Biosciences

**Director**
- Daniel Tranel

**Faculty:** http://www.medicine.uiowa.edu/edTraining_Affiliations_apr.aspx?option=biosciences

**Web site:** http://www.medicine.uiowa.edu/biosciences/

**Graduate Program of Study**

The Biosciences Program is not accepting any students at this time; the program is being reorganized.

Participation in the Biosciences Program leads to a Ph.D. degree in a biosciences discipline. The program provides graduate students the freedom to explore research in any of 17 University of Iowa biosciences research departments and programs: the Departments of Anatomy and Cell Biology, Biochemistry, Biology, Biomedical Engineering, Chemistry, Communication Sciences and Disorders, Microbiology, Molecular Physiology and Biophysics, Pharmacology, Physical Therapy and Rehabilitation Science, Physics and Astronomy; and the Free Radical and Radiation Biology, Genetics, Human Toxicology, Immunology, Molecular and Cellular Biology, and Neuroscience Programs.

Biosciences students enjoy the flexibility of investigating several disciplines through research rotations in the laboratories of Biosciences Program faculty members. Following completion of their first year in the program, students select a research laboratory and program affiliation and decide on a thesis project that will lead to a Ph.D.

**Curriculum**

Students spend their first two semesters in the Biosciences Program. The curriculum provides them with an integrated core foundation on modern molecular and cellular biology while giving them flexibility to accommodate their individual interests.

Instead of offering one semester-long core course, the program offers at least six content modules. In consultation with their advisors, students choose modules at five-week intervals, tailoring their individual study plans to meet their interests. Some modules are intended to be taken as a series; they cover fundamentals of cell structure, intracellular trafficking, signal transduction, and protein structure. Other modules are stand-alone units on more specialized topics, such as biostatistics.

Early in the second semester, Biosciences Program students talk with prospective mentors about thesis projects and laboratory openings for the following summer. In March they submit their choice of the graduate program they wish to join and the faculty member they wish to have as a mentor.

The Biosciences web site contains typical study plans for students interested in specific graduate programs.

The student's choice of program determines his or her curriculum for subsequent years.

Students in the Biosciences Program are not required to teach, but most of the graduate programs they enter will require that they take on teaching responsibilities.

During their Biosciences Program year, students are advised on course selection, research rotations, and registration by a faculty member closely related to the student's research and academic interests. As research rotations are assigned, the faculty advisor works in consultation with the student's rotation advisors until the end of the first year.

Students provide a short oral presentation following each research rotation to an audience of their primary advisor, research advisor(s), and other biosciences students. Rotation advisors provide rotation reports, and rotations are evaluated by the student's primary advisor. The student's primary advisor also confers with the student on course grades, subsequent rotations, and the student's selection of a department or program and lab for thesis research.

All biosciences students take BISC:5265 Biosciences Critical Thinking and Communication, which dovetails with research rotations and seminar series offered by the University's biosciences research departments and programs. The course involves weekly discussions of selected papers and oral and written presentations tied to the student's research rotations.

Each student's overall progress is monitored by his or her primary advisor, rotation advisor(s), and program director, who meet at the end of each semester to review the student's work. At the end of the second semester, the primary advisor, in cooperation with the rotation advisor(s), makes a recommendation to the Biosciences Program director as to whether or not the student should continue in the Ph.D. program. University guidelines, such as maintaining a cumulative g.p.a. of 3.00 or higher, are considered, along with performance in rotations.

The Biosciences Program's office coordinates students' transfers to their chosen graduate programs. Matriculation is conditional upon satisfactory progress and successful completion of the second semester.

Once a student enters his or her chosen graduate program, it is that program's responsibility to advise the student, evaluate his or her academic performance, and assign the student a thesis mentor and laboratory.

Most participating departments and programs require that students take a comprehensive exam at the end of the second year and no later than the third year. Following successful completion of the exam, students advance to Ph.D. candidacy.

**REQUIRED COURSES**

All Biosciences Program students must complete the following course work. Students earn at least 12 s.h. each semester.

**Fall Semester**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BISC:5265</td>
<td>Biosciences Critical Thinking and Communication</td>
<td>2 s.h.</td>
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<tr>
<td>BISC:5302</td>
<td>Biosciences Research (8-week research rotations)</td>
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**Admission**

The program accepts students with a variety of backgrounds in the biological and physical sciences. Entering students must hold a baccalaureate degree from an accredited college or university and should have completed courses in biology, chemistry, physics, and calculus consistent with requirements for a baccalaureate degree in the sciences. An undergraduate g.p.a. of at least 3.00 is required.

Applicants must submit their scores on the Graduate Record Exam (GRE) General Test. Applicants whose first language is not English must score at least 600 (paper-based) or 100 (Internet-based) on the Test of English as a Foreign Language (TOEFL).

Other indicators of academic accomplishments, such as research experience and letters of recommendation, are considered.

Information about graduate training and application materials are available from the Biosciences Program office.

Applicants must meet the admission requirements of the Graduate College; see the Manual of Rules and Regulations of the Graduate College.

**Financial Support**

Graduate students receive stipend and tuition support from the University of Iowa and other sources. Students promoted to the second year in the program receive support from their graduate departments and programs. The Biosciences Program also helps some students apply for competitive national awards for outstanding academic and research achievement.

**Facilities**

The Carver College of Medicine provides state-of-the-art facilities for students, researchers, and instructors. The Medical Education and Research Facility, completed in 2002, provides 220,000 square feet of modern laboratories, lecture halls, clinical examination rooms, and study and meeting space for students. The Carver Biomedical Research building opened in 2005. The 135,000 square-foot building is devoted to research, with five floors of specialized laboratories and new technology. In addition to its new buildings, the college offers recently renovated laboratories and classrooms.

The health sciences campus provides parking, food service, and enjoyable outdoor common areas and pedestrian routes. Most of the University's health sciences colleges and clinical facilities are located there.

The basic science and clinical departments of the Carver College of Medicine are housed primarily in the Bowen Science Building, Carver Biomedical Research Building, Eckstein Medical Research Building, Medical Education and Research Facility, Medical Laboratories, and University of Iowa Hospitals and Clinics. Nearby are the Hardin Library for the Health Sciences and the Iowa City Veterans Affairs Medical Center.

The Departments of Anatomy and Cell Biology, Biochemistry, Microbiology, Molecular Physiology and Biophysics, and Pharmacology are housed in the Bowen Science Building. Laboratories of clinical departments are located primarily in the Medical Laboratories and the Medical Research Center.

The Eckstein Medical Research Building houses major core facilities for microscopy, image analysis, flow cytometry, protein structure, and monoclonal antibody production, as well as research laboratories for basic investigators with interdisciplinary approaches to cancer, molecular biology, genetics, and immunology. The geographic proximity of these facilities promotes interchange among clinical and basic science faculty members and students and maximizes use of the University's extensive core facilities for biomedical research.

Integral to the University's research environment are the Carver Nonprofit Genetic Testing Laboratory, Center for Auditory Regeneration and Deafness, Center for Bioinformatics and Computational Biology, Center for Emerging Infectious Diseases, Center for Functional Genomics of Hypertension, Center for Gene Therapy, Center for Research in the Implementation of Innovative Strategies in Practice, Center on Aging, Craniofacial Center Collaboratory, Cystic Fibrosis Research Center, Holden Comprehensive Cancer Center, Huntington's Disease Society of America Center of Excellence, Institute for Clinical and Translational Science, Iowa Cardiovascular Center, Iowa Comprehensive Lung Imaging Center, Helen C. Levitt Center for Viral Pathogenesis, George M. O'Brien Kidney Research Center, Specialized Center for Research in Osteoarthritis, and the Senator Paul D. Wellstone Muscular Dystrophy Cooperative Research Center.

In addition to the University's extensive facilities for research support, the Carver College of Medicine and the College of Liberal Arts and Sciences operate a variety of research support facilities. Tissue culture, autoclaving, purified water, darkrooms, counters, and a variety of general-use equipment and services are available on a shared basis.

**Courses**

**BISC:5201 Fundamentals of Gene Expression**

1 s.h.

DNA and RNA structure, nuclear organization, DNA replication, RNA production and processing, small RNAs, RNAi, and genetic and epigenetic regulation; didactic and small group sessions, discussion of primary research publications.

**BISC:5203 Fundamentals of Dynamic Cell Processes**

1 s.h.

Overview of actin, microtubules, motors, intermediate filaments, cell-cell junctions, G-coupled signaling, wnt-jak/stat signaling, ion channels, cell cycle, stem cells.

**BISC:5204 Biostatistics for Biomedical Research**

1 s.h.
Application of statistical techniques to biological data analysis; normal distribution, sampling distribution of the mean, variance, nonparametric methods, linear regression, power, and sample size. Same as BIOS:5050.

**BISC:5205 Practical Bioinformatics**
1 s.h.
Formal instruction on the use and application of bioinformatics for bench scientists; bioinformatics, resources, genome annotations, sequence analysis, comparative genomics, expression analysis, and systems biology. Requirements: biostatistics.

**BISC:5206 Biophysical Chemistry Module 1**
1 s.h.
Overview of principles of protein structure, stability, folding, and dynamics; brief treatment of structural biology approaches to help students become critical users of models derived from X-ray crystallography and NMR; taken alone or as part of BIOC:5241. Requirements: introductory course in biochemistry. Same as BIOC:5243.

**BISC:5265 Biosciences Critical Thinking and Communication**
2 s.h.
Selected papers and oral and written presentations tied to students’ research rotations; introductory seminar. Same as MPB:5342, BIOL:5270.

**BISC:5302 Biosciences Research**
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Research experience in the lab of a biosciences program faculty member.