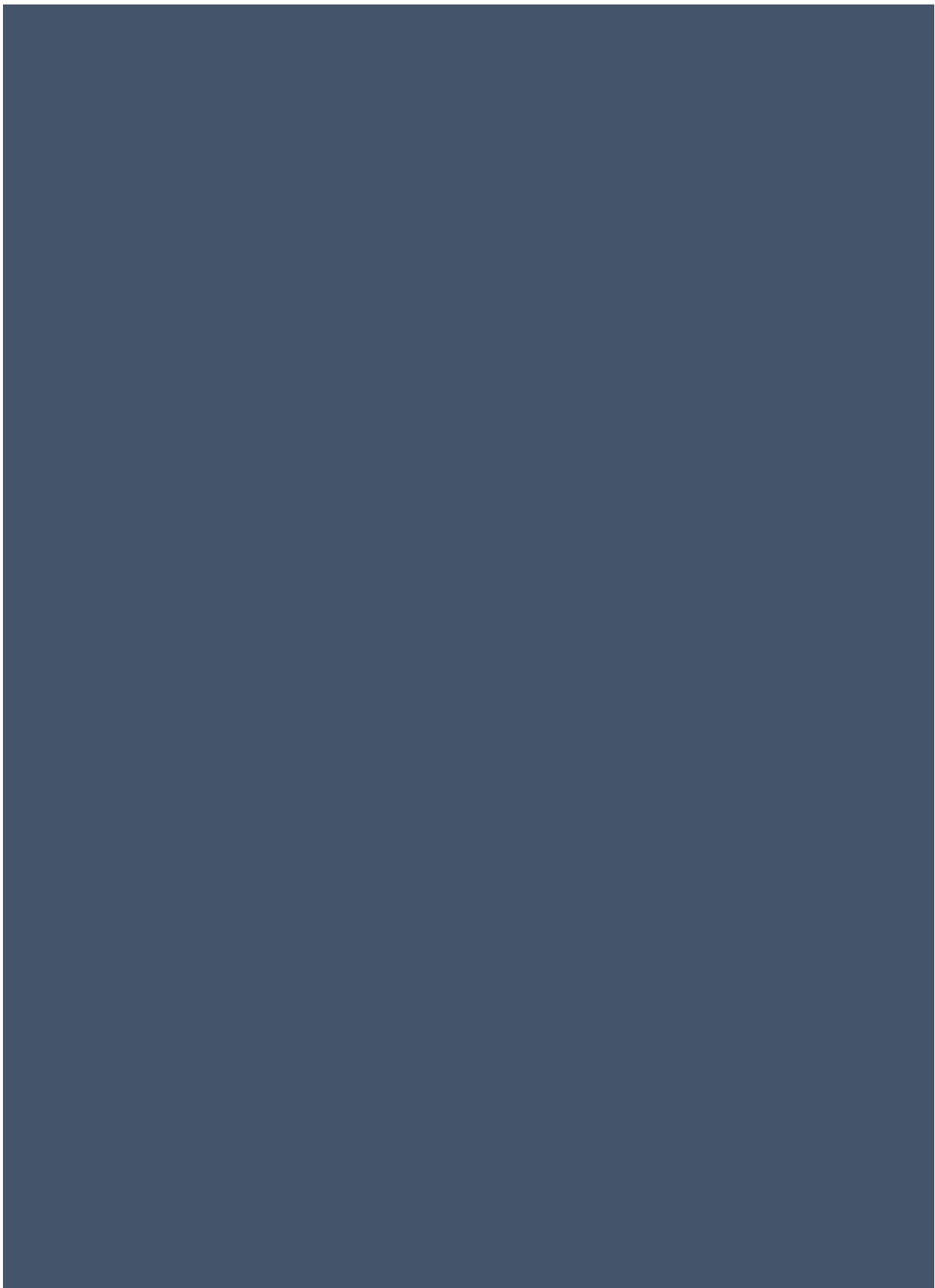


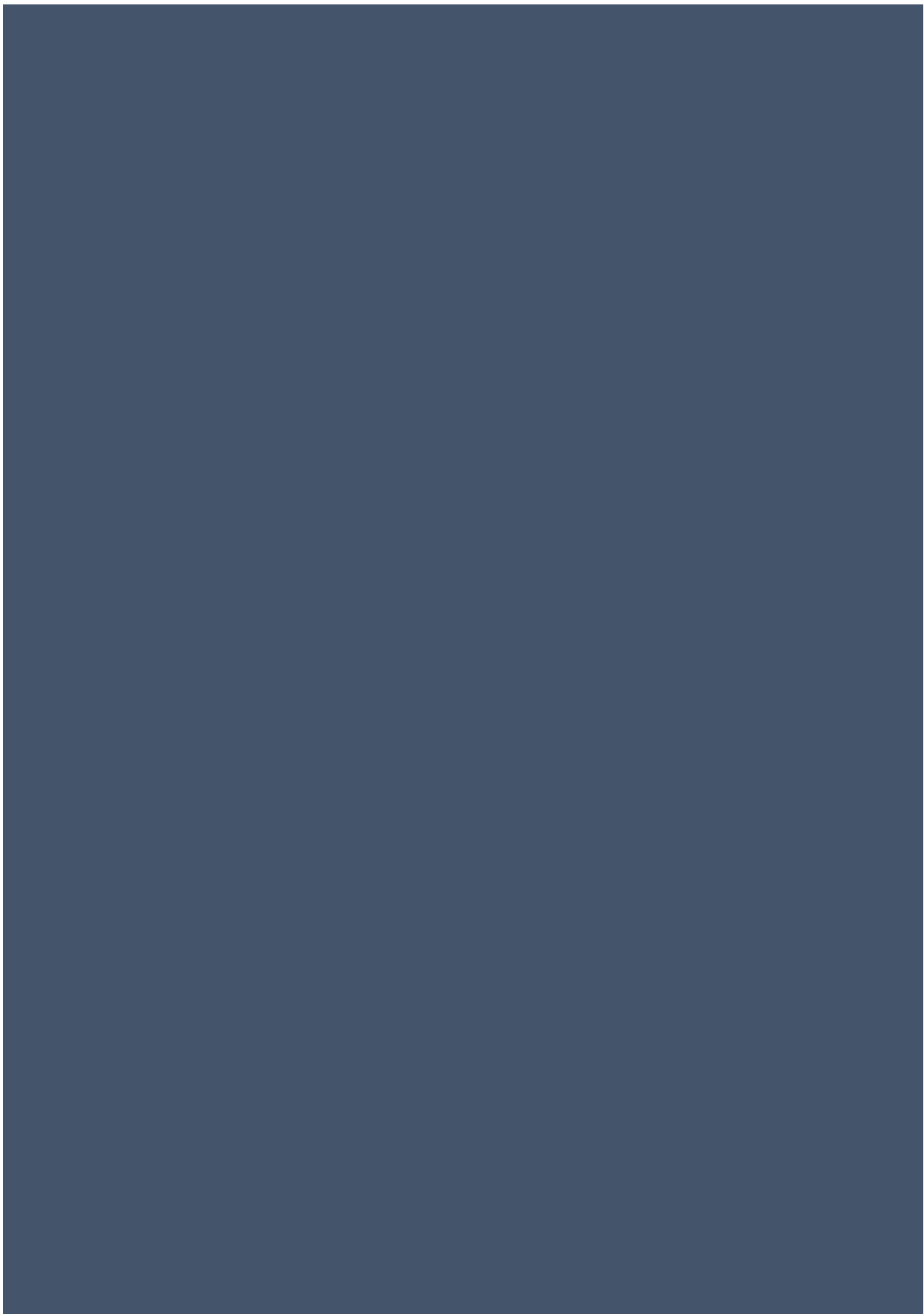


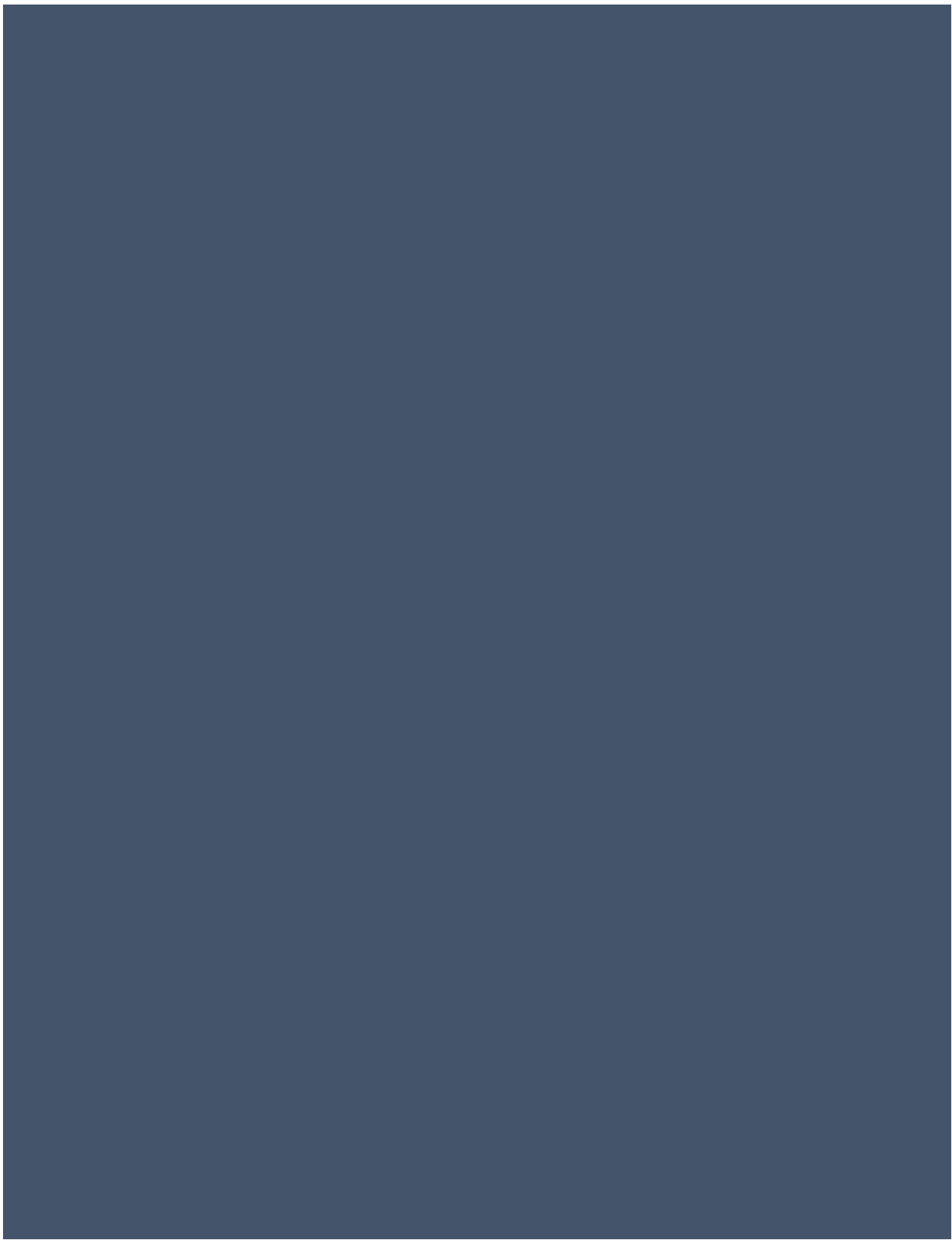


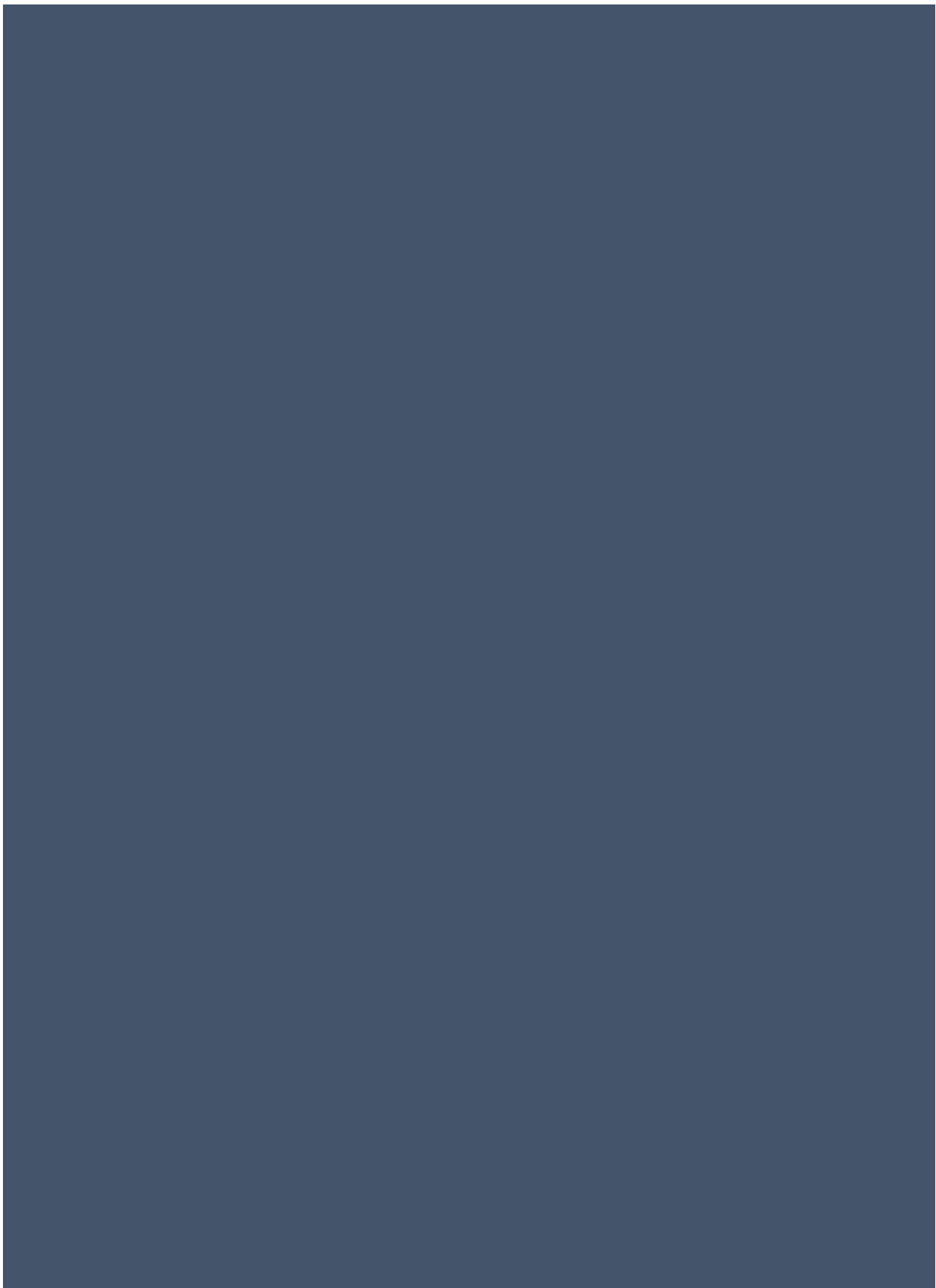


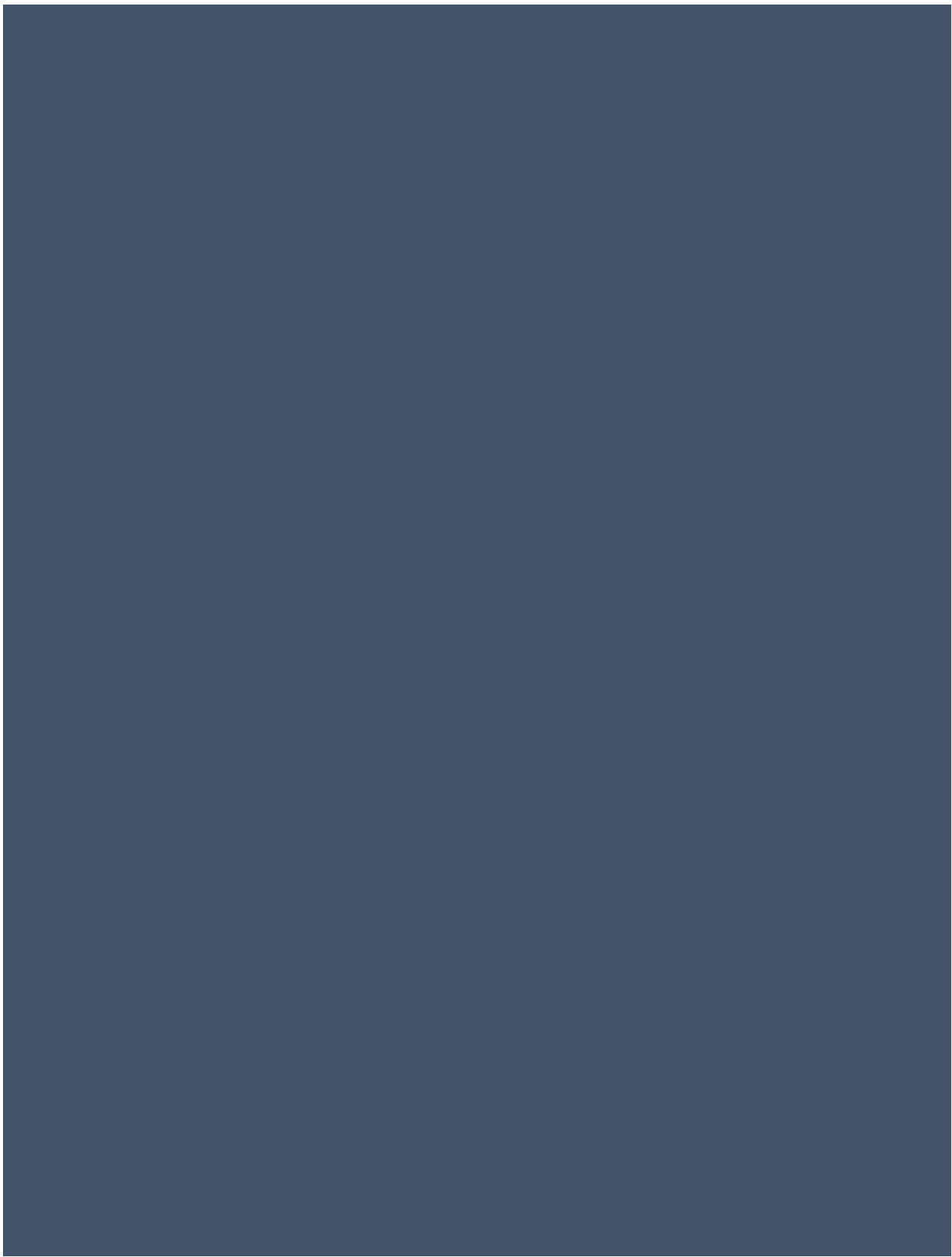


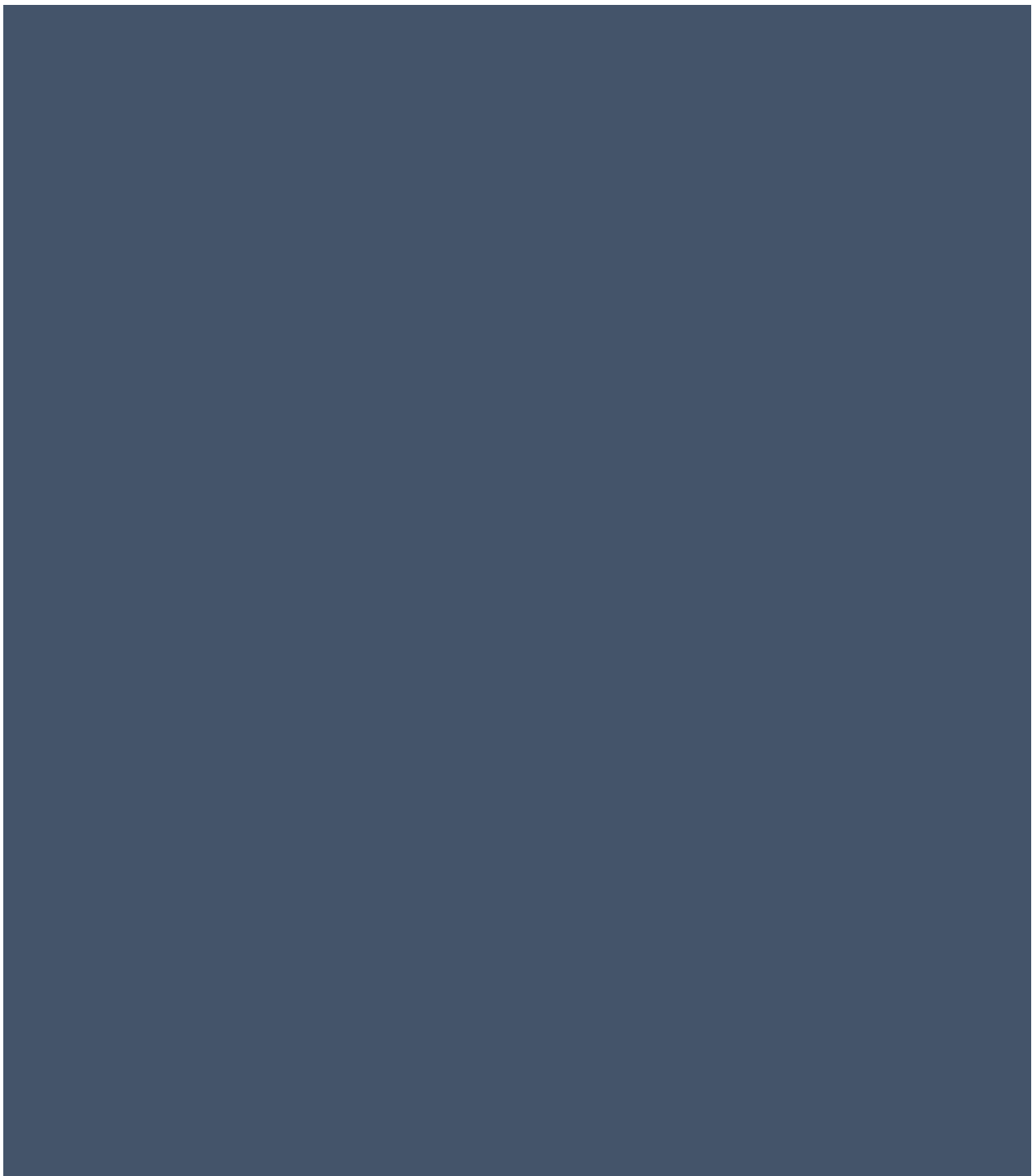




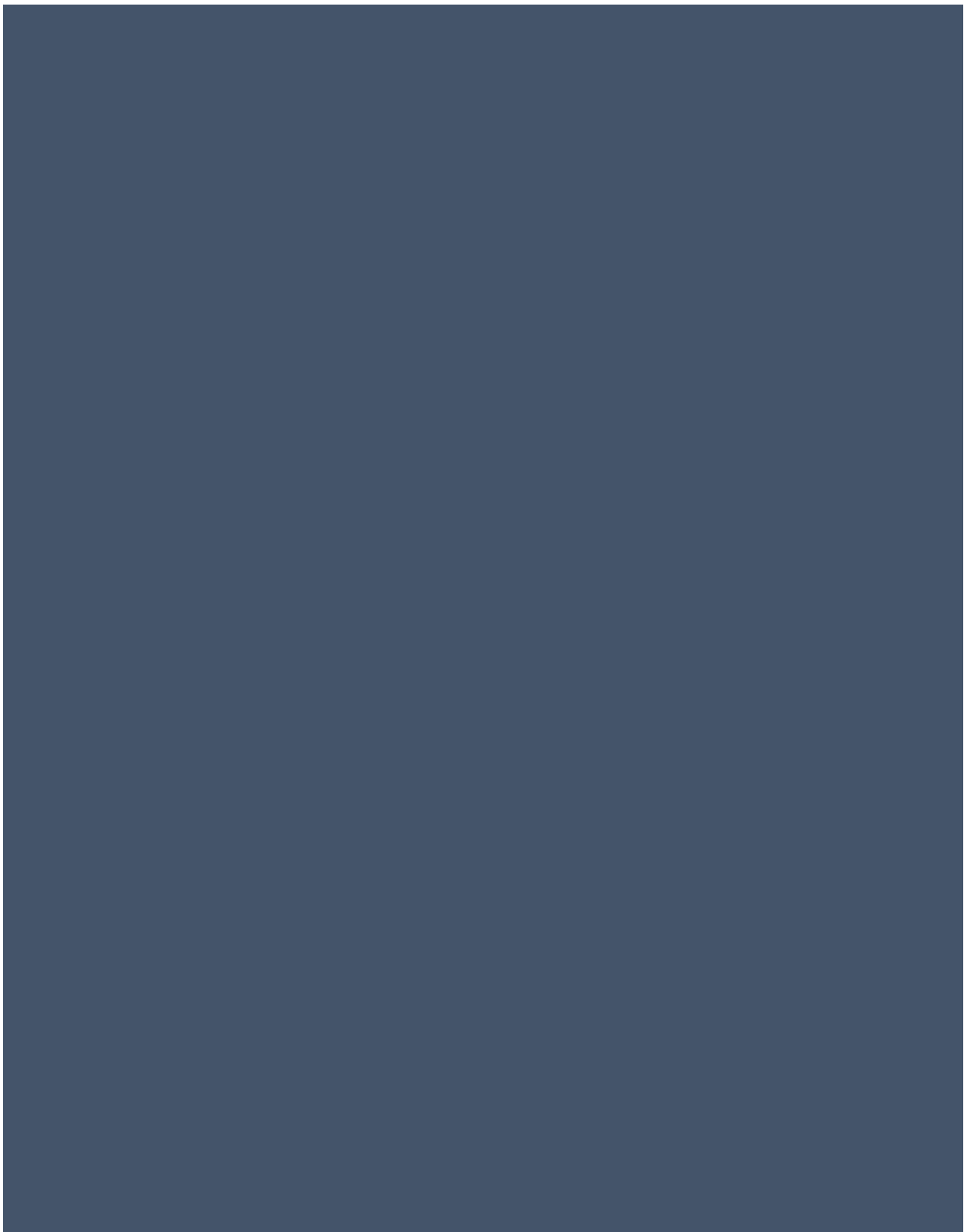


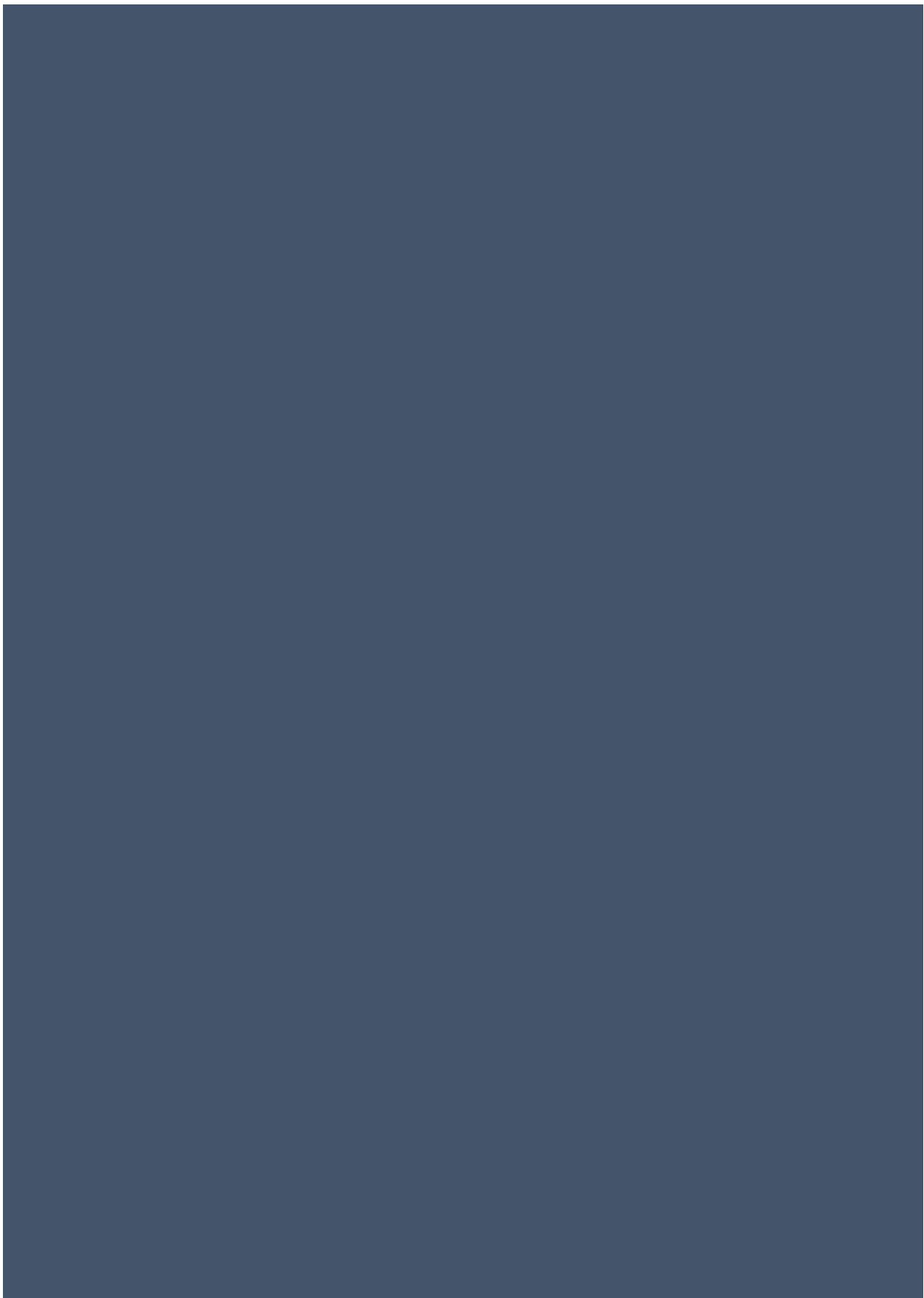


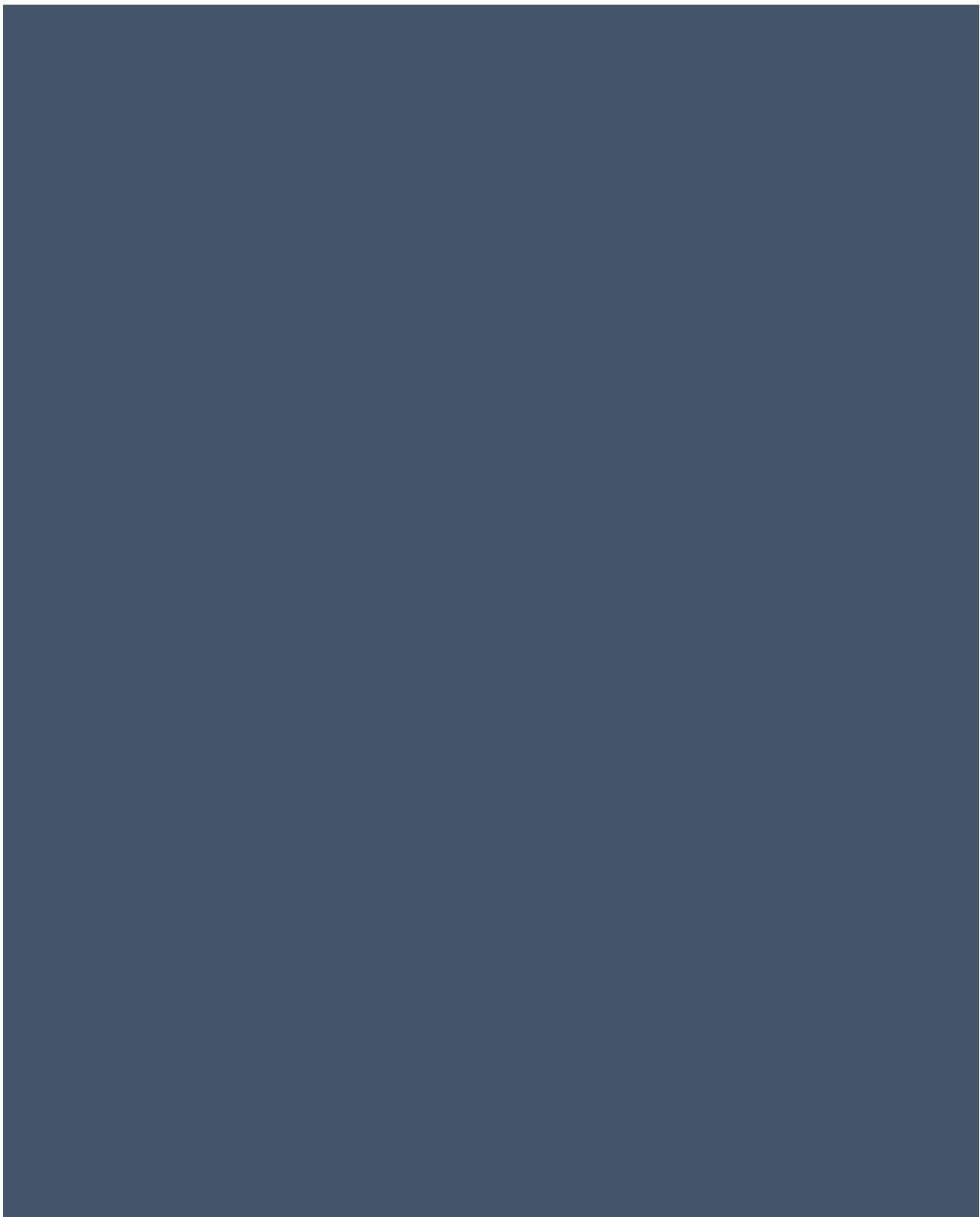


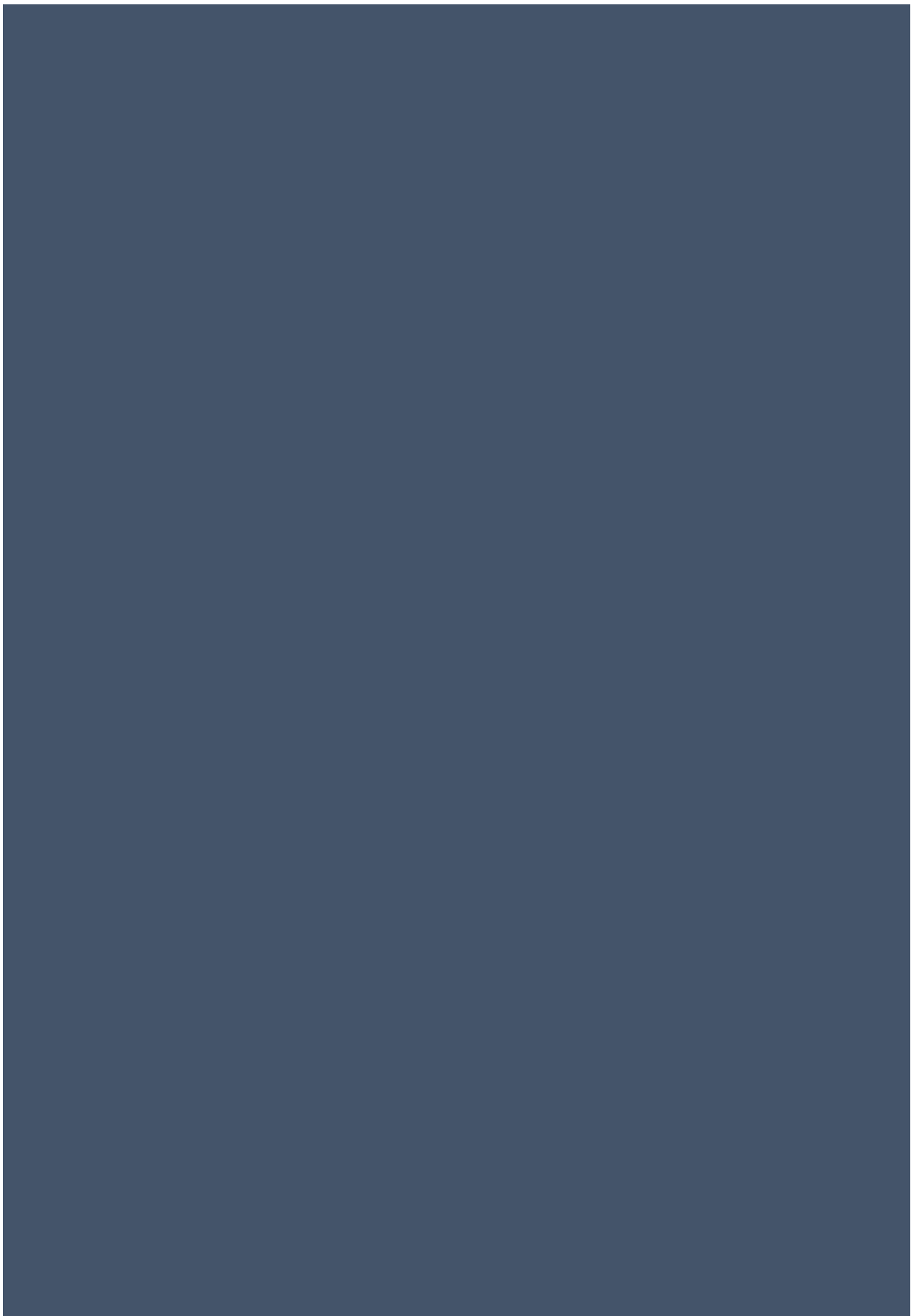


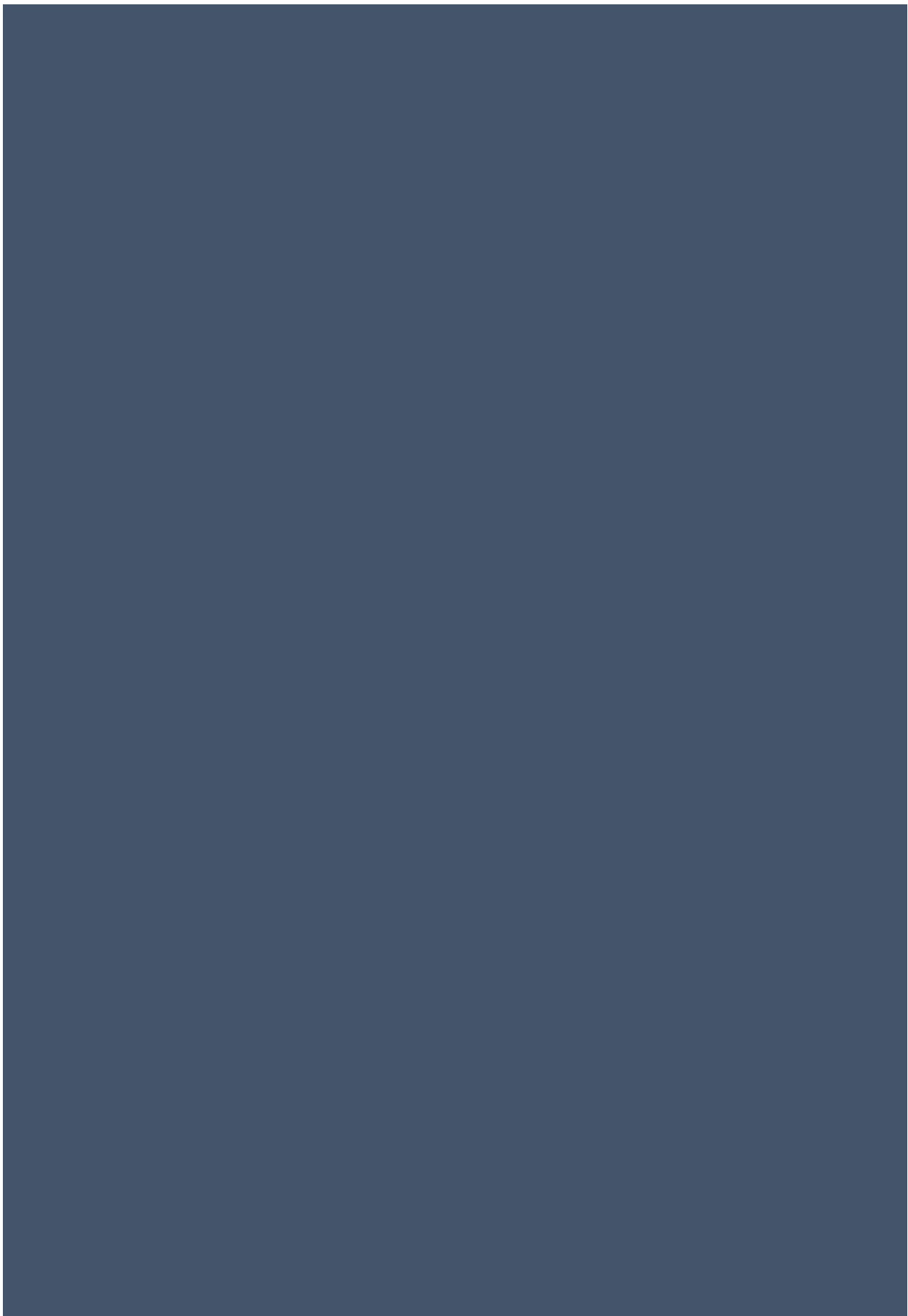


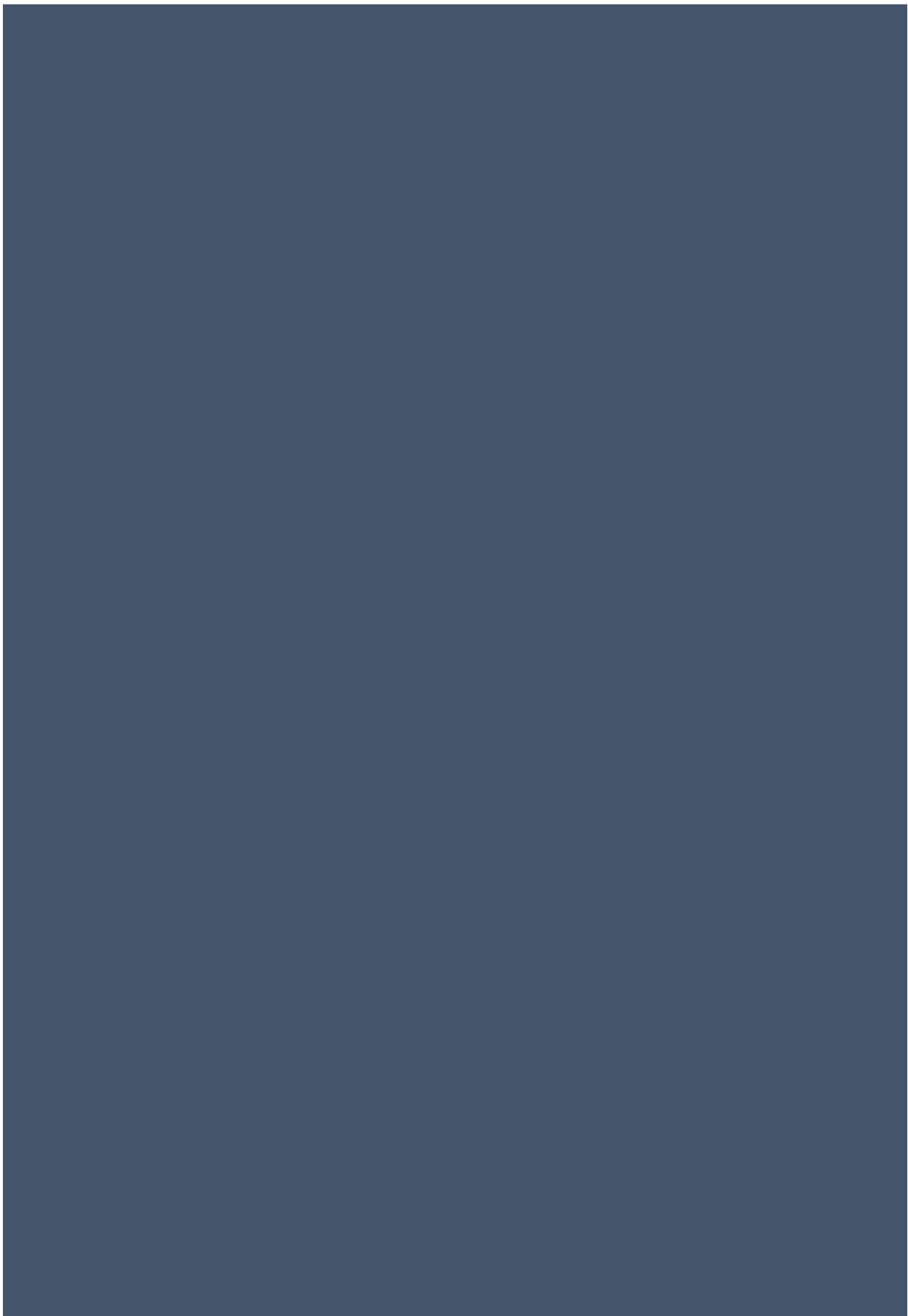


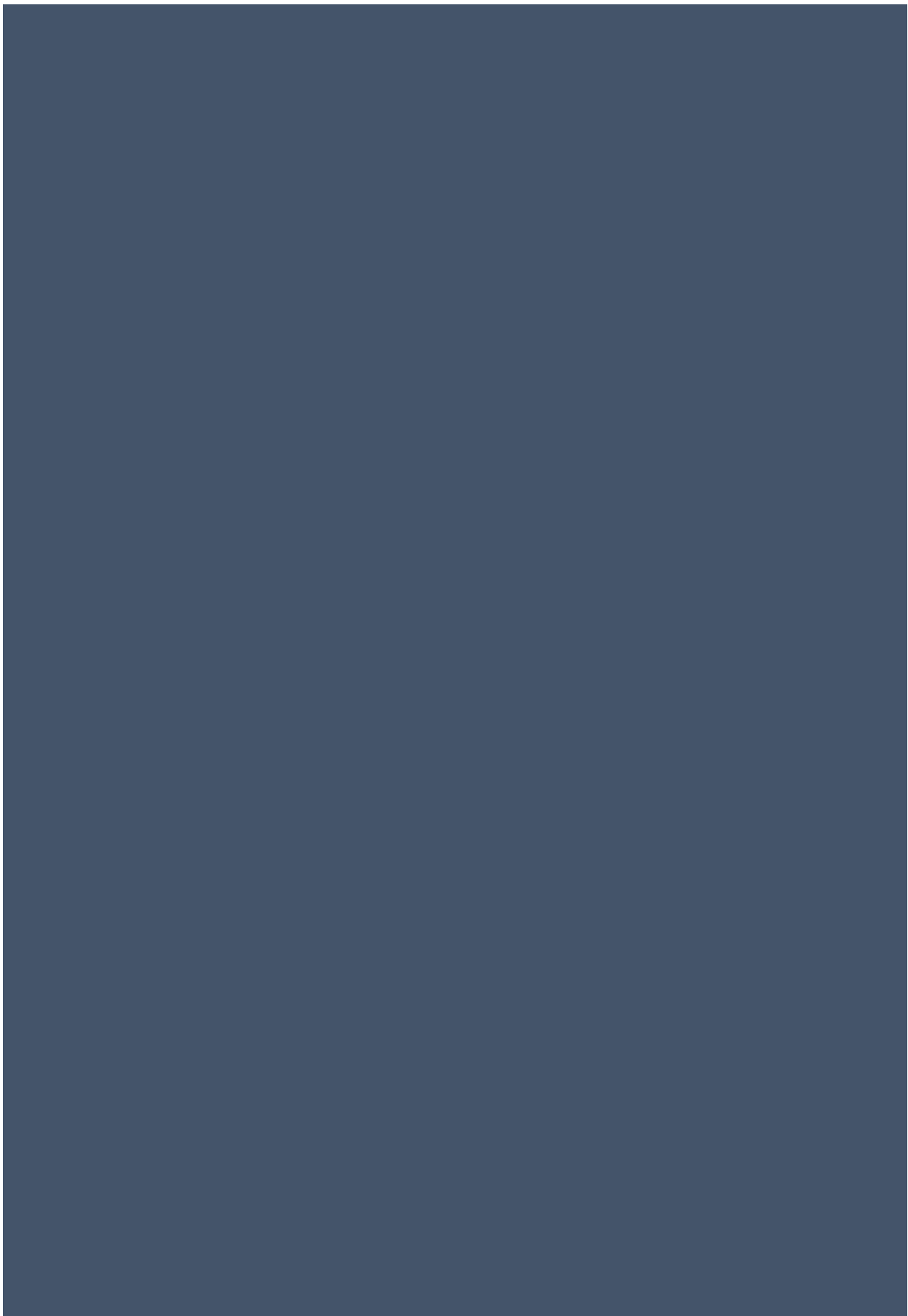


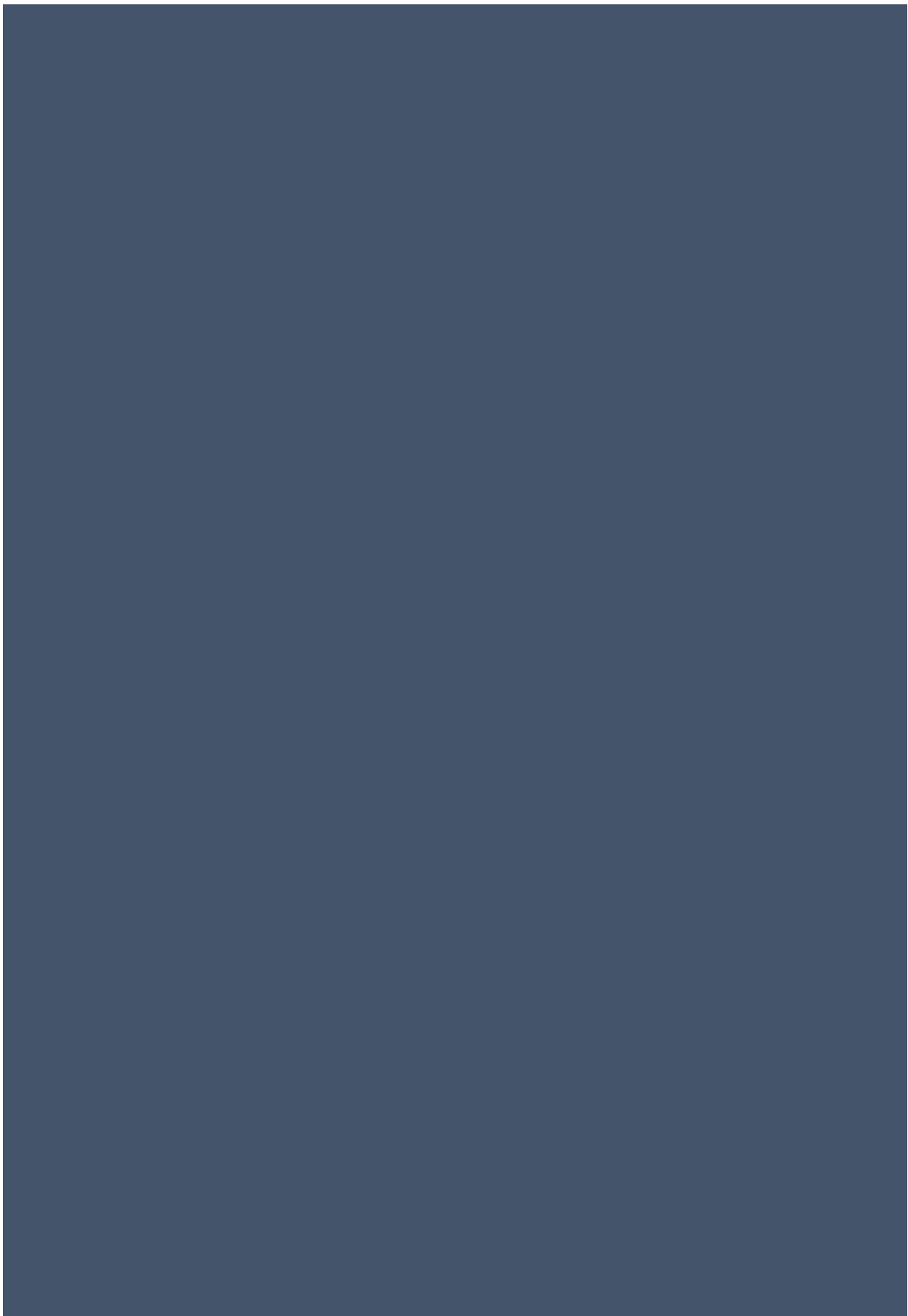




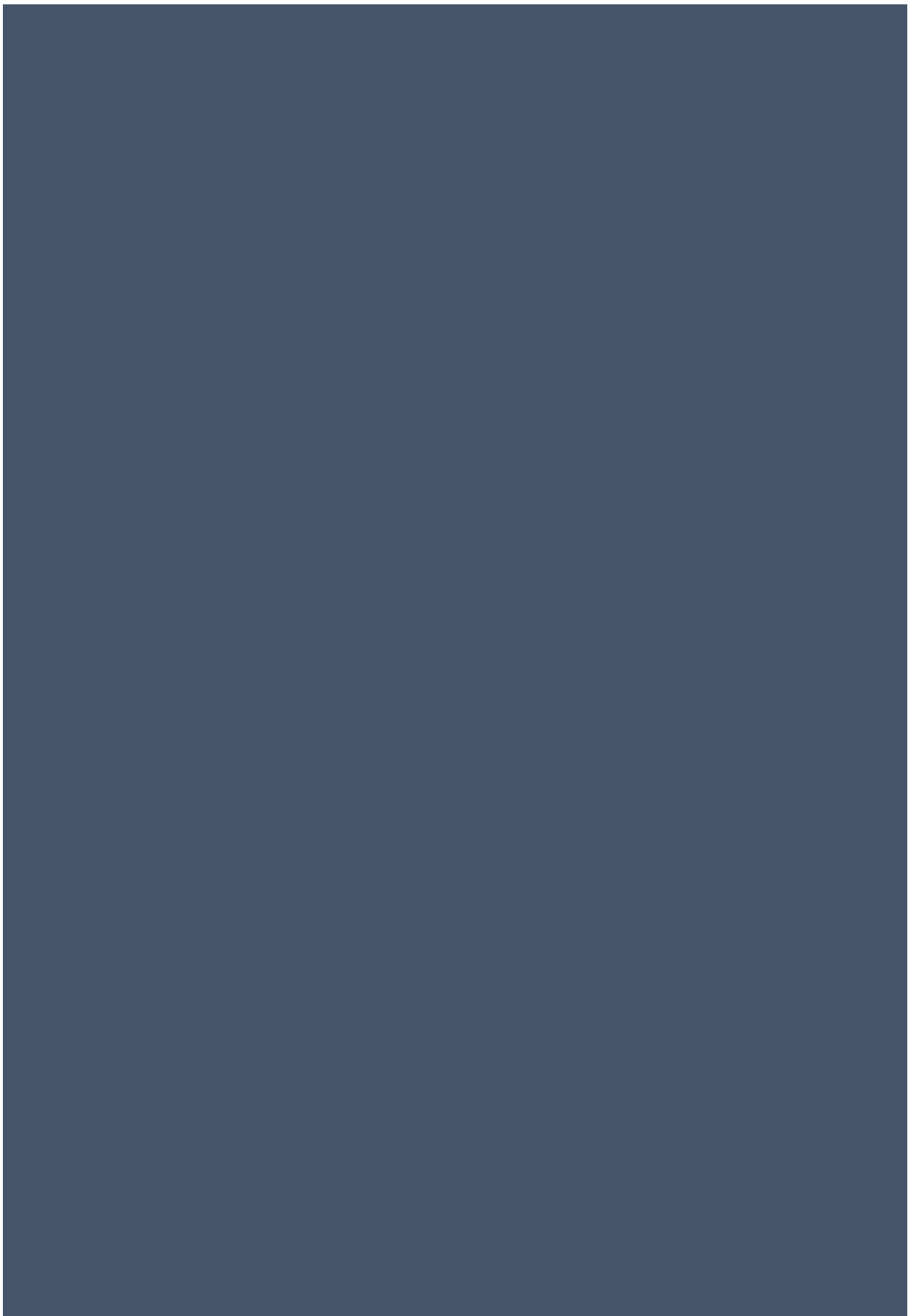


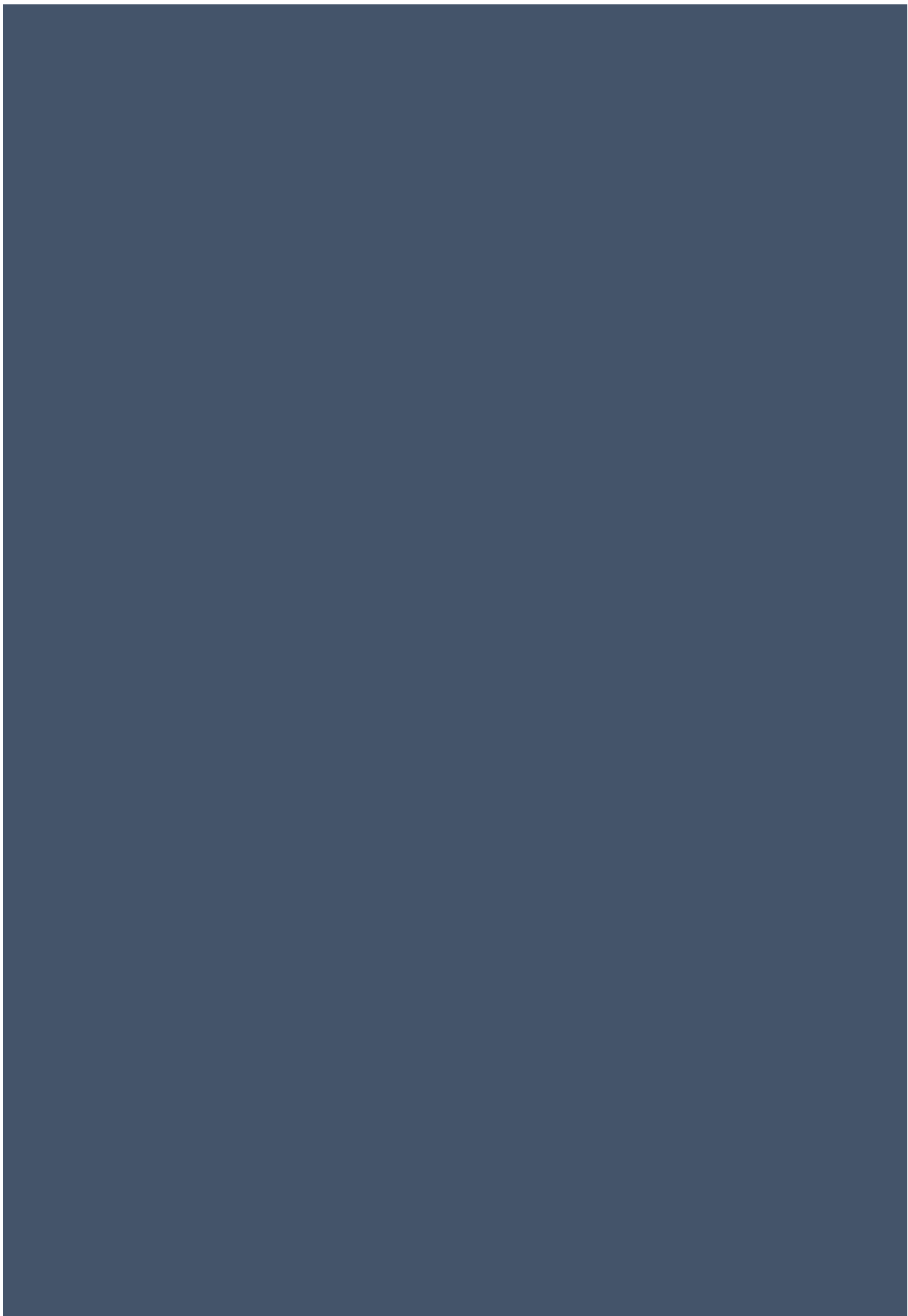














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