

**Microbiology and Immunology Graduate Program
Columbia University
2023-2024 Guide for New Students**

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Welcome to the Department of Microbiology and Immunology. We are delighted to have you join us!

The following description of our Graduate Program will give you some idea of how the next several years of your Graduate Education and Research will proceed. **Please keep this description in your files for future reference.** The information contained in this document can also be found at the Departmental website, <http://www.microbiology.columbia.edu/>, which is updated regularly.

Our Department works hard to administer a vibrant Graduate Program, and with the continuing advances in biology it is a particularly exciting time to be pursuing scientific research. We are looking forward to your development as inspired, creative, and productive scientists.

Your contacts here will primarily be the graduate studies director, Lorraine Symington, your faculty mentor and student advisors, our departmental administrator James Lapin, and the CMBS Program coordinator Zaia Sivo. Contact details are provided below. You are welcome to contact us whenever you have questions. We are here to ensure you have a successful, productive and fulfilling graduate research education.

You will need to schedule a meeting with Lorraine Symington, the Director of Graduate Studies, at least one time per each semester during the first year to assist you with choosing a lab for your rotation and to discuss your progress. Lorraine also assumes the responsibility for the remainder of your graduate education here.

MICROBIOLOGY AND IMMUNOLOGY GRADUATE COMMITTEE

The Microbiology and Immunology Graduate Committee is responsible for reviewing applicants to the Ph.D. program, and establishing and reviewing curriculum, including courses, rotations, and qualifying exam; and monitoring student progress. Members of the Graduate Committee for 2017-18 are listed below:

Lorraine Symington, Director of Graduate Studies
Room 1222 HHSC, ext. 305-4793
lss5@cumc.columbia.edu

Ivaylo Ivanov, Director of Graduate Admissions
Room 910A HHSC, ext 304-6080
li2137@cumc.columbia.edu

Uttiya Basu, Training Grant Director
Room 908A HHSC, ext. 305-0816
ub2121@columbia.edu

Jonathan Dworkin, Head of Qualifying Exam Committee
Room 1218A HHSC, ext. 342-3731
jed2113@cumc.columbia.edu

The Committee receives administrative support from:

James Lapin, Departmental Administrator
Room 1208 HHSC, ext. 305-4046
jl2787@cumc.columbia.edu

Andry Dominguez, Executive Assistant to Dr. Ghosh
Room 1210 HHSC, ext. 342-5424
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Oliver Jovanonic, IT
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Zaia Sivo, CMBS Program Coordinator and Curriculum
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ns2072@columbia.edu

CURRICULUM FOR STUDENTS ENTERING 2023

ORIENTATION

The CMBS/M&I program and the Office of Graduate Affairs interact with trainees in the summer prior to matriculation to facilitate acquisition of Columbia sponsored housing. Off campus housing is available and facilitated by realtors who have long-standing working relations with Columbia housing administration. Upon arrival at Columbia, the Office of Graduate Affairs (OGA) holds a series of orientation events to acclimatize the students to the campus and the city. The program also holds an orientation meeting to discuss with incoming students what their time in the graduate program will be like, including course requirements, laboratory rotations, qualifying examinations, student seminars and any other requirements that they might have during their tenure as graduate students. The program director subsequently meets individually with each student to discuss her/his rotation choices.

During the orientation, the Office of Graduate Affairs holds a number of important events that are important for the students. We start with a mini-course that explains how to establish the framework for an experimental project, how to set up a system, design experiments within that system, and how to determine and use the correct set of controls. This course also covers an introduction to **rigor and reproducibility** in experimentation that is necessary for all the students. The students also get mandatory training in Laboratory Safety, an orientation on sexual violence and response, as well as discrimination, harassment and gender-based misconduct policy. Finally, as part of their orientation session, the students will be given a lecture on **Responsible Conduct of Research (RCR)**. They also receive the booklet "On Being a Scientist", as well as Columbia University's regulation on RCR.

COURSEWORK

Our first-year courses are designed to provide the student with a strong foundation in both classical and modern molecular biology and genetics. The first-year courses are generally lecture-style with time taken for discussion of published papers. Note: Information about these courses can be obtained through the Columbia University Directory of Classes at: <http://www.columbia.edu/cu/bulletin/uwb>. Every fall and spring the department will send you a list of upcoming courses and details on how and when to register online. Once you are enrolled, you can access the course information through our Courseworks system: <https://courseworks.columbia.edu/>

In addition to the core course in Biochemistry and Molecular Cell Biology, our department teaches three courses – Molecular Genetics, Graduate Immunology and Advanced Topics in Microbiology and Immunology. Electives are not required, although you are welcome to discuss with your mentor and with Dr. Symington the suitability of an elective course for your particular research. A listing of potential electives can be found below, and other options can be found through Courseworks.

Please note also that the Seminars in Microbiology and Immunology program is a seminar series from 12-1 PM on Wednesdays and research in progress (RIP) talks from 3:30-4:30 PM on Fridays (hybrid this semester). The RIP seminar will be held in the Hammer Health Sciences Center (HHSC) Room 301. Attendance is mandatory. Please see below for more details.

FIRST YEAR

Fall semester:

Biochemistry and Molecular/Cell Biology I G6300

Molecular Genetics [G4150](#)
Intro to Computational & Quantitative Biology [G4120](#) (alternating years)
Research in Microbiology and Immunology I [G9501](#)
Seminars in Microbiology and Immunology I [G9301](#)

Spring semester:

Biochemistry and Molecular/Cell Biology II [G6301](#)
Graduate Immunology [G4020](#)
Research in Microbiology and Immunology II [G9502](#)
Seminars in Microbiology and Immunology II [G9302](#)

Summer semester:

Research in Microbiology and Immunology III

SECOND YEAR

Fall semester:

Advanced Topics in Microbiology and Immunology I [G6055](#)
Advanced Elective (optional; see Electives below)
Research in Microbiology and Immunology I [G9501](#)
Seminars in Microbiology and Immunology I [G9301](#)

Spring semester:

Advanced Topics in Microbiology and Immunology II [G6056](#)
Responsible Conduct of Research and Related Policy Issues [G4010](#)
Dissertation Research in Microbiology and Immunology II [G9502](#)
Seminars in Microbiology and Immunology II [G9302](#)

Ph.D. Qualifying Exam (typically first or second week of March of second year)

Summer semester:

Dissertation Research in Microbiology and Immunology III

SUBSEQUENT YEARS

Dissertation Research [G9501/G9502](#)
Seminars in Microbiology and Immunology I and II [G9301/G9302](#)

ELECTIVES

Second year students may wish to take one graduate level elective course, preferably in the Fall of their second year, which is relevant to their research interests. Examples of courses currently offered at the College of Physicians and Surgeons follow. Please note that not all courses are offered each year. Check with the individual Department websites (these can be accessed through the Graduate School of Arts and Sciences (GSAS) link to PhD Programs in Basic Cell and Molecular Biology listed [here](#) and the GSAS PhD Selection overview site) or the Registrar's [Directory of Classes](#). Also, please note that some students may wish to take a course in another Columbia school (e.g. the Mailman School of Public Health) as an elective. Many excellent courses exist and we are happy to consider such an option. In that case, students are required to obtain prior approval from their Mentor and the Program Director.

Fall semester electives:

Mechanisms in Human Disease [G6003](#)
Genetic Approaches to Biological Problems [G6210](#)

Cancer Biology I [G4500](#)
Deep Sequencing [G4017](#)

Spring semester electives (will be updated in memo for Spring registration):

Virology [W4310](#)

Statistics for Basic Sciences [G8012](#)

ACADEMIC STANDARDS

The department has strict guidelines for academic progress. Students are required to maintain a 3.0 GPA. Any student who receives a C or lower without a reasonable explanation can be placed on academic probation. Possible outcomes of probation include remedial instruction on the topic, re-taking the course or in instances of serious deficiencies possible dismissal from the program.

RESEARCH ROTATIONS

Our program immediately emphasizes your participation in research. At the departmental retreat September 13, you will attend a series of informal presentations by each faculty member to become acquainted with the research in the Department. You will then select a laboratory for the first research rotation, which begins no later than September 18, 2022.

The three research rotations are vital components of the training program. This is a valuable experience, even if you feel you have already decided on a field for your thesis research. Rotations are scheduled for three months each to allow you to obtain a realistic sampling of the nature of the research, and the strategies and methodologies employed by a given laboratory. The duration is long enough for you to have a productive research experience. In several cases, the work accomplished during laboratory rotations has resulted in or been included in published papers. You are expected to participate at laboratory meetings and to make a final presentation of your work to the lab and mentor.

Rotations will follow this schedule:

- **Rotation 1:** 09/18/23-12/15/23
- **Rotation 2:** 1/3/24-3/29/24
- **Rotation 3:** 4/1/24-6/28/24

A summer rotation is permissible if the student has not found a host lab in which to conduct their doctoral research. We will assist you in choosing these rotations. Note however that the Faculty members are not obliged to offer PhD studies to a rotation student. It is important for you as students to make an excellent impression and to convince your Faculty Mentor to accept you into their lab.

Please note that your first rotation needs to be with a member of the department and that two of the three rotations need to be with a program faculty member.

PARKER AWARD

The Richard C Parker award is awarded to the best senior student, usually one that has recently graduated or is about to graduate. It consists of recognition at the annual Richard C. Parker Memorial Lecture, and a \$500 award. This annual Lecture offers graduate students the opportunity to invite and host a speaker of their own choice.

SEMINAR PROGRAMS

Microbiology and Immunology Seminar Program for Invited Speakers. The Wednesday seminar series is an opportunity for our department to host outstanding scientists and we strive to create a very high-level scientific forum here. The list of speakers for the Fall semester seminar series will be available soon at <http://www.microbiology.columbia.edu/seminars/seminarseries.html>. Seminars are held on Wednesdays, 12:00 Noon and announcements will be sent from the Department Office. **Attendance is required for all students of the Microbiology and Immunology Department and the program has 2 credits.** This is an activity of major importance for students, postdocs, and faculty. Trainees are invited to meet with seminar speaker, 1:45-2:30 pm.

Friday Work in Progress Seminars. Held every Friday, 3:30 PM. The Friday seminars provide an opportunity for students and postdocs to speak about their research. Once students begin their third year, they are asked to give a talk in the Department's Friday seminar series once a year. This is a valuable experience that brings together all members of the Department including faculty. These seminars present ongoing and unfinished work and generate considerable discussion. As with the Wednesday seminar series, the Friday Research in Progress Seminars are mandatory for students to attend! The Work in Progress seminar is a graded with P or F and failure in maintaining attendance will lead to an F grade.

Happy Hour. This follows the Research in Progress on Fridays from 4:30-5:30 PM, in the 12th floor lobby or 13th floor conference room. This is a great occasion for students, postdocs and faculty to socialize in a more casual environment and we encourage all to attend:-)

JOURNAL/DATA CLUBS

Students are encouraged to participate in one of several departmental journal/data clubs, preferably one related to the student's area of research. We encourage each student to attend at least one club regularly and make at least one presentation each year. These clubs include:

DNA Dynamics – Alberto Ciccia (attended by Basu, Symington and Zha labs from Micro and Immuno). 2nd Mon of every month 1:30 PM ICRC auditorium.

Immunology and Microbiology Journal Club – contact Nicholas Arpaia for meeting times.

QUALIFYING EXAMINATION

The qualification exam is administered to all second-year PhD students as a formal evaluation of the student's potential as a candidate for the Ph.D. degree. It is designed to assess the student's ability to develop a sophisticated, in-depth understanding of their thesis project and it also serves as a tool for identifying deficiencies in the students' background that could be remedied by further coursework or additional reading. Students present a written research proposal on their thesis topic. The proposal is written in the format of an NIH fellowship and consists of description of the background and significance of the topic, specific aims and research approaches to address the aims. The research will be the combination of studies conducted during the first-year rotation in the laboratory and those continued upon joining the lab (in July of the first year) for thesis research. Thus, students will be able to draw upon approximately ten months of research for their March presentation. The exam consists of the written proposal, a ~30-minute research presentation and an oral defense. A passing grade is required to advance within the program to dissertation-only status. The primary exam is conducted in in early March of the second year. In the event that the primary exam results in a conditional pass, then a second assessment takes place six months later, in early September.

Timeline

March 1, or thereabouts – Deadline for submission of a concise, 6-page report (single line spacing) written in the style of an F31 fellowship application.

Mid-March– Research presentation. Students are encouraged to use PowerPoint presentations, and to bring paper copies of their presentation for each committee member (see recommendations below).

Second Assessment in the event of a Conditional Pass - First half of September. The primary intent is to present the research results obtained in the preceding six months, and ensure that adequate progress has been made.

Qualifying Exam Committee

The committee will consist of two faculty members of the department who will serve on each committee and a third member selected by the student and mentor. It will meet as a group to review the written reports, listen to the oral presentations and ask questions. All faculty members within the department will serve on the committee on a rotating schedule, with a balance of junior and senior faculty. A thesis advisor may not examine his/her own student. In the event a committee member has a student that will be examined then an alternate committee member will be selected. Of note, the thesis advisor is not allowed to be present during the exam.

Role of the Thesis Advisor

Students are encouraged to discuss their project with their mentor and to show the mentor their written proposal and slide presentation with sufficient lead-time for the mentor to provide feedback on the documents. The thesis mentor should not be involved in any primary writing or extensive editing. The thesis mentor is also not permitted to give the student past or present grant or fellowship applications.

Student Evaluations

At the end of the March exam, the committee chair will provide students with an evaluation of their written material, slide presentation and oral defense.

Oral Exam Guidelines

Exams will be scheduled for 2 hours. At the beginning of the exam, the student's file will be provided to the committee by the training program, including all grades as well as rotation evaluations. The committee will initially meet and discuss the student's overall record to date. They should identify possible weaknesses in order to focus the oral questioning. They will also discuss the written report and presentation, and identify any deficiencies.

The student should prepare a 20 to 30-minute PowerPoint presentation. Students will be able to proceed with their presentation uninterrupted, with questioning at the conclusion. Questioning should proceed in a rotating fashion through the committee. The student is welcome to use the white board to assist with responses. The questioning will explore the depth of the student's knowledge on the subject of the research report. Questions pertaining to experimental design and the ability of the student to interpret results should be emphasized. Questions may extend to a broader line of inquiry about the student's fund of knowledge in areas covered by graduate courses (primarily in microbiology and immunology). When the committee feels that the student has been examined sufficiently, the student will be asked to leave the room.

Each student will be evaluated based on:

- Quality of the written report
- Quality of oral presentation
- Strength of oral defense
- General background knowledge

Each member of the committee will be asked to evaluate the student on a numerical scale from 1-5 (1 indicates outstanding, 5 unacceptable) in each area. They will also be asked for additional comments. The forms must be signed, and submitted by the end of the day of the exam. They will be included in the student's permanent file. At the conclusion of their exam, all students will receive their grades.

Possible Outcomes for the March Exam

- **Pass, recommended for PhD studies** -The outcome for most students is a Pass. This indicates they have a solid grounding in both knowledge and experimental design. Students with a Pass will not require a secondary assessment and will be deemed to have passed their Qualifying Exam
- **Conditional Pass** - A student that does well, but exhibits a major weakness in a specific area, may receive a Conditional Pass. The student will be asked to defend their proposal again in September, with the format to be decided by the Qualifying Exam Committee Chair in consultation with the Program Directors. This will generally require a new oral presentation in September, and may also require a revised and updated proposal. The student may also be asked to take additional coursework to fill gaps in their knowledge.
- **Pass, NOT recommended for PhD studies** – Although the student will not be allowed to remain in the PhD program, he/she will be provided with the opportunity to receive an M.A. degree.
- **Fail** - This is the outcome for a student with multiple, significant weaknesses. This can constitute grounds for immediate dismissal from the program. No degree will be awarded. At the committee's discretion, the student may be given the opportunity to receive an M.A. degree prior to withdrawal. Although this is possible, please note that this is extremely rare.

DEPARTMENTAL TRAINING GRANT

The Department of Microbiology and Immunology has a NIH Training Grant to support our mission of scientific graduate education in the area of microbiology, immunology and infection. Dr. Basu is the Director of this training grant. All students who are US citizens or hold a green card are eligible once they have passed their qualifying exam and we encourage all eligible students to apply. Support is available for one to two years. Details for applying will be sent after the Qual Exam.

DISSERTATION RESEARCH

After passing your qualifying exam, it is your responsibility to form an advisory committee. A Thesis Advisory Committee (TRAC) consists of at least three faculty members, not including the advisor. One of the faculty members, who is a Professor or Associate Professor in the department, should be designated a Chair; other faculty members may be from the department or from outside departments. The TRAC is assembled to follow the progress of your research until its completion for the dissertation. The purpose of the TRAC is to monitor the student's progress throughout the period of dissertation research. To accomplish this goal, the student must meet at least once a year with the committee, unless the committee recommends a more frequent schedule. After 5 years, the committee must meet twice a year. This is a departmental requisite to continue with good standing in the program. The students must hold a TRAC meeting within a year of successful completion of the qualifying examination, and preferably within 6-8 months. The student presents

a complete description of the proposed research project at the first meeting, and any data gathered. For subsequent meetings, the student must prepare a written summary of progress and of future objectives, and distribute it to the committee prior to the meeting.

The template for the TRAC meeting report is available from Lorraine Symington, and is to be used by the advisory committee members and the student to document student progress. These forms must be completed and signed at the end of the meeting and the original given to Dr. Symington. Please note that students are welcome at any point to request a meeting with the Program Director or their designated TRAC Chair (see above) to discuss any concerns that may arise along the way.

VACATION POLICY (GSAS policy)

In doctoral study, the periods between semesters (fall to spring, spring to fall) are times of active research, research training, and teaching preparation, rather than considered holidays. However, in any given academic year, student officers on twelve-month research are entitled to 10 days of vacation time per year without loss of compensation. Student officers observe the University academic holiday schedule. Those who are required to work on a University academic holiday shall receive an alternate day off approved in advance by their supervisor. Student officers of research who plan to take time off at other times may do so only after coordinating with their advisor. Student officers of instruction may take vacation during academic breaks or as otherwise mutually agreed to by the faculty mentor. This will ensure that the requested time off does not conflict with the responsibilities attendant to the research enterprise. Student officers of instruction and research are entitled to 1 paid personal day per semester. The personal day must be approved in advance in the same manner as vacation time described above. In addition, personal days must be used during the semester in which they are earned.

STUDENT-MENTOR CONFLICTS

The purpose of the three mandatory laboratory rotations during the first year is to find a research topic that the student is interested in pursuing and a suitable mentor to provide guidance for the student's thesis research. Although we expect a student to complete his/her thesis research in the laboratory selected, we understand that sometimes there are conflicts between a student and mentor that are not easily reconciled. If a student has concerns regarding the direction of their thesis research, these should be raised in thesis committee meetings, and if things escalate, the committee will bring it to the attention of the DGS. If there are other sources of conflict between the student and mentor, these should be discussed with the DGS. The DGS will serve as an intermediary between the student and mentor to resolve the conflict. In the rare event that a solution cannot be reached, the student may consider changing mentors. Changing mentors is not an ideal situation for either party. In the case of the student, several years of effort could be wasted and it is likely that more time will be needed to fulfill the requirements for the Ph.D. In the case of the mentor, precious resources (time on the part of the mentor and other laboratory personnel, supplies and financial support) are wasted if the student does not complete their thesis research in the mentor's laboratory. A change of mentor, while not ideal, may nonetheless be the only practical solution. The DGS will decide on the best course of action and communicate with the student and mentor.

THESIS AND THESIS DEFENSE

The Department of Microbiology and Immunology expects that all graduate students should complete their thesis research within 5–5.5 years of entrance into the training program. We require a dissertation that represents a definitive contribution to scientific knowledge and that demonstrates the student's ability to perform independent research. The dissertation should contain experimental information that answers a stated question and should display a logical progression of scientific thought. Graduates should have as their goal accomplishing work that

results in two or more lead-author research publications in peer-reviewed scientific journals.

At a minimum, one lead-author peer-reviewed research publication should be in press prior to the granting of permission to write and defend the thesis. In exceptional cases, a senior student who has produced an outstanding body of work that is being revised for a high-profile publication may be allowed to write and defend their thesis. This decision will be entirely at the discretion of the thesis committee and program directors, and will require evidence of a pending publication. The thesis committee has the final authority to grant permission to write and defend the thesis. However, in cases where these standards are not met, the thesis committee chair or research advisor must consult with the Program Director prior to granting permission to write the thesis. University laws specify the composition of the Thesis Defense Committee and the format of the thesis defense. Members of the Thesis Advisory Committee are usually part of the Thesis Defense Committee.

The advisor, department chair, and Director of Graduate studies nominate the Dissertation Defense Committee, and students are not permitted to be involved in asking faculty members to sit their committee. The committee must consist of two members from inside the department, including the advisor, and two members from outside the department. At least three of the five members must hold a seat on the GSAS Faculty.

Students must distribute copies of their dissertation to defense committee members at least two weeks prior to the defense date to ensure the committee members have time to read the dissertation thoroughly before the defense. Instructions for distributing, defending and depositing your thesis can be found at <https://gsas.columbia.edu/student-guide/dissertation/distribution-defense-and-deposit-dissertation>

The thesis defense consists of a one-hour public lecture followed by a closed-door thesis exam with members of your thesis committee. The public lecture is a research seminar. Please remember this when preparing your slides as we now mandate one and only one acknowledgements slide. We strongly discourage students presenting multiple slides with a long list of acknowledgements that become often emotional. This is about your thesis research. The thesis exam typically takes about 2 hours, during which time the committee will probe your fund of knowledge about your research and its broader context. You are expected to have read the articles that you cite. You are also required to give due credit to other researchers that have contributed to any data included in your thesis. It is imperative that the committee be able to readily distinguish between your original research and that from others that collaborated with you on this project. At the completion of the exam, the committee will vote for a pass with minor revisions, a conditional pass that requires major revisions, or a fail. A conditional pass may require another examination, although that is rare. Thesis committee members are expected to bring their thesis copy with annotated notes, which they will leave for the student.

At the completion of the exam, the student is expected to generate a document that lists the revisions that were requested. The student then will make the changes and needs to present these changes along with a completed summary of revisions to both the research advisor and the graduate director.

Once you have passed your defense, you must submit the Approval deposit the final thesis copy (with any pertinent revisions) to the Dissertation Office at 107 Low Library (Monday-Friday 9AM-4:45 PM).

We are here to help you at all times throughout your graduate program and encourage you to work

hard and take full opportunity of the scientific resources available in our department and across the campus. We are confident you will all succeed brilliantly and look forward to these coming years leading to your PhD degree.

