

# IMMUNOLOGY, PHD

## For more complete information and to apply to the Graduate Program in Immunology:

<https://gradimmunology.med.som.jhmi.edu/index.html> (<https://gradimmunology.med.som.jhmi.edu/>)

The Graduate Program in Immunology began in 1982 with two students and a handful of faculty. Since then we have grown to 36 students currently in training and 36 faculty. The faculty research interests span the entire gamut of Immunology, from basic mechanisms such as somatic hypermutation and gene rearrangement, molecular mechanisms of antigen processing and presentation, molecular signals for immune cell development and differentiation to translational research in the fields of cancer vaccines, allergy, infectious disease, immune engineering, autoimmunity and transplantation.

We are fortunate to have a number of centers of excellence in Basic Immunology and Cellular Engineering, Microbial Immunology, Autoimmunity and Cancer Immunology. This, combined with world-class facilities in genomics, genetics, proteomics, cell imaging and bioinformatics mean almost limitless opportunities for students to do cutting edge and creative Immunology research. It is indeed an exciting time for Immunology at Hopkins.

We are able to offer one of the most rigorous and expansive scientific training arenas in the world. The large number of accomplished biomedical scientists, the focus on interdisciplinary training, the availability of state of the art research facilities and a collegial environment gives our students a unique opportunity to develop as the next generation of leaders in Immunology. Recent program graduates have become post-doctoral research fellows in major labs all over the world. Many of our alumni have gone on to significant positions as successful independent researchers at universities, research institutes, government laboratories and biotechnology enterprises. Also, a number have distinguished themselves in the public policy, intellectual property and in scientific writing. All of our alumni have gone on to fulfilling careers in the biomedical field and for that we are grateful and very proud.

## Fellowships

### Financial Support:

Students accepted into the program will have their tuition, fees, and medical insurance (including dental and vision) paid. Students will receive a competitive stipend to cover living expenses. Support for the Graduate Program in Immunology is derived from government and private sources and individual research grants.

### Note to International Applicants:

We are very much interested in attracting talented students from other countries to our program. However, there are some practical issues that you should be aware of before applying. We have a limited ability to support students who are not citizens or permanent residents of the United States. Our training program is funded by a training grant from the United States government. This grant will only support US citizens or permanent residents. Only very rarely do we have funds that can be used to support citizens of other countries.

We highly recommend that foreign applicants seek other possible means of supporting the cost of graduate study. Support could come from: (a) a scholarship from your government or (b) from a 'special' foundation

award. In your application, please discuss the possibility of obtaining support from one of these sources. Final admission to the program requires documentation that the appropriate financial resources are available. We highly recommend that you review the NAFSA: Association of International Educators website at [www.nafsa.org](http://www.nafsa.org). NAFSA does not offer financial assistance, but will offer some suggestions to help your search for financial aid for study in the United States.

Acceptance into the Immunology Program is dependent on an invited personal interview. Foreign applicants, on invitation, should be prepared to travel to Baltimore, Maryland under their own expense. Once in Baltimore the program will pay for local transportation, meals and accommodations.

## Admission Requirements

### Undergraduate Degree

Candidates for admission should hold a bachelor's degree or higher with training in one of the following, or related, areas:

General Biology

Biochemistry

Physics

Calculus

Organic/Inorganic Chemistry

Courses in Immunology, Biochemistry & Molecular Biology are recommended, but not required.

### Transcripts

Transcripts of **all** college and university study (undergraduate and graduate) are required and must be uploaded to the application. If you have attended more than one institution, transcripts from each institution must be received for your application to be considered complete. International transcripts must be officially translated into English. If you have not yet completed your Bachelor's degree, upload a copy of your current transcript, showing in-progress courses. Official transcripts for in-progress courses can be uploaded to the online application in the Transcript Upload section when they become available, after you submit. Applicants should also upload a list of any current courses, and courses that will be taken before beginning graduate study that do not appear on their transcripts. Do not mail documents to the Office of Graduate Student Affairs unless requested or admitted.

If admitted, an official transcript from each institution you have attended showing proof of graduation and degree conferral will be required prior to matriculation. To be considered official, final transcripts must be sent: 1) by mail, directly from the institution in a sealed envelope:

### Office of Graduate Biomedical Education

1830 E. Monument Street, Suite 620 (<https://www.google.com/maps/search/1830+E.+Monument+Street,+Suite+620+%0D%0ABaltimore,+MD+21287?entry=gmail/&#38;source=g>)

Baltimore, MD 21287 (<https://www.google.com/maps/search/1830+E.+Monument+Street,+Suite+620+%0D%0ABaltimore,+MD+21287?entry=gmail/&#38;source=g>)

If your institution is sending an E-transcript, please make sure they are sending the notifications to: [Gradadmissions@jhmi.edu](mailto:Gradadmissions@jhmi.edu)

### Letters of Recommendation

Three letters of recommendation must be submitted through the online recommendation system. Applicants will need to obtain the name and email address of the recommenders when completing the application.

Please request your letters of recommendation from faculty members or other professionals who are acquainted with you and your academic work. These letters should comment on your aptitude and promise for independent research.

#### **GRE (no longer required for admission)**

As of October 2019, The Graduate Program in Immunology **will no longer require** the Graduate Record Exam (GRE) for admission.

#### **TOEFL Scores (Test of English as a Foreign Language) and IELTS (International English Language Testing System)**

All levels of graduate education at Johns Hopkins require proficiency in the English language. It is highly recommended that applicants for whom English is a second language take the TOEFL/IELTS to demonstrate this proficiency. In general, foreign students admitted to the Graduate Program in Immunology have achieved TOEFL scores over 550.

You are exempt from having to take the TOEFL/IELTS if you hold a degree from a U.S. University/College or have attended a minimum of 2 years at an English speaking University/College. TOEFL/IELTS scores are valid for 2 years from expected entrance date.

Please use the Johns Hopkins School of Medicine code (**5316**) when submitting scores.

#### **Application Fee**

Application fee is \$115.

#### **Criminal Background Check**

All Johns Hopkins University graduate students who are accepted will be subject to criminal background investigations. Generally, all offers of admission to School of Medicine degree programs will be conditioned on satisfactory criminal background investigations.

## **Program Requirements**

In the **first year** of study, each student takes a core set of courses emphasizing basic molecular principles and how they apply to understanding immune function.

### **Required Coursework**

- ME.250.721 Fundamentals of Immune Recognition
- ME.100.716 Analysis of Macromolecules
- ME.110.728 Cell Structure and Dynamics
- ME.250.703 Graduate Immunology
- ME.250.709 Immunology Course Discussion
- ME.250.804 Introduction to Immunology Research (Parts I and II)
- ME.110.733 Principles of Genetics
- ME.260.709 Molecular Biology and Genomics
- ME.260.802 Special Studies and Research
- ME.360.728 Pathways and Regulation

### **Laboratory Rotations**

During the first year, each student engages in three short-term research projects. Each project lasts approximately three months and is carried out under the direction of a faculty member. Additional rotations may be scheduled based on student interest. The projects are designed to give you an introduction to experimental research and an opportunity to learn more about specific areas of immunology prior to choosing a

thesis laboratory and project. After completing the research rotations, the student will select a mentor for his/her thesis project

## **2nd Year**

### **Elective Courses**

Students are required to take five elective courses prior to graduation. Students can begin taking courses in the spring of their first year, but most students opt to start in their second year. There are many available advanced level graduate courses offered in the School of Medicine, Bloomberg School of Public Health, and the Kreiger School of Arts and Sciences. The Immunology Programs specifically offers several courses, including Tumor Immunology and Immunotherapy, Immunometabolism, Translational Immunology, HIV Biology and more. Many of these courses utilize small group discussions, in which students read and discuss current and seminal research papers on the selected topic.

### **Oral Examination**

In the fall of the second year of study, trainees will take the Graduate Board Oral Examination. By the time the students take this exam, they will have successfully completed all required coursework. This examination serves as a means of evaluating the student's cumulative knowledge in biochemistry, cellular and molecular biology, biophysics, genetics, and immunology and his/her preparedness to carry out research for the Ph.D. degree. The exam may cover the student's proposed dissertation topic, but this is not the focus of the exam.

### **Formation of Thesis Committee**

In the spring of the second year of study, students will bring together 4-5 faculty members, including their mentor, to serve as their thesis advisory committee. The purpose of the thesis committee is to help the student move their research forward, provide networking opportunities and career development advice and to ensure the student successfully completes their degree. At the initial meeting, the student will prepare a written research proposal in the form of an NIH grant.

## **3rd Year and Beyond**

### **Elective Courses**

Students are required to take five elective courses prior to graduation. Students can begin taking courses in the spring of their first year, but most students opt to start in their second year. There are many available advanced level graduate courses offered in the School of Medicine, Bloomberg School of Public Health, and the Kreiger School of Arts and Sciences. The Immunology Programs specifically offers several courses, including Tumor Immunology and Immunotherapy, Immunometabolism, Translational Immunology, HIV Biology and more. Many of these courses utilize small group discussions, in which students read and discuss current and seminal research papers on the selected topic.

### **Thesis Meetings**

Students are required to have at least ONE thesis meeting per year, but are welcome to have more if desired. At each committee meeting, the student should present their research work, roughly following the format of the written proposal. The discussion can be, and often is, open-ended in nature. The student should be prepared to discuss:

1. Background and significance
2. Specific goals of the research (specific aims)
3. Work accomplished to date, including pertinent experiments that 'did not work'
4. Future experiments (long and short term)

### **Thesis and Final Seminar**

Upon completion of the thesis research, each student must prepare a formal written thesis, based on the guidelines provided by the Graduate

Board of the University. Two readers must find the written thesis acceptable: the thesis advisor and another member of the Thesis Advisory Committee. Students must also present a formal public seminar on their research. The program office will schedule the final seminar. All University guidelines for thesis preparation must be met. More detailed information on this process is available in the program office.

## **Required Program Events**

The Graduate Program in Immunology offers a wide range of activities that serve to enrich the training experience. All students are required to participate in the program activities throughout their graduate career and this is a vital aspect of the training program.

### **Journal Club**

Immunology Journal Club is intended to provide all graduate students in the Graduate Immunology Program the habit of reading a diverse range of immunology journal articles early in their graduate career. Presenters are generally encouraged to present new developments and findings that are less related to their research focus. This will allow participants to explore new areas of immunology, familiarize themselves with key investigators in the immunology field, and to develop sharp and valid criticism of sound experiments. This is an invaluable opportunity to keep abreast of new advances as well as hone one's presentation skills in an informal setting.

### **Annual Immunology Retreat**

The Graduate Program in Immunology holds an annual fall retreat. This is a one-day activity on an off-site location. The day includes poster presentations by all immunology trainees (3rd year and above), a series of 5-6 short student oral presentations (4th years), and a keynote address by a distinguished invited speaker. This meeting provides students with an excellent opportunity to hone presentation skills in an informal retreat setting.

### **Immunology Floor Meeting**

Students and faculty of the Graduate Program in Immunology gather regularly on Thursdays at 12:00pm for the "Immunology Floor Meeting". At these meetings two speakers from different labs will each give a 30 minute presentation on their research in progress. These presentations are designed to allow for the exchange of ideas. The atmosphere is informal, and lunch is provided. The idea is to have people present, as if they were presenting at lab meeting, so we can exchange ideas at the frontier of our research. These are not to be highly polished presentations but a description of your project as it stands, with people encouraged to talk not just about exciting new results, but also about difficulties, troubleshooting, new techniques being attempted, ideas, etc. The speakers can be graduate students, post-docs, or even faculty members, and we hope the venue will be an excellent opportunity for honing our speaking skills.

### **Immunology Forum**

Students are required to attend the Johns Hopkins Immunology Forum that is scheduled regularly on Tuesdays at 4PM. As an added bonus for the students, we provide lunch for the speaker and the students on Forum days. Seminar speakers come from various institutions in the United States and abroad and meet with faculty and trainees. Immunology students are given the opportunity to invite several speakers each year. On this date, the students extend the invitation, organize the schedule, and take them to dinner. The seminar coordinator will assist in this. Collectively these activities provide a powerful training opportunity, allowing trainees to not only hear an interesting seminar, but also to develop the skills and confidence enabling them to enter into scientific dialogue with a gifted scientist.