Twin Cities Campus

Microbiology, Immunology, and Cancer Biology Ph.D.

Medical School - Adm

Medical School

Link to a list of faculty for this program.

Contact Information:
Microbiology, Immunology and Cancer Biology PhD Program
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- Program Type: Doctorate
- Requirements for this program are current for Spring 2020
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Applicants must have a bachelor's degree (BS preferred).

Other requirements to be completed before admission:
Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc., are also required.

Research experience is required. Relevant undergraduate experience includes honors thesis work, paid or volunteer work in a research laboratory and summer internships. It does not include laboratory courses that accompany science courses such as biology. Postbaccalaureate research experience is preferred but not required.

Special Application Requirements:
The program evaluates applications based on four equally weighted criteria: academics, letters (3) of recommendation, a personal statement, and research experience. The average GPA scores of accepted applicants are typically 3.50. We do not accept or require GRE scores. Letters of recommendation from research advisers or mentors are preferred as these individuals can comment knowledgeably on the student's potential in biomedical research. Applicants' personal statements should describe their research in general and their specific contribution to it, their rationale for seeking a doctoral degree, and any information they wish to share regarding their backgrounds and interest in the MICaB Program. Finally, applicants should provide specific details of their research experiences (project titles, mentors, dates, locations, etc.), along with a list of relevant abstracts, publications, etc.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

During the first year of study, students will identify an advisor through completing laboratory rotations, select a focus area, and initiate thesis research. Students also must complete an ethics seminar and responsible conduct of research course their first year in the program.

All coursework must be taken for an A/F grade and completed with a minimum grade of C, unless the course is only offered for an S/N grade.

No more than one 4xxx-level elective course can be applied to this degree.

Core Coursework (4 credits)

Take one of the following 4-credit core courses in consultation with the advisor. Although only one of the 3 courses is required, taking all 3 is strongly encouraged. If students take more than one of these courses, the additional course(s) will count towards the elective coursework requirement.
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)

Required Coursework (4 credits)

Take both of the following courses. Take MICA 8094 twice (fall and spring semester of the first year) for 2 credits.
MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)

Practicum and Seminar Coursework

Take all of the following courses. Take MICA 5000 twice; MICA 8910 4 times; and MICA 8920 4 times.
MICA 5000 - Practicum: Teaching (0.0 cr)
MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
MICA 8920 - Seminar: Student Research Topics (0.0 cr)

Elective Coursework

Select electives, in consultation with the advisor, to complete the 24 course credits required. Use of 4xxx- and 5xxx-level courses is restricted to either two 5-level courses or one 4- and one 5-level course.
BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5960 - Biophysical Spectroscopy (2.0 cr)
BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
BTHX 5610 - Research & Publication Seminar (1.0 cr)
CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
CHEN 8995 - Special Topics (1.0 - 4.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)

ESCI 4801 - Geomicrobiology (3.0 cr)
GCD 5005 - Computer Programming for Biology (3.0 cr)
GCD 6103 - Human Histology (3.0 - 8.0 cr)
GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8920 - Special Topics (1.0 - 4.0 cr)
GEOG 8260 - Seminar: Physical Geography (2.0 cr)
GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
HINF 5502 - Python Programming Essentials for the Health Sciences (1.0 cr)
LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
MICA 8010 - Microbial Pathogenesis (3.0 cr)
MICA 8011 - Current Topics in Immunology (3.0 cr)
MICA 8013 - Translational Cancer Research (2.0 cr)
MICA 8014 - Small RNA Biology (2.0 cr)
PHCL 5111 - Pharmacogenomics (3.0 cr)
PHSL 8242 - Professional Skills Development for Biomedical Scientists (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
SCB 8181 - Stem Cell Biology (3.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
MICA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework:MD/PhD-Microbiology, Immunology, and Cancer BiologyStudent may take a total of 15 credits in common among the academic programs.