BIOLOGICAL CHEMISTRY

- chair, graduate program
  Benjamin Tu, Ph.D.

- degree offered
  Doctor of Philosophy

FACULTY

- professors
  Michael S. Brown
  M.D., University of Pennsylvania
  School of Medicine, 1966

  David Chuang
  Ph.D., Utah State University, 1970

  David R. Corey
  Ph.D., University of California, Berkeley, 1990

  Jef K. DeBrabander
  Ph.D., University of Ghent, Belgium, 1993

  George N. DeMartino
  Ph.D., University of Rochester, 1976

  J. Russell Falck
  Ph.D., Imperial College, London, 1974

  Kevin H. Gardner
  Ph.D., Yale University, 1995

  Elizabeth J. Goldsmith
  Ph.D., University of California, Los Angeles, 1972

  Joseph L. Goldstein
  M.D., UT Southwestern Medical Center, 1966

  Mark A. Lehrman
  Ph.D., Duke University, 1982

  Steven L. McKnight
  Ph.D., University of Virginia, 1977

  Carole R. Mendelson
  Ph.D., Rutgers University, 1970

  Kim Orth
  Ph.D., UT Southwestern Medical Center, 1993

  Margaret A. Phillips
  Ph.D., University of California, San Francisco, 1988

- associate professors
  Richard Bruick
  Ph.D., Scripps Research Institute, 1998

  Igor Butovich
  Ph.D., Institute of Physical Chemistry, Ukraine, 1985

Joseph Ready
Ph.D., Harvard University, 2001

Michael Rosen
Ph.D., Harvard University, 1993

Vanessa Sperandio
Ph.D., State University of Campinas, Brazil, 1995

Diana Tomchick
Ph.D., University of Wisconsin, Madison, 1990

Kosaku Uyeda
Ph.D., University of California, Berkeley, 1962

Noelle Williams
Ph.D., University of Virginia Health Sciences Center, 1996

- biomedical engineering • cancer biology • cell regulation • genetics and development • immunology • integrative biology • molecular biophysics • molecular microbiology • neuroscience
ASSISTANT PROFESSORS

Nicholas K. Conrad
Ph.D., Johns Hopkins University, 2001

Bethany Janowski
Ph.D., UT Southwestern Medical Center, 1999

Jennifer J. Kohler
Ph.D., Yale University, 2000

Laszlo Kurti
Ph.D., University of Pennsylvania, 2006

John B. MacMillan
Ph.D., University of California, Davis, 2004

Peter Michael
Ph.D., Duke University, 1995

Steven Patric
Ph.D., University of Illinois, Urbana, 2004

Arun Radhakrishnan
Ph.D., Stanford University, 2002

Uttam Tambar
Ph.D., California Institute of Technology, 2006

Benjamin Tu
Ph.D., University of California, San Francisco, 2003

Gomika Udugamaooriya
Ph.D., Wayne State University, 2006

OBJECTIVES

The Biological Chemistry Graduate Program at UT Southwestern offers state-of-the-art training in biochemistry, synthetic organic chemistry, and molecular biology with the goal of preparing students to make significant research contributions at the interface of chemistry and biology. Faculty within the Program are actively engaged in researching a wide range of topics, including enzymology, RNA-mediated cellular processes, hormone receptors, metabolism, small-molecule control of cellular function, and synthetic organic chemistry. A characteristic of UTSW’s scientific environment is the close proximity of basic science and clinical departments. The extensive collaborations of the Program faculty with faculty of clinical departments provide additional opportunities for students to contribute significantly to research with direct patient and medical relevance. Faculty members of the Program are also well-recognized in their fields and maintain a lively communication with colleagues around the world. Numerous seminars by outstanding visiting scientists also are offered and are a vital component of the educational experience.

SPECIAL REQUIREMENTS FOR ADMISSION

Students wishing to join the Biological Chemistry Graduate Program must be enrolled in the Division of Basic Science and be in good standing academically. It is not necessary for a student within the Program to choose a mentor who is a faculty member of the Program, provided that the student has sound reasons for this choice. Students ordinarily will apply for formal admission to the Program after completing the first-year curriculum but may participate in the Program informally at any time after successful admission into the Division of Basic Science. The Program has two training tracks: Biochemistry and Chemistry.

BIOCHEMISTRY TRAINING TRACK

The Biochemistry Training Track is designed to train students in theory and techniques related to the molecular mechanisms that control cellular activities. Topics encompassed within the Program include gene regulation, RNA-mediated processes, protein interactions, enzyme functions, and cellular metabolism.

CURRICULUM

Students in the Biological Chemistry Graduate Program must satisfactorily complete the core curriculum offered in the fall term and three laboratory rotations. In the rest of the first year, students are expected to complete eight credit hours of advanced course work, which require a grade average of B or better. Three and one-half credit hours consist of two required courses; the additional 4.5 hours may be selected from offerings by other Programs within the Division of Basic Science. Course descriptions are located in the Division of Basic Science section. For exceptional reasons, these course requirements may be altered with permission of the Program Chair. In addition, students participate in a student seminar and journal club each semester.

Near the end of the second year, students take a qualifying examination that consists of an oral defense of an original written research proposal. Admission to candidacy for the Ph.D. degree requires satisfactory performance in the core and advanced courses, the qualifying examination, and research.

REQUISITE COURSES

Physical Biochemistry I (2.0 hrs)
Physical Biochemistry II (1.5 hrs)

ELECTIVES

Gene Regulation
Mechanism of Drug Action
Molecular Basis of Metabolic Regulation
Signal Transduction I
Signal Transduction II

Descriptions of these courses may be found in the Division of Basic Science chapter.

STUDENT RESEARCH SEMINAR

Weekly works-in-progress seminars provide a format in which students are encouraged to think critically about their own research and how it relates to related topics in biochemistry. Students receive critical feedback and suggestions from students and faculty with a range of biochemical expertise as well as gaining experience with formal presentations, a critical skill for a successful scientist. Several faculty mentors attend regularly and assist in facilitating discussion of the research presented. All track students are required to attend the WIP series weekly and to actively participate in the discussions, in addition to presenting their ongoing research once each year.

DISSERTATION COMMITTEE

The dissertation committee oversees the scientific progress of students toward the completion of their degrees. Faculty members on the committee are selected for expertise in the thesis area so they can contribute substantial intellectual insight in direction of the project. The committee must have at least four members, including the thesis adviser, and at least two must be Program faculty. The committee meets at least once a year to provide guidance and advice and to ensure a student’s satisfactory progression toward a degree.

QUALIFYING EXAMINATION

The qualifying examination evaluates the student’s ability to develop a hypothesis-based research proposal that addresses a specific question in modern biochemistry. The proposal must be presented in written and oral forms. To distinguish the student’s abilities from those of the dissertation adviser, the student may not prepare a proposal related to his or her dissertation research or to research being carried out by other members of the student’s laboratory. The examination tests the student’s ability to defend work described in the proposal and to demonstrate an understanding of the underlying concepts, experimental approaches and designs, and their limitations. Advancement to Ph.D. candidacy depends on successful completion of the oral proposal examination. The qualifying
Chemistry Training Track

The Chemistry Training Track is designed to prepare students for emerging research opportunities at the crossroads of modern chemistry and discovery biology. Research projects focus on topics at the forefront of synthetic and mechanistic chemistry, chemical biology, and biochemistry. The Program is committed to providing an educational experience that is challenging, broad-based, and rigorous.

Curriculum

Students in the Chemistry Training Track begin advanced course work in the first year. Prospective students should mention their intention to join the Chemistry Training Track as part of their application to the Graduate School. Required courses are listed below. The first-year Core Course and other courses offered in the Division of Basic Science may be taken as electives with approval.

Fall, First Year

Core Curriculum – Proteins
Chemical Structure and Reactivity
Chemical Synthesis I
Advanced Problems in Reaction Mechanisms I

Spring, First Year

Chemical Synthesis II
Advanced Synthesis and Catalysis
Small Molecule Structure Elucidation
Advanced Problems in Reaction Mechanisms II

Descriptions of these courses may be found in the Division of Basic Science chapter.

Student Seminars

A weekly seminar provides a format in which students are encouraged to think critically about their research and how it relates to topics in chemistry. Each student presents one works-in-progress talk and one journal club annually.

WIPs are designed to generate feedback and suggestions for students regarding their research from a diverse audience and to provide experience with formal presentations, a critical skill for successful scientists. Faculty mentors attend regularly and facilitate discussion of the research presented.

Journal club presentations provide a forum for students to learn and describe an area of chemistry not directly related to their thesis topics. This forum aims to broaden students’ knowledge and sophistication regarding important areas in synthetic chemistry. Topics are chosen by students in consultation with thesis advisers. Postdoctoral fellows also have an opportunity to present journal clubs.

In addition, a biweekly Chemistry Evening Seminar series provides students an opportunity to become familiar with research from leading laboratories and institutions worldwide.

Dissertation Committee

This committee oversees the scientific progress of the student toward completion of a degree. Faculty members on the committee are selected for expertise in the thesis area so they can contribute substantial intellectual insight in direction of the project. The committee must have at least four members, including the thesis adviser and at least two Program faculty members. The committee meets at least once a year to provide guidance and advice and to ensure the student’s satisfactory progress toward a degree.

Qualifying Examination

The qualifying examination evaluates the student’s ability to develop a hypothesis-based research proposal that addresses a specific question in modern chemistry. The proposal must be presented in written and oral forms. To distinguish the student’s abilities from those of the dissertation adviser, the student may not prepare a proposal related to dissertation research or to research being carried out by other members of the student’s laboratory. The examination tests the student’s ability to defend work described in the proposal and to demonstrate an understanding of the underlying concepts, experimental approaches and designs, and their limitations. Advancement to Ph.D. candidacy depends on successful completion of the oral examination. The qualifying examination process takes place during the Spring of the first year after course work is completed.

Faculty

The following faculty members have a particular focus on chemistry:

- Chuo Chen, Ph.D.
- David Corey, Ph.D.
- Jef DeBrabander, Ph.D.
- Laszlo Kurti, Ph.D.
- Wen-hong Li, Ph.D.
- John MacMillan, Ph.D.
- Joseph Ready, Ph.D.
- Uttam Tambar, Ph.D.
- Gomika Udugamasooriya, Ph.D.