Twin Cities Campus

Molecular, Cellular, Developmental Biology and Genetics Ph.D.

Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED

Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street SE, University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2017
- Length of program in credits: 30 to 50
- 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.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, genome engineering, stem cell research and a center for developmental biology provide opportunities for graduate study.

PhD students are admitted to MCDB&G under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first year program administered by the MCDB&G and the Biochemistry, Molecular Biology and Biophysics (BMBB) graduate programs. After the first year, students select either MCDB&G or BMBB to complete their degree. MCDB&G does NOT have a freestanding master's program.

The MCDB&G PhD is also part of two joint degree programs: The Joint Degree Program in Law, Health, and Life Sciences; and the MD/PhD program.

The Joint Degree Program in Law, Health, and Life Sciences is unique in the nation and enables students to combine a JD degree with a PhD or MS degree. Students entering this program must be admitted to both the MCDB&G program and the Law School. Admission qualifications for MS and PhD students are identical; only the student's career objectives distinguish the degree that they pursue.

The MD/PhD program emphasizes integration of the two major components of training--medicine and research--to ensure excellence in both. The program features a special curriculum that facilitates the transition from Medical School to the first year of formal graduate training, and the transition from graduate training back to Medical School.

Program Delivery

This program is available:

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

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.50.

Applications from students with an undergraduate or master's degree in the biological, chemical, or physical sciences are preferred.

Other requirements to be completed before admission:
Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry.

Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to embarking on a graduate career in this program.

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Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and scores from the General Test of the GRE are required. We will accept copies of the transcripts and GRE scores. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The deadline for receipt of completed applications is December 1. Graduate studies begin fall semester only.

Entry into the J.D./Ph.D. program requires separate admittance to both the Law School and the MCDB&G Graduate Program. Entry into the M.D./Ph.D. program requires separate admittance to both the Medical School and the MCDB&G Graduate Program.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 550
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 625

Key to test abbreviations(GRE, TOEFL).

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.
0 credits are required outside the major.
24 thesis credits are required.

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits.The final exam is written and oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major.The final exam is written and oral. A capstone project is required.
Capstone Project: Plan B students are expected to produce a report approximately 15 pages in length that thoughtfully discusses an important scientific topic that the student and advisor agree upon. The report should include an introduction that explains the significance of the topic, a review of the literature or an analysis of a specific aspect of the area and a discussion regarding current or future endeavors.

This program may not be completed with a minor.

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

A minimum GPA of 3.0 is required for students to remain in good standing.

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

Required courses
Take all of the following courses:
GCD 8151 - Cellular Biochemistry and Cell Biology (2.0 - 4.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8161 - Advanced Cell Biology and Development (2.0 cr)
GCD 8171 - Literature Analysis (1.0 - 2.0 cr)
BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
MCDG 8920 - Special Topics (1.0 - 4.0 cr)
MCDG 8900 - Student Research Seminar (1.0 cr)
GCD 8900 - Seminar (1.0 - 2.0 cr)
MCDG 8950 - Teaching Practicum (1.0 cr)

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MCDG 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Course options

Choose at least one of these courses
GCD 8920 Special Topics: Computational Genomics
or GCD 5005 - Computer Programming for Biology (3.0 cr)

Elective Courses

Take 0 or more credit(s) from the following:

- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 5527 *{Inactive}*(4.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Genome Engineering (2.0 cr)
- GCD 8073 - Genetics & Genomics in Human Health (2.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- 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)
- MATH 8540 - Topics in Mathematical Biology (1.0 - 3.0 cr)
- NSC 8211 - Developmental Neurobiology (2.0 - 4.0 cr)
- OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Science and Technology.Student may take a total of 12 credits in common among the academic programs.

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