INTEGRATIVE BIOLOGY • biological chemistry • biomedical engineering• cancer biology • cell regulation • genetics and development • immunology • molecular biophysics • molecular microbiology • neuroscience

Integrative Biology

Chair, Graduate Program

Yi Liu, Ph.D.

Degree Offered

Doctor of Philosophy

Faculty

Professors

Ilya B. Bezprozvanny
Ph.D., Institute of Cytology Russian Academy of Sciences, 1992

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

Stephen C. Cannon
M.D., Ph.D., Johns Hopkins University, 1986

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

J. Michael DiMaio
M.D., University of Miami, 1987

Joel K. Elmquist
D.V.M., Ph.D., Iowa State University, 1992, 1993

Errol C. Friedberg
M.D., University of Witwatersrand, South Africa, 1961

William T. Garrard
Ph.D., University of California, Los Angeles, 1971

Dwight C. German
Ph.D., University of Oklahoma Health Sciences Center, 1972

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

Frederick Grinnell
Ph.D., Tufts University School of Medicine, 1970

Lisa Halvorson
M.D., Johns Hopkins University, 1987

Joachim Herz
M.D., University of Heidelberg, Germany, 1983

Joseph A. Hill
M.D., Ph.D., Duke University, 1987

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Sandra Lee Hofmann
M.D., Ph.D., Washington University, St. Louis, 1983

Jay D. Horton
M.D., University of Iowa College of Medicine, 1988

Chou-Long Huang
M.D., Taipei Medical University, Taiwan, 1981; Ph.D., University of California, San Francisco, 1988

Peter Igarashi
M.D., University of California, Los Angeles, 1981

Kristine E. Kamm
Ph.D., University of Missouri, 1977

W. Lee Kraus
Ph.D., University of Illinois, Urbana-Champaign, 1994

Makoto Kuro-o
M.D., Ph.D., University of Tokyo, 1985, 1991

Yi Liu
Ph.D., Vanderbilt University, 1995

David J. Mangelsdorf
Ph.D., University of Arizona, 1987

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

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

Orson W. Moe
M.D., University of Toronto Faculty of Medicine, 1982

Eric N. Olson
Ph.D., Wake Forest University, 1981

Charles R. Rosenfeld
M.D., Emory University, 1966

Rashmin C. Savani
M.B., Ch.B., University of Sheffield School of Medicine, England, 1982

Philipp E. Scherer
Ph.D., University of Basel, Switzerland, 1992

Philip W. Shaul
M.D., University of Cincinnati, 1981

William J. Snell
Ph.D., Yale University, 1975

Rhonda F. Souza
M.D., Howard University, 1991

James T. Stull
Ph.D., Emory University, 1971

Philip J. Thomas
Ph.D., University of South Dakota, 1988

Roger H. Unger
M.D., Columbia University, 1947

Steven Vernino
M.D., Ph.D., Baylor College of Medicine, 1994

Masashi Yanagisawa
M.D., Ph.D., University of Tsukuba, Japan, 1985, 1988

Helen L. Yin
Ph.D., Harvard University, 1976

Andrew R. Zinn
M.D., Ph.D., UT Southwestern Medical Center, 1988

Associate Professors

Rolf A. Brekken
Ph.D., UT Southwestern Medical Center, 1999

Benjamin Chen
Ph.D., Ohio State University, 1996

Deborah J. Clegg
Ph.D., University of Georgia, 2000

Amelia J. Eisch
Ph.D., University of California, Irvine, 1997

Carol F. Elias
Ph.D., University of Sao Paulo, Brazil, 1997

Andrew P. Feranchak
M.D., University of Pittsburgh School of Medicine, 1992

Christine Kim Garcia
M.D., Ph.D., UT Southwestern Medical Center, 1996

Joseph A. Garcia
M.D., Ph.D., University of California, Los Angeles, 1993

Mala Mahendroo
Ph.D., UT Southwestern Medical Center, 1992

Lisa M. Monteggia
Ph.D., Chicago Medical School, 1998

Joyce R. Repa
Ph.D., University of Wisconsin, Madison, 1996

Beverly A. Rothermel
Ph.D., Yale University, 1991

Margaret A. Schwarz
M.D., University of Missouri-Kansas City, 1987

Thomas M. Wilkie
Ph.D., University of Washington, Seattle, 1986

Hiromi Yanagisawa
M.D., Ph.D., University of Tsukuba, Japan, 1986, 1993

Jin Ye
Ph.D., UT Southwestern Medical Center, 2000

Jeffrey M. Zigman
Ph.D., M.D., University of Chicago, 1994, 1997

ASSISTANT PROFESSORS

Massimo Attanasio
M.D., University of Naples "Federico II," Italy, 1990

Roberto Coppari
Ph.D., University of Marche, Italy, 2002

Todd N. Eagar
Ph.D., Northwestern University Medical School, Chicago, 2001

Rana K. Gupta
Ph.D., University of Pennsylvania, Philadelphia, 2006

Lu Q. Le
Ph.D., M.D., University of California, Los Angeles, 2002, 2003

Guosheng Liang
Ph.D., Ohio State University, 1997

Pradeep Mammen
M.D., University of Wisconsin, Madison, 1995

Chieko Mineo
Ph.D., University of Tokyo, 1992

Hamid Mirzaei
Ph.D., Purdue University, 2005

Nikhil Munshi
Ph.D., M.D., Columbia University, 2001, 2003

Juan M. Pascual
M.D., Universidad de Granada, Spain, 1990; Ph.D., Baylor College of Medicine, 1995

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

Yihong Wan
Ph.D., University of Colorado Health Sciences Center, 2001

Chengcheng "Alec" Zhang
Ph.D., University of Illinois at Urbana-Champaign, 1999

Description of the Discipline

The Integrative Biology Graduate Program fosters training in scientific investigations that relate biological processes to normal or pathological organismal functions. Principles and techniques used to study multicellular biological preparations are applied to investigate and verify hypotheses arising from knowledge of molecular and cellular biology. Multicellular preparations may include co-cultures of different cell types, isolated tissues, organ systems, or whole animals. Thus, cells and tissues are studied in their "social" context. This Program promotes effective cross-disciplinary research involving faculty in basic science and clinical departments with the goal of training a student for a career as an independent investigator.

Some areas of interest in this Program include response and adaptation to physiological (exercise, microgravity, and pregnancy) and pathological (ischemia, hypertension, cancer, diabetes, sepsis, and inflammatory and immune diseases) stresses. Specific subjects of investigation involve cell-cell signaling, including the basis of fertilization; exocrine secretion; renal tubular transport; gene regulation in development and differentiation; regulation of cardiovascular function and metabolism; regulation of muscle contraction and protein turnover; sensory regulation of behavior; carbohydrate and lipid metabolism; and tumor biology.

Objectives

The Integrative Biology Graduate Program offers doctoral training in a multidisciplinary, integrative discipline that seeks to understand the complexity of interacting organismal systems and the molecular basis of involved processes. This approach provides insights into derangements caused by disease and thereby provides biomedical advances for treatment of humans through molecular medicine. Students in this Program have the opportunity to master scientific principles through classroom, seminar, and discussion experiences and have the opportunity to perform original and innovative research in this new area. The goal of this Program is to prepare students for biomedical research in academia, industry, or government.

The dissertation project should combine studies on multicellular culture preparations, isolated tissue or organs, organ systems, or whole animals with aspects of cell or molecular biology. The Program encourages the recruitment of two mentors if this requirement is not met in a single laboratory. The two-mentor system is intended to promote ongoing or newly initiated cross-disciplinary studies providing a broad-based education for the student.

Special Requirements for Admission

Students wishing to join the Integrative Biology Graduate Program must be enrolled in the Division of Basic Science and be in good standing academically. Usually students seek enrollment in the Program toward the end of the first year of study following completion of the set of research rotations and selection of a mentor.

Curriculum

All students in the Integrative Biology Graduate Program must have satisfactorily completed the first-year core curriculum and three laboratory rotations. In the second year, students complete at least nine credit hours of advanced course work. Three hours must include Human Biology and Disease, and three hours are selected from the following list of courses. Additional courses may be selected from courses listed in the Division of Basic Science section and from the Biomedical Engineering and Radiological Sciences Graduate Programs.

Students are strongly encouraged to develop, in collaboration with the graduate student adviser and appropriate faculty, special topic courses dealing with the physiological systems related to future dissertation research. These tutorial-type courses may cover fundamental knowledge as well as methodological approaches and recent primary literature. Students will participate in a seminar-journal club each term.

At the end of the second year, students take a qualifying examination, which consists of an oral defense of an original, written proposal.

Admission to candidacy for the Ph.D. requires satisfactory performance in the core and advanced courses and on the qualifying exam.

INTEGRATIVE BIOLOGY COURSES

Advanced Genetics I: Model Systems
Advanced Genetics II: Human Genetics
Experimental Approaches to Complex Genetic Disease and Therapy
Fundamentals of Neuroscience
Human Biology and Disease
Molecular Basis of Metabolic Regulation
Responses to Stress
Signal Transduction I
Topics in Developmental Biology