The PhD **Program in Immunology and Microbial Pathogenesis (IMP)** is designed to take a multidisciplinary approach to the field by providing the student with a strong basic knowledge of immunology, microbiology, biochemistry, cell biology, and molecular biology, with additional exposure to other areas of related interest. The ultimate goal of this program is to provide aspiring students with the background, training, and experience necessary to launch careers as independent scientific investigators.

Program Directors:

Chris Snyder, PhD	215-503-2543	Christopher.Snyder@jefferson.edu,	730 BLSB
Fabienne Paumet, PhD	215-503-8567	Fabienne.Paumet@jefferson.edu,	750 BLSB

IMP PhD Program Committee:
David Abraham, PhD; Gudrun Debes, DVM; Claudio Giraudo, PhD; Luis Sigal, DVM, PhD; Sangwon Kim, PhD; Fabienne Paumet, PhD (Chair); and Christopher Snyder, PhD (Chair)

Program Coordinator:

Danielle Park	215-503-0164	Danielle.Park@jefferson.edu	M-46 JAH

General PhD Requirements: The PhD degree earned through the IMP Program requires the student to complete all degree requirements of both the Program and the Jefferson College of Life Sciences (JCLS). JCLS requirements are described in the JCLS catalog and, in greater detail, in the "Guide to the PhD Degree and Thesis Manual". An IMP specific synopsis of these requirements follows in this handbook.

Credit Requirements: A minimum of 180 credits beyond the bachelor's degree are required. 54 of these credits must be from a combination of required and elective coursework, including seminar/journal club. At least 18 of these credits must be from outside the major Program (i.e., not IMP). The remaining credits are dissertation research credits. Full-time enrollment in the Fall Semester is 20 credits, Winter Semester is 10 credits, Spring Semester is 30 credits, and Summer Semester is 10 credits.

Transfer of Credits: A student may be able to receive transfer credits up to a maximum of 18 credits for graduate-level courses taken at another institution per the policy described in the JCLS Catalog. Check with the Program Directors or the Training Programs Office for more details regarding credit transfers.

Guidelines for Good Standing:

1. Maintain a B average in coursework and rotations.
2. Performance in core courses – GC 550, IMP 505 A and B, IMP 530, IMP 600
    a. A grade less than a B- in any core course could be grounds for dismissal if this takes place, the IMP PhD Program Committee will meet with the student. The final decision rests with IMP PhD Program Committee.
3. A grade less than B- in any advanced course triggers a meeting with the IMP PhD Program Committee, and could be grounds for dismissal from the Program after review of circumstances and overall performance.
4. Students must demonstrate progress toward a 1st author paper by the end of year 2 or earlier.
5. Committee meetings every 6 months are mandatory.

Course Calendar

<table>
<tr><th>60 credits total</th><th>Fall
(16 wks)</th><th>Winter
(4 wks)</th><th>Spring
(16 wks)</th><th>Summer
(16 wks)</th></tr>
<tr><td rowspan="6">Year 1</td><td>GC550 (Foundations of Biomedical Science-10 credits)
Jaynes</td><td rowspan="3">GC550D
(Rudiments/Computational Biology & Medicine – 1 credit)
Rigoutsos</td><td>IMP 505A
(Immunology-2 credits)
Manser/Sykulev</td><td rowspan="3">IMP505B
(Advanced immunology- 2 credits)
Manser/Sykulev</td></tr>
<tr><td>GC 760 (Rotation 3 credits)
Snyder/Paumet</td><td>IMP600A
(Microbiology-1 credit)
Alugupalli</td></tr>
<tr><td>IMP710 (Seminar-1 credit)
Sigal/Schnell</td><td>IMP600B (Virology-1 credits)
Snyder</td></tr>
<tr><td rowspan="3">IMP910 (Research – Variable)
Snyder/Paumet</td><td rowspan="3">IMP940 (Thesis research – variable credits)
Snyder/Paumet</td><td>IMP722 (Journal club-1 credit)
Kim</td><td>IMP732 (Journal Club-1 credit)
Kim</td></tr>
<tr><td>IMP720 (Seminar-1 credit)
Sigal/Schnell</td><td>IMP730 (Seminar-1 credit)
Sigal/Schnell</td></tr>
<tr><td>GC 770/780(Rotation 3 credits)
Snyder/Paumet</td><td>GC 750 (Rotation 3 credits)
Snyder/Paumet</td></tr>
<tr><td></td><td></td><td>IMP920 (Research - Variable)
Snyder/Paumet</td><td rowspan="2">IMP930
(Research-Variable)
Snyder/Paumet</td></tr>
<tr><td></td><td></td><td>GC 640 (Ethics- 1 credit)
Grunwald</td></tr>
</table>

<table>
<tr><th>60 credits total</th><th>Fall
(16 wks)</th><th>Winter
(4 wks)</th><th>Spring
(16 wks)</th><th>Summer
(16 wks)</th></tr>
<tr><td rowspan="4">Year 2</td><td>IMP 530 (Infection and Immunity-3 credits)
Sigal/Paumet</td><td rowspan="4">IMP940 (Thesis research – variable credits)
Snyder/Paumet</td><td>GC 675
(Cancer Immunology-2 credits)
Snook</td><td rowspan="2">Comprehensive examination</td></tr>
<tr><td></td><td>GC730 (Grant writing-1 credit)
Philp</td></tr>
<tr><td>IMP 712
(Journal club- 1 credit)
Kim</td><td>NS 740 (statistics-2 credits)
Chervoneva</td></tr>
<tr><td>IMP910 (Thesis research – variable credits)</td><td>IMP 722 (Journal club-1 credit)
Kim</td><td>IMP 732
(Journal club-1 credit)
Kim</td></tr>
<tr><td></td><td>IMP720 (Seminar – 1 credit)
Sigal/Schnell</td><td>IMP730 (Seminar – 1 credit)
Sigal/Schnell</td></tr>
<tr><td></td><td>IMP920 (Thesis research – variable credits)</td><td>IMP930 (Thesis research – variable credits)</td></tr>
</table>

			Snyder/Paumet	Snyder/Paumet

60 credits total	Fall (16 wks)	Winter (4 wks)	Spring (16 wks)	Summer (16 wks)
Year 3	**IMP 712** (Journal club- 1 credit) Kim	**IMP940** (Thesis research- variable credits) Snyder/Paumet	**IMP 722** (Journal club- 1 credit) Kim	**IMP 732** (Journal club-1 credit) Kim
	IMP710 (Seminar – 1 credit) Sigal/Schnell		**IMP720** (Seminar – 1 credit) Sigal/Schnell	**IMP730** (Seminar – 1 credit) Sigal/Schnell
	IMP910 (Thesis research– variable credits) Snyder/Paumet		**IMP920** (Thesis research– variable credits) Snyder/Paumet	**IMP930** (Thesis research – variable credits) Snyder/Paumet

Presentation of Scientific Information
The student must register for Journal Club each semester, beginning in Spring of year 1 through the end of year 3. For students in year 4 and beyond participation is voluntary and encouraged.

Starting in their second year, after completion of the Comprehensive Examination, each student will present his or her progress once a year in the "Research in Progress" section of the Microbiology & Immunology Seminar series that occurs on a weekly basis and in which pre-and postdoctoral trainees participate. Students register for Seminar (IMP 710, 720, 730) each semester until defense.

Laboratory Research Rotations: During the first year of study, graduate students are required to rotate through at least two different laboratories (three are strongly recommended). The purpose of laboratory rotations is threefold:
1) to expose the student to various experimental approaches to laboratory research problems dealing with different aspects of biomedical research,
2) to help the student select a dissertation research advisor, and
3) to assist the faculty in evaluating the student's strengths and areas needing further attention. The student arranges his or her research rotations in consultation with the Program Directors on the basis of the student's own interests and the willingness of a faculty member to serve as a rotation mentor. The student is expected to spend all available working hours when not attending classes engaged in **research-related activities** during each of these rotations.

All IMP rotations will be completed in Fall, Winter, Spring, and Summer; an early start in the summer prior to matriculation is an option that is encouraged and can be arranged.

At the end of each rotation, the student is required to submit a brief written report summarizing the rationale of the experiments conducted, the methodologies, results, and a brief discussion. The faculty member in whose laboratory the rotation has occurred then makes a written evaluation of the student's performance for each rotation.

Evaluation at End of the First Year: The IMP PhD Program Committee will evaluate the performance of students in the Program at the end of the summer semester. The criteria for evaluation will be the student's course grades, lab rotation evaluations, and participation and presentations in Journal Club. Students deficient in any of these areas will be brought before the Committee to discuss problems and possible ways to remedy the situation. Students with overall poor performance and judged unable to rectify the situation will be asked to leave the Program at this time.

Thesis Advisor and Research Advisory Committee: The Program Directors will be the student's advisors during the first year and will meet with the student in order to establish the student's academic program and ascertain the nature of the student's research interests. Subsequent meetings will occur at the end of the first and second semesters in order to review academic progress and the development of research interests.

Permanent thesis advisor: The Thesis Advisor is selected on the basis of the student's academic accomplishments and research interests in consultation with the Program Directors after the completion of three laboratory rotations.
Research Advisory Committee (Thesis Committee): This Committee is selected by the student and permanent thesis advisor, in consultation with the IMP PhD Program Committee. This committee needs to be formed before December 31 of the second academic year, with the first committee meeting completed by March 31 of the second academic year. The Research Advisory Committee shall consist of the permanent thesis advisor and at least three other members of the graduate faculty; two of them should be members of the IMP Program. One member can be from outside of the Program (or a faculty from another institution with the appropriate credentials). The Program Directors are ex-officio members of all student Advisory Committees and, as such, should be notified of the date and time of each meeting. Each student must have at least two Committee meetings per academic year. **It is the responsibility of the student to arrange Committee meetings and procure forms for recording minutes. Meeting forms are available on the JCLS webpage under "student resources → policies & guidelines" at the following web address: https://www.jefferson.edu/academics/colleges-schools-institutes/life-sciences/student-resources/policies-guidelines.html, or from Danielle Park. There is one form for the committee chairperson and a second form for each individual member (including the chairperson).** All forms should be returned to the Training Programs Office for inclusion in the student's file and distribution to the JCLS Dean. Either the student or thesis advisor may call committee meetings at any time.

If a student desires to change a permanent thesis advisor, or a thesis advisor desires to be relieved of the responsibility to a student, the matter will be brought before the JCLS Executive Committee for consideration.

Comprehensive Examination: A student in good academic standing officially becomes a candidate for the degree of Doctor of Philosophy after passing the Comprehensive Examination. The main purpose of this examination is to determine the student's readiness to conduct independent scientific research. Additionally, the exam will identify weaknesses in the student's progress at the time of the exam. Students who cannot pass this exam to the satisfaction of the Examination Committee will not be recommended for continued study in the PhD program.

1. The exam will be scheduled before June 30 of the second academic year. Any requests for a change in this schedule will be evaluated for approval by the IMP program committee.
2. An Examining Committee is convened by the IMP PhD Program Directors. The student's thesis advisor will not be part of the Examining Committee but may participate in discussions regarding the student before the examination.
3. At least two weeks prior to the exam the student is expected to distribute a hard copy of the written grant proposal (F31 format) to the members of the Immunology and Microbial Pathogenesis Examining Committee. In addition, an e-copy can be emailed, as per the request of examining committee members. This proposal, which forms the basis for the subsequent oral examination should be based on the student's anticipated thesis project. The Proposal should conform to the following guidelines:
    a. **Fonts and margins**: minimum margin of 0.5", single-spaced with Arial or Helvetica font, no smaller than 11pt in the text.
    b. **Required Sections**:
        i. Abstract/summary (no more than 500 words)
        ii. Specific Aims (1-page maximum),
        iii. Research Approach (6 pages maximum) containing i) Significance, ii) Innovation iii), Background, iv) Preliminary data, and v) Research plan for each specific aim. **The research plan for each specific aim should contain a discussion of anticipated and other possible results, interpretations of possible outcomes, pitfalls, alternative approaches, and future directions**.
        iv. Cited references (no page limit).
4. The student is expected to write the proposal entirely on their own, but it is strongly suggested that the student consults with colleagues (e.g. other students, postdocs, and faculty) regarding the content of the proposal. The student's thesis advisor can read the proposal once and give general advice on the strength and weaknesses but should not be involved in the writing of the proposal (e.g. providing previous grants on the same topic or editing).
5. The oral examination is scheduled for a minimum of a two-hour period. A rubric outlining the components of the exam and the evaluation process is included below:

Comprehensive Exam Rubric

Possible Outcomes: The decision by the committee must be unanimous.

- **Pass:** The student has met or exceeded expectations for all of the areas in each of the 3 sections listed below. No further work is required.
- **Conditional Pass:** The student received a grade of "requires remediation" for at least one area below **OR** "did not meet expectations" in one area under Section B. The terms of remediation and the deadline (within 2 months of the examination date) will be set by the examination committee.
- **Fail:** The student receives a grade of "does not meet expectations" in Section A **OR** any 2 or more areas of Section B. The student must retake the exam and the case will be discussed by the IMP program committee. If the majority of the Examining Committee agrees that the student passed the re-exam, the student will be passed on to candidacy for the PhD A second failure may result in the dismissal of the student from the program.

Section A: Fundamental Knowledge

If the student "does not meet expectations" in this section, they will receive a final grade of "**Fail**". The decision by the committee must be unanimous.

1) **Did the student demonstrate a working comprehension of the basic/ fundamental scientific information needed for the project including: 1) general knowledge, 2) knowledge of project-related scientific information and 3) knowledge of the relevant background?**

- Minimal fundamental knowledge or major gaps ☐ (Does not meet expectations)
- General knowledge is OK but some gaps remain ☐ (Requires remediation)
- Excellent grasp of the background information ☐ (Meets or Exceeds expectations)

Section B: Formulation of the Research Proposal

The student may receive a grade of "**Conditional Pass**" if they "do not meet expectations" in any one of the following areas. If they "do not meet expectations" in two or more areas, they will receive a final grade of "**Fail".** The decision by the committee must be unanimous.

1) **Did the student clearly state the hypotheses to be tested and convey background information to support the significance of their hypotheses?**

- Hypothesis was unclear and poorly justified ☐ (Does not meet expectations)
- Hypothesis was clear, but poorly justified ☐ (Requires remediation)
- Hypothesis was clear and well justified ☐ (Meets or Exceeds expectations)

2) **Did the student clearly explain the rationale and technical details of the experimental design? Was the experimental design sufficient to address the hypothesis?**

- Rationale and design were unclear or would fail to address the hypothesis:
  ☐ (Does not meet expectations)
- Rationale and design were clear but additional approaches were needed to address the hypothesis
  ☐ (Requires remediation)
- Excellent rationale and experimental design
  ☐ (Meets or Exceeds Expectations)

3) **Did the student outline the expected results as well as other possible results and how any such results would be interpreted?**

- Expected results were poorly explained and not justified ☐ (Does not meet expectations)
- Results and interpretations were partly elaborated ☐ (Requires remediation)

- Results and interpretations were well elaborated ☐ (Meets or Exceeds expectations)

4) Did the student adequately explain the caveats and limitations of their approach, and did they include alternative approaches to use in case of technical problems?

- Major caveats and alternative approaches were missing
  ☐ (Does not meet expectations)
- Caveats and alternative approaches were included but obvious potential issues were not considered
  ☐ (Requires Remediation)
- Thorough descriptions were given of caveats and alternative approaches
  ☐ (Meets or Exceeds expectations)

Section C: Scientific Communication

The student cannot fail based on this section alone. The decision by the committee must be unanimous.

1) Was the document written in a clear manner and satisfactory for a student at this stage in their training?

- The writing needs additional work ☐ (Requires remediation)
- The writing was excellent for a student at this stage ☐ (Meets or Exceeds expectations)

2) Was the oral presentation satisfactory for a student at this stage in their training?

- The oral presentation needs additional work ☐ (Requires remediation)
- The oral presentation was excellent for a student at this stage ☐ (Meets or Exceeds expectations)

Final Grade: The decision by the committee must be unanimous. Please forward the decision to Danielle Park, Chris Snyder and Fabienne Paumet.

☐ **Pass:** no further work is required
☐ **Conditional Pass:** The examination committee will assign remediation and a deadline within 2 months of the examination date.
☐ **Fail:** The student must retake the exam.

Readiness to Write the Thesis: Before the student begins writing, the Research Advisor, Research Advisory Committee, and the candidate must reach a consensus on the content of the thesis and the format – either traditional or manuscript. JCLS is notified by use of the Chairperson's report (see above). At this time the student and committee will also designate the format of the thesis, By the time of the thesis defense, the research work performed by the student must have reached a stage of completion such that **at least one paper, represents work to which the student has been a primary contributor (first author), has been published or accepted for publication in a respected peer-reviewed journal.**

Final Examination (Defense) Committee: This committee is composed of the Research Advisory Committee, the Program Directors, and the JCLS Dean's Representative. This committee is chaired by the Program Directors (or their designee) who are the JCLS Dean's designee.

Scheduling the Seminar and Defense: The student will be responsible for scheduling the date and time of the defense. The student will also contact the Training Programs Office to reserve a room and AV equipment for the public seminar and private defense. Please note, however, that **the defense cannot be scheduled unless the student has one first-author paper at least accepted prior to the defense date. The Program Directors must be notified of this paper citation before requesting the necessary letter to JCLS (see below).**

Letter from the Program Directors: At least one month before the planned Defense, the students will contact the Training Programs Office to generate an official letter from the Program Directors to the JCLS Dean. The following information is necessary for this letter:

1. Program Directors notified of publication as described above.
2. Outside review completed.
3. Date, time, location of Public Seminar and Thesis Defense

4. Thesis title
5. Student's name as it should appear on the diploma
6. Members of the Final Examination Committee; addresses for any outside the University
7. The date on which the student stipend payment will stop (this information is for JCLS Financial Office use only; it will not appear on other defense documents)

Distribution of Thesis Prior to Defense: At least three weeks before the Thesis Defense, the PhD candidate will deliver one copy of the thesis draft to the Dean's Office, one copy to the student's Program Director, and one copy to each of the Final Examination Committee members.

Thesis Defense: The IMP program follows the JCLS guidelines and policies for the thesis defense. **Please see the "Guide to the PhD Degree and Thesis Manual" available on the JCLS policies and guidelines website** for information about the thesis defense. This manual contains the JCLS requirements for the successful completion of the PhD degree from the time you matriculate until you complete your degree. These are minimal requirements that are supplemented and expanded by IMP Program-specific requirements and instructions.

Highlights from the PhD Thesis Manual that is important to your progress:

- **page 6**: Formation of the Research Committee
  - JCLS minimum - research advisor and 2 graduate faculty; formed in consultation with the advisor and the Program Directors
  - Chairman of the committee – a member other than the thesis advisor
    - IMP – permanent thesis advisor and at least three other members of the graduate faculty; two of them should be members of the IMP program. One member can be from outside of the Program (or a faculty from another institution with the appropriate credentials). The Program Directors are 'ex-officio' members of each student's committee and should be notified of the date and time of each meeting but will not necessarily attend each meeting
    - IMP – the student forms the Research Committee before the end of the semester in which the thesis advisor is selected
- **page 6-7**: Monitoring Progress
  - 2 committee meetings per year, each year of research activity (Mandatory)
  - Use forms for reporting results: report from each committee member plus chairperson's report – both available IMP Blackboard site
    - IMP – return all forms to Training Programs Office, M-46 JAH for required distribution
  - Yearly meeting with Program Directors
  - Semi-Annual Report to JCLS from student
- **page 7**: Thesis Proposal, Maybe part of the Comprehensive Exam
- **page 8**: Comprehensive Examination
    - IMP – initial exam will be scheduled before June 30 of the second year of study.
- **page 9**: Readiness to write
  - Determined by Research Committee; JCLS notified by use of Chairperson's report
  - Designate format of thesis: Traditional or Manuscript
- **page 10-12**: Final Examination Committee and Defense of Thesis
  - Candidate must present an open seminar of thesis work followed by a private defense before their Examining Committee
  - By the time of the thesis defense, the research work performed by the student should have reached a stage of completion such that **at least one paper**, representing work to which the student has been a primary contributor (**first author**), **has been published or accepted** for publication in a respected peer-reviewed journal.
  - Committee Membership: Research Advisory Committee; Program Directors; Dean's Representative
  - Arrange defense date at least one month prior to planned defense
    - IMP – notify the Training Program Office of the date and time in order to arrange room and AV equipment for the open seminar
  - One month prior to the defense request letter from Program Directors to JCLS denoting readiness to defend
  - IMP – contact Training Programs Office to request this letter; 3-0164 or Danielle.Park@jefferson.edu
- **page 13**: Format of Thesis – Model 1, Traditional

- **page 22**: Format of Thesis – Model 2, Manuscript

Student Personal Counseling Center
833 Chestnut Street, Suite 230
215-955-HELP (4357); (215) 503-2817