Students at Macalester can study biochemistry through two programs: the chemistry major with added emphasis in biochemistry (American Chemical Society-certified) or the biology major with added emphasis in biochemistry. Both programs provide training in biochemistry and molecular biology, but they do so from different disciplinary perspectives. In addition to rigorous and innovative curricula, the Biology and Chemistry departments offer opportunities for student research with our own faculty or with scientists at academic, corporate, and governmental research sites across the country.

Faculty and Staff

Lin Aanonsen, O.T. Walter Professor of Biology and director of the Health Professions Advisory Committee, is a neurobiologist who regularly teaches Cell Biology, Human Physiology, various neurobiology courses and additional new non-majors courses exploring science and spirituality. Her research focuses on elucidating the mechanisms of pain transmission in the spinal cord. Students are actively engaged in her research during the summer and academic year and have co-authored publications. She received the 2003 Macalester College Excellence in Teaching Award and the 2014 Thomas Jefferson Award.

Ronald Brisbois, professor, is a synthetic chemist. His varied research interests include synthetic methodology development, ligand and catalyst design, cyclophane construction, and transition metal-mediated supramolecular self-assembly. On a sabbatical in the Biomaterials Technology Center at 3M, he initiated and has continued investigations regarding highly fluorescent hexaazaanthracene derivatives. In 1993, President Clinton designated him a Presidential Faculty Fellow.

Mary Montgomery, associate professor and chair of the Biology Department, examines the evolution of the molecular genetic pathways that direct the earliest stages of animal development. Grants from the National Science Foundation have allowed her to purchase additional related equipment. Students participating in her research program often present their work at national conferences. She also serves as a health professions advisor.

Marcos Ortega, assistant professor, is a biochemist who utilizes X-ray crystallography, biophysics, and biochemistry to try to elucidate the connection between protein structure and function in virus replication. Current projects involve trying to understand the molecular interactions of viral proteins and viral DNA to initiate replication through a process called DNA packaging.

Paul Overvoorde, professor, is currently serving as associate dean of the faculty. He has teaching interests in genetics, cell biology, synthetic biology, genomics, and plant physiology. Through collaboration with colleagues in the Chemistry Department and in Ghent, Belgium, he has involved Macalester students in a "chemical genetics" project that aims to define the role of auxin during lateral root formation.

Kathryn Splan, associate professor, is a bioinorganic chemist. Her research studies the effects of copper on biological molecules and seeks to understand factors that control how a protein acquires the correct metal ion. A separate area of research focuses on porphyrins, a class of synthetic compounds that mimic the structure and function of the natural pigments heme and chlorophyll. Grants from ACS, Research Corporation, and the National Science Foundation have supported these projects. Splan teaches courses in both introductory chemistry and biochemistry.

Steve Sundby, instructor and laboratory supervisor, has specialties in molecular biology, protein biochemistry, and virology. He teaches microbiology and several of the laboratories for courses in cell biology and genetics.

Recent Topics Courses

- Cellular and Molecular Neuroscience
- Research in Biochemistry
- Research in Molecular Biology
- Synthetic and Computational Biology
- Topics in Cancer Biology

Special Opportunities

Chemistry and biology majors with an added emphasis in biochemistry have opportunities to work side by side with faculty conducting original research. Independent projects allow students to get involved in research early in their time at Macalester. Support for student summer research is available through grants from federal or private science foundations to individuals or groups of faculty members, and endowed funds created through the Keck Foundation or alumni gifts. In the last five years, Macalester students have also performed off-campus research at such institutions as Harvard University, the University of Chicago, Cold Spring Harbor Laboratory, Mayo Clinic, and Washington University in St. Louis. The Macalester College Science and Research Office (SRO) coordinates and facilitates the identification of both on- and off-campus research activities. The SRO hosts informational sessions and workshops related to identifying, applying, and making the most of undergraduate research experiences.

Resources

A state-of-the-art science facility housing the Chemistry and Biology departments supports student-faculty research and includes fully equipped teaching laboratories supporting the mainline curricula in biology and chemistry. National Science Foundation grants and other funds have provided advanced equipment for student and faculty use, including:

- GE Healthcare AKTA Fast Protein Liquid Chromatography system (FPLC)
- Two Beckman Coulter Gold Bioessential High-Performance Liquid Chromatography systems (HPLC)
BIOCHEMISTRY

Beckman Coulter CEQ 8000 Genetic Analysis System
Bio–Rad iCycler Real-Time PCR System
Beckman Coulter CytoMics FC500 flow cytometer
Bruker BioSpin Avance III 400 MHz NMR spectrometer
Cary Eclipse Spectrofluorimeter
Cary 50 Bio thermostatted UV/visible spectrophotometer
Agilent 8453 UV/visible spectrophotometer
Agilent 5973/6890N gas chromatograph/mass spectrometer system with autosampler
Varian Eclipse Fluorometer and Fluorescence Polarimeter
Beckman Coulter CEQ-8000 DNA sequencer
Nanodrop spectrophotometer
Licor DNA sequencer and image analyzer (two separate instruments)
Nicolet Magna 550 FT-IR, and Perkin Elmer 1430 IR spectrometers
Buck model 200A atomic absorption spectrometer
Hewlett-Packard chiral capillary gas chromatograph
JOEL scanning electron microscope with energy and wavelength dispersive spectroscopy abilities
X-ray diffractometer
X-ray fluorescence spectrometer (in the divisional Keck facility)

Research
Alyssa Ashbaugh ’14 (Madison, Wis.) completed an honors thesis with Professor Chatterjea titled “Dynamics of Tactile Sensitivity, Inflammation, and Neuro–immune Interactions in a Model of Persistent Allergen-provoked Vulvar Pain.”
Richard Liang ’13 (Nanjing, China) completed an honors thesis with Professor Kathryn Splan that studied the copper-binding properties of X-linked inhibitor of apoptosis protein.
Aubrey Ellison ’12 (Plymouth, Minn.) spent two summers in the Brisbois lab at Macalester developing methodology for desilyative “click” chemistry toward the synthesis of 1,2,3-triazoles.

Tijana Martinov ’12 (Belgrade, Serbia) completed an honors thesis with Professor Chatterjea titled “A Mast Cell-Mediated Model of Acute Vulvar Pain.”
Christina Fitzsimmons ’11 (Camp Hill, Pa.) characterized the activity of a protein involved in the production of molecules necessary for virulence in the human pathogen Aspergillus fumigatus. She presented her work at the national meeting of the American Chemical Society in Anaheim, Calif.

Peter Goldberg ’11 (Bemidji, Minn.) spent two summers in the Splan lab at Macalester synthesizing porphyrins that exhibit enhanced light-absorbing properties with potential applications in fields such as solar energy conversion and photodynamic therapy.

After Macalester
Aryeh Blumenreich ’16 (Minnetonka, Minn.) is attending medical school at Temple University.
Lawrence Furia ’16 (Albany, New York) has started a company, VivoDynamics, focused on biocatalysis.
Nicole Mandel ’16 (Portland, Ore.) is earning a PhD in physical chemistry at Columbia University.
Brian Carr ’15 (Mequon, Wis.) is attending dental school at the University of Pennsylvania.
Modestas Filipavičius ’15 (Šiauliai, Lithuania) is pursuing a PhD in medicinal chemistry at the University of Washington–Seattle.
Lorela Paco ’15 (Vlora, Albania) is pursuing a PhD in medicinal chemistry at the University of Washington.
Yang Zhang ’15 (Shanghai, China) is in the master of public health program at Yale University.
Alyssa Ashbaugh ’14 (San Francisco) is a laboratory technician at Johns Hopkins University Medical School.
Kacper Skakuj ’14 (Durham, N.C.) is pursuing a PhD in chemistry at Northwestern University.
Christopher Smith ’14 (Ashland, Wis.) is in the chemical physics PhD program at the University of Minnesota.

Max Soghikian ’14 (Piedmont, Calif.) is a medical student at Northwestern University Medical School.
Julie Sun ’14 (Shanghai, China) is pursuing a PhD in biomedical engineering at Boston University.
Alex Huszagh ’13 (Wilmette, Ill.) is pursuing a PhD in biochemistry at the University of California–Irvine.
Abas Noor ’13 (New Hope, Minn.) is currently a medical student at Brown University.
Jason Schrad ’13 (Lincoln, Neb.) is pursuing a PhD in biochemistry at Michigan State University.
Zhenmei Zhang ’13 (Nanjing, China) is currently a medical student at Albert Einstein College of Medicine.

Aubrey Ellison ’12 (Plymouth, Minn.) completed an internship in medicinal chemistry at Eli Lilly and Company and is pursuing a PhD in chemistry at the University of Wisconsin.
Kevin Sullivan ’12 (Shoreview, Minn.) is pursuing a PhD in biochemistry at Emory University.
Christina Fitzsimmons ’11 (Camp Hill, Pa.) is pursuing a PhD in chemistry and chemical biology at the University of California–San Francisco.
Peter Goldberg ’11 (Bemidji, Minn.) is pursuing a PhD in chemistry at the University of Michigan.
Chen Gu ’11 (Shanghai, China) is pursuing a PhD in chemistry at the University of Pennsylvania.

Willem Laursen ’11 (Charleston, Ill.) spent one year in the National Institutes of Health post-baccalaureate program and is pursuing a PhD in neuroscience at Yale University.
Nick O’Connor ’11 (Beaverton, Ore.) is in the PhD program at Cal Tech.