

# Biochemistry and Molecular Biology

“At Cornell, teaching and research are integrated, and student involvement allows faculty to use its research as a learning experience for undergraduates.”

*Craig Tepper, Professor of Biology*

Cornell's interdisciplinary program in biochemistry and molecular biology (BMB) is designed to prepare students for graduate school, professional school, or a technical career in the field. The curriculum is drawn from the departments of biology and chemistry, with emphasis on cellular biology, genetics, and biochemistry. This type of combined major is offered by few undergraduate institutions.

The BMB major combines specific biology and chemistry courses. The biology courses focus on animal and human biology and genetics. The chemistry courses emphasize organic and analytical chemistry that are the foundation for understanding physiological processes.

Special attention is given to developing excellent laboratory skills, and Cornell's One Course At A Time curriculum gives professors a great deal of flexibility in how they integrate laboratory and classroom learning. In genetics lab, for example, students are not simply given tasks to perform, but they are given the responsibility to choose a problem, design an experiment, analyze the data, and present the results.

Professors in biology and chemistry lead ongoing summer research projects in small, collaborative teams as part of the Cornell Summer Research Institute. Students also participate in high-level research through relationships with external programs, and the block plan makes such opportunities feasible even during the school year.

## PRE-MEDICAL PREPARATION

Students wishing to attend a professional or graduate school in medical fields often choose to major in biochemistry and molecular biology. This major allows students to meet both the biology and the chemistry prerequisites required by any graduate program, without the need to double major in both biology and chemistry.

## CORNELL COLLEGE'S DIMENSIONS PROGRAM FOR HEALTH PROFESSIONS

Dimensions is an academic enrichment program that provides students a full range of support in preparing for health-related professions. In addition to research and internship placements, Dimensions coordinates workshops, guest speakers, MCAT preparation, career services, and reading groups. Cornell's 20012-2016 medical school acceptance rate is 75 percent. That is well above the national average of 39 percent for 2012-2016.

## BENEFITS OF ONE COURSE AT A TIME

The One Course At A Time curriculum allows students to immerse themselves in scientific discovery without competing demands from other courses or the limitations of short class periods separated by lengthy periods of time. In lab classes, faculty structure classroom and lab time to effectively meet the needs of the subject matter, rather than the demands of the clock. Students enjoy extended time to conduct more complex and in-depth investigations.

The block plan also provides many opportunities for research experiences beyond campus. Students might go on a diving expedition in the Caribbean to study coral bleaching, then further their research on campus through an

## Faculty Bios & Courses

### Core Faculty:

#### JEFF CARDON

*Professor of Biology and Chemistry*

Teaches courses in biology and chemistry, including Cell and Molecular Biology, Biochemistry, and the BMB elective Microbiology. Recent research with students has focused on energy utilization in the yeast *S. cerevisiae*, which might shed light on biological causes of obesity in humans. Ph.D., molecular biology, University of California, Los Angeles

#### BARBARA CHRISTIE-POPE

*Professor of Biology*

Teaches courses in biology, including Neurobiology, Immunology, and Human Anatomy and Physiology. She has research interests in neuropharmacology and degenerative diseases of the brain, and recent studies with students and University of Iowa researchers are examining zebrafish for a potential link between pigment producing melanocytes in the skin and dopaminergic neurons in the brain. Ph.D., pharmacology, University of South Alabama.

#### BRIAN NOWAK-THOMPSON

*Associate Professor of Biology and Chemistry*

Teaches courses in biology and chemistry, including Organic Chemistry Lab, Biochemistry, and the BMB elective Chemical Ecology. Students in his lab study the production of bacterial metabolites that inhibit plant pathogens and are sometimes used in place of agricultural pesticides. Ph.D., biochemistry and biophysics, Oregon State University.

#### CRAIG TEPPER

*Professor of Biology*

Teaches courses in biology, including Cell and Molecular Biology, Genetics, and Developmental Biology. His research with students focuses on molecular genetics and marine symbionts, and includes collaborations on coral bleaching and the loss of reef habitat in the Caribbean. Ph.D., molecular plant pathology, Utah State University.

independent study block or through the Cornell Summer Research Institute. Students might also pursue a Cornell Fellowship for two blocks at a medical research hospital or simply enjoy the opportunity for field trips to local prairies, wetlands, and forests as part of the normal coursework.

#### CURRICULUM HIGHLIGHTS

##### CAPSTONE

Majors complete their degree by undertaking an independent research project. They can create their own projects or take on problems covered in off-campus trips, including the study of coral bleaching in the Bahamas or Belize and plant-insect interaction in tropical rain forests. The project includes reviewing literature, collecting and interpreting data, and writing a research report.

#### RESEARCH

##### STUDENT-FACULTY RESEARCH

Faculty in both biology and chemistry involve students in collaborative research projects, with topics ranging from tropical species diversity to bacteria that may provide an alternative to synthetic pesticides to medical research related to neuromuscular diseases.

##### OFF-CAMPUS RESEARCH

In addition to working with faculty on research projects at Cornell, students frequently complete research projects at other prestigious institutions. Students have recently completed research experiences at the University of Chicago; the School of Medicine, University of Colorado; Genetic Laboratory, the University of Iowa; the University of Wisconsin-Madison; and North Carolina State University.

#### INTERNSHIPS/FELLOWSHIPS

Students have recently completed internships or Cornell Fellowships at Baylor College of Medicine in Houston, Texas; the Children's Hospital in Aurora, Colorado; and the University of Maryland School of Medicine in Baltimore, Maryland.

#### AFTER CORNELL

##### ALUMNI CAREERS

According to the U.S. Bureau of Labor Statistics, molecular biologists can expect higher job growth and starting salaries than biochemists, particularly if they complete a doctoral degree. More people with training in biochemistry and molecular biology will be needed to apply basic research to develop biological products and processes that improve people's lives. Persons holding bachelor's degrees in this field often work as technologists in research or clinical laboratories. National Association of Colleges and Employers (NACE) reports that employment of medical laboratory technologists is projected to grow 11 percent by 2026, much faster the average for

all occupations. The median starting salary in the biological sciences was \$61,000 in 2018.

Laboratory technician, Kraft Heinz Company, Aledo, Illinois (Class of 2017)

Research intern, University of Iowa, Iowa City, Iowa (Class of 2017)

Laboratory research assistant, University of Texas MD Anderson Cancer Center, Houston Texas (Class of 2016)

Medical scribe, Denver Colorado (Class of 2016)

Production scientist, Integrated DNA Technologies, Coralville, Iowa (Class of 2016)

Peace Corps, Republic of Paraguay (Class of 2016)

Camp and family director, Town North YMCA, Dallas, Texas (Class of 2016)

Professional research assistant, University of Colorado Denver, Denver, Colorado (Class of 2015)

Laboratory research technician, University of Iowa Carver School of Medicine, Iowa City, Iowa (Class of 2015)

Laboratory senior technician, Roquette America Inc., Mount Pleasant, Iowa (Class of 2013)

Production chemist, Bio-Rad Laboratories, Hercules, California (Class of 2013)

Pathology aide, Poudre Valley Health Center, Fort Collins, Colorado (Class of 2013)

Program specialist, University of Texas Medical Branch, Memphis, Tennessee (Class of 2011)

Laboratory technician, Freeport-McMoRan Copper and Gold, Galveston, Texas (Class of 2010)

#### GRADUATE SCHOOLS ATTENDED

M.A., marine biology, University of Hawaii, Honolulu, Hawaii (Class of 2016)

M.D., University of Texas Southwestern Medical School, Dallas, Texas (Class of 2016)

M.D., Medical College of Wisconsin, Milwaukee, Wisconsin (Class of 2015)

Ph.D., molecular biology, University of Iowa, Iowa City, Iowa (Class of 2015)

Ph.D., chemistry, Columbia University, New York City, New York (Class of 2015)

M.A., biology, University of Eastern Illinois, Charleston, Illinois (Class of 2015)

Ph.D., neuroscience, University of Utah, Salt Lake City, Utah (Class of 2015)

Ph.D., pharmacy, University of Minnesota, Minneapolis, Minnesota (Class of 2013)

Ph.D., biochemistry and molecular biology, Baylor College of Medicine, Houston, Texas (Class of 2013)

#### Affiliated Faculty in Biology:

##### MARTY CONDON

*Professor of Biology*  
Teaches the capstone course Biological Problems. Ph.D., University of Texas.

##### ANDY MCCOLLUM

*Professor of Biology*  
Teaches Foundations: Organismal Biology. Ph.D., zoology, Duke University.

##### TAMMY MILDENSTEIN

*Assistant Professor of Biology*  
Teaches Foundations: Organismal Biology. Ph.D., zoology, Duke University.

#### Affiliated Faculty in Chemistry:

##### CHARLEY LIBERKO

*Professor of Chemistry*  
Teaches courses in organic chemistry and Chemical Principles I and II. Ph.D., University of Minnesota.

##### JAI SHANATA

*Associate Professor of Chemistry*  
Teaches courses in organic chemistry and Chemical Principles I and II. Ph.D., chemistry, California Institute of Technology.

##### CINDY STRONG

*Professor of Chemistry*  
Teaches Chemical Principles I and II, Accelerated General Chemistry, and Analytical Chemistry. Ph.D., chemistry, California Institute of Technology.

##### CRAIG TEAGUE

*Associate Professor of Chemistry*  
Teaches Chemical Principles I and II, Accelerated General Chemistry, Analytical Chemistry, and the BMB elective Physical Chemistry. Ph.D., chemistry, University of Illinois at Urbana-Champaign.