

# DEPARTMENT OF BIOLOGY

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**More Information:** <https://www.case.edu/artsci/biol>

The mission of the Department of Biology at Case Western Reserve University is to promote research programs of national and international prominence and to provide strong undergraduate and graduate educational programs that emphasize integrative approaches to biological problems. In doing so, our programs support preparation and professional development for careers related to the biological and health sciences.

The department offers courses leading to the degrees of Bachelor of Science, Bachelor of Arts, Master of Science, and Doctor of Philosophy. Cooperative programs between the Department of Biology and the Case Western Reserve University School of Medicine, the Cleveland Botanical Garden, the Cleveland Metroparks Zoo, the Holden Arboretum, the Cleveland Institute of Art, and other departments in Case Western Reserve University significantly extend the range of resources available to biology students. The department also operates an extensive field research station at Squire Valleevue Farm, located about 10 miles east of the university. Undergraduate students are encouraged to conduct individually supervised research projects with biology faculty and with faculty in cooperating departments. A supervised research project is required of all students in the Biology, BS and Neuroscience, BS programs.

The undergraduate programs in biology provide excellent preparation for graduate or professional schools, including medical, dental, and veterinary schools and the many specialized graduate programs in the biological sciences. A biology degree also prepares students for careers in industry and government. For students interested in biotechnology—a field with growing career opportunities—the department offers elective sequences within the BA and BS degrees.

In addition to formal courses for credit, the department offers weekly seminars during the academic year, presenting recent advances in biology. These seminars are held every Thursday at 4:00 p.m. and are open to the university community.

## Department Faculty

Michael F. Benard, PhD  
(University of California, Davis)  
*Professor; Department Chair*  
Ecology; evolutionary biology

Karen C. Abbott, PhD  
(University of Chicago)  
*Professor, Associate Chair*  
Ecology; theoretical biology

Radhika Atit, PhD  
(University of Cincinnati)  
*Professor*  
Developmental biology and genetics; origin and patterning of skin

Sarah C. Bagby, PhD  
(Massachusetts Institute of Technology)  
*Assistant Professor*  
Microbial and viral evolution and community dynamics; geobiology; microbial physiology; bioinformatics and ecoinformatics

Rebecca Benard, PhD  
(University of California, Davis)  
*Senior Instructor; Associate Dean, College of Arts and Sciences*  
Plant population ecology; physiology

Susan M. Burden-Gulley, PhD  
(Case Western Reserve University)  
*Senior Instructor*  
Neuroscience; axonal growth; neural development; brain cancer

Jean H. Burns, PhD  
(Florida State University)  
*Professor; Director of Graduate Studies*  
Plant ecology; community assembly; invasibility; the role of phylogeny in assembly; the role of demographic processes in biological invasions

Leena Chakravarty, PhD  
(Ohio State University)  
*Instructor*  
Microbial molecular genetics

Hillel J. Chiel, PhD  
(Massachusetts Institute of Technology)  
*Distinguished University Professor*  
Neurobiology and animal behavior; cellular dynamics of neuronal computation

Nicole Crown, PhD  
(Indiana University)  
*Associate Professor*  
Molecular genetics of meiosis in *Drosophila melanogaster*

Christopher A. Cullis, PhD  
(University of East Anglia, United Kingdom)  
*Francis Hobart Herrick Professor of Biology*  
Plant molecular biology and genetics; modifications of the information content of plant cells

Andrew Dacks, PhD  
(University of Arizona)  
*Associate Professor*  
Mechanisms of sensory processing and motor output in nervous systems

Sarah E. Diamond, PhD  
(University of North Carolina, Chapel Hill)  
*Associate Professor*  
Evolutionary ecology; global change biology; invertebrate immunology; multivariate statistics

Nancy Dilulio, PhD  
(Pennsylvania State University College of Medicine)  
*Instructor*  
Scientific teaching and learning, biochemistry, cell biology and genetics

Angela Dixon, PhD  
(University of Michigan)  
*Assistant Professor*  
Nervous system; olfactory system; biohybrid technologies; in-vitro tissue and organ models; microfluidic models; patterned cell cultures

Richard F. Drushel, PhD  
(Case Western Reserve University)  
*Senior Instructor*  
Vertebrate anatomy and physiology; kinematic modeling and neural control; autonomous robotics

Yolanda M. Fortenberry, PhD  
(Louisiana State University School of Medicine)  
*Associate Professor*  
Regulation of blood coagulation; development of RNA aptamers as anticoagulants and for treatment of sickle cell disease

Jessica L. Fox, PhD  
(University of Washington)  
*Professor*  
Neurobiology of behavior

Elliot M. Gardner, PhD and JD  
(Northwestern University and Chicago Botanic Garden; Benjamin N. Cardozo School of Law)  
*Assistant Professor*  
Plant systematics; phylogenetics; ethnobotany; pollination biology and chemical ecology; flora of Southeast Asia

Abdel H. Halloway, PhD  
(University of Illinois at Urbana-Champaign)  
*Assistant Professor*  
Ecology, Evolution, Mathematical biology

Stephen E. Haynesworth, PhD  
(Case Western Reserve University)  
*Associate Professor; Director, The Emerging Scholars Program*  
Developmental and aging biology

Valerie Haywood, PhD  
(University of California, Davis)  
*Senior Instructor*  
Plant developmental biology; molecular biology

Kathleen Hershberger, PhD  
(Duke University)  
*Instructor*  
Influence of genetic and environmental factors on mitochondria and whole animal health. Incorporating authentic research experiences into laboratory classes.

Emmitt R. Jolly, PhD  
(University of California, San Francisco)  
*Professor*  
Molecular biology and genetics; developmental biology; parasitology; schistosomiasis

Barbara A. Kuemerle, PhD  
(Case Western Reserve University)  
*Senior Instructor*  
Molecular biology and genetics; developmental neuroscience

Ryan A. Martin, PhD  
(University of North Carolina, Chapel Hill)  
*Associate Professor*  
Evolutionary ecology; behavioral ecology; ecology's role in evolutionary diversification; causes and consequences of phenotypic plasticity

Claudia M. Mizutani, PhD  
(Federal University of Rio de Janeiro, Brazil)  
*Associate Professor*  
Developmental biology and genetics; embryonic body-axis formation

Ronald G. Oldfield, PhD  
(University of Michigan)  
*Senior Instructor*  
Evolutionary ecology of cichlid fishes; ichthyology

Fritz Petersen, PhD  
(West Virginia University)  
*Instructor*  
Microbial and aquatic biology, environmental contaminants, scientific teaching.

Robin Snyder, PhD  
(University of California, Santa Barbara)  
*Professor*  
Theoretical ecology

Yash Sondhi, PhD  
(Florida International University)  
*Assistant Professor*  
Neuroethology; sensory biology; evolution; functional genomics

Joy K. Ward, PhD  
(Duke University)  
*Professor; Provost and Executive Vice President, Case Western Reserve University*  
Plant biology; climate change

Robert E. Ward, PhD  
(Duke University)  
*Professor*  
Developmental biology; cell biology; model system genetics

Mark A. Willis, PhD  
(University of California, Riverside)  
*Professor*  
Neurobiology and behavior; sensorimotor control of insect flight; animal behavior

Gabriella Wolff, PhD  
(University of Arizona)  
*Assistant Professor*  
Neuroethology; evolutionary and comparative neurobiology; olfaction; learning and memory

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## Research Faculty

Rodrigo Somoza Palacio, PhD  
(Universidad Federico Santa Maria, Chile)  
*Research Associate Professor*  
Cartilage tissue engineering; somatic stem cell biology; reprogramming technology (IPS); cell therapy and tissue regeneration; cancer metastasis

Jean F. Welter, MD, PhD  
(Leopold Franzens Universität, Austria; Case Western Reserve University)

*Research Associate Professor*

Tissue engineering and cell-based therapies; bioreactor design; mechanobiology; bone transplantation; imaging; fluorescence spectroscopy; drug delivery

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## Secondary Faculty

Martín L. Basch, PhD  
(California Institute of Technology)  
*Assistant Professor, Department of Otolaryngology, University Hospitals of Cleveland*  
Neurobiology; hearing and deafness; mechanotransduction; synapse development

Darin Croft, PhD  
(University of Chicago)  
*Professor, Department of Anatomy, School of Medicine*  
Vertebrate paleontology and fieldwork; mammals, especially those of South America; paleoecology and ancient ecosystems

Brian M. McDermott, PhD  
(Columbia University)  
*Associate Professor, Department of Otolaryngology, University Hospitals of Cleveland*  
Neurobiology; hearing and deafness; zebrafish; mechanotransduction; synapse development

Timothy J. Mead, PhD  
(University of Cincinnati College of Medicine)  
*Assistant Professor, Department of Pediatrics, School of Medicine*  
Developmental biology

Scott W. Simpson, PhD  
(Kent State University)  
*Professor, Department of Anatomy, School of Medicine*  
Hominin paleontology and fieldwork; hominid dentition; locomotor capacities of early *Homo erectus*

Peter Thomas, PhD  
(University of Chicago)  
*Professor, Department of Mathematics, Applied Mathematics, and Statistics*  
Synchronization and reliability of neural activity; gradient sensing, signal transduction and information theory; pattern formation in the visual cortex; malaria informatics

Peter A. Zimmerman, PhD  
(Case Western Reserve University)  
*Professor, Center for Global Health and Diseases, School of Medicine*  
Infectious diseases; genetics, genomic epidemiology and evolution

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## Adjunct Faculty

James Bader, MS  
(Case Western Reserve University)  
*Adjunct Lecturer; Executive Director, Gelfand STEM Center*  
STEM education; aquatic biology

David J. Burke, PhD  
(Rutgers University)  
*Adjunct Assistant Professor; Vice President for Science and Conservation, Holden Arboretum*  
Rhizosphere ecology; plant-microbe interactions; molecular microbial ecology; plant ecology

Pam Dennis, DVM (Ohio State University; College of Veterinary Medicine), PhD (North Carolina State University)  
*Adjunct Assistant Professor; Clinical Assistant Professor, Cleveland Metroparks Zoo*  
Veterinary wildlife epidemiology in zoo and free-ranging animal populations

Noah T. Dunham, PhD  
(Ohio State University)  
*Adjunct Assistant Professor; Research Curator, Cleveland Metroparks Zoo*  
Primate behavior; nutritional ecology; locomotor kinematics

Nicole L. Gunter, PhD  
(University of Queensland, Australia)  
*Adjunct Assistant Professor; Scientist and Curator, Entomology, Biodiversity and Geosciences, Queensland Museum, Australia*  
Phylogenetics and systematics of dung beetles

Diana C. Koester, PhD  
(George Mason University)  
*Adjunct Assistant Professor; Research Curator, Cleveland Metroparks Zoo*  
Wildlife endocrinology; reproductive physiology; animal welfare

Christopher Kuhar, PhD  
(Georgia Institute of Technology)  
*Adjunct Assistant Professor; Executive Director, Cleveland Metroparks Zoo*  
Conservation and education program evaluation; experimental psychology; animal behavior

Kristen E. Lukas, PhD  
(Georgia Institute of Technology)  
*Adjunct Assistant Professor; Director of Conservation & Science, Cleveland Metroparks Zoo*  
Applied animal behavior; behavior and health; visitor attitudes and behavior

Juliana S. Medeiros, PhD  
(University of New Mexico)  
*Adjunct Assistant Professor; Plant Biologist, Holden Arboretum*  
Plant physiological ecology; evolutionary ecology; acclimation and adaptation to the abiotic environment; carbon and water relations

Katherine L. Stuble, PhD  
(University of Tennessee)  
*Adjunct Assistant Professor; Research Chair, Holden Arboretum*  
Plant community ecology; plant insect interactions

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## Lecturers

Julie M. Denker, MS  
(Case Western Reserve University)  
*Full-time Lecturer*  
Anatomy, physiology, molecular techniques

Deborah L. Harris, MS  
(Wright State University)  
*Full-time Lecturer*  
Aquatic biofouling; mycology

Priyusha Pokala, MS  
(Western Kentucky University)  
*Full-time Lecturer*  
Microbiology

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## Emeritus Faculty

Morris Burke, PhD  
(University of New South Wales, Australia)  
*Professor Emeritus*  
Muscle physiology; protein chemistry

Joseph F. Koonce, PhD  
(University of Wisconsin, Madison)  
*Professor Emeritus*  
Aquatic ecology; systems ecology

Roy E. Ritzmann, PhD  
(University of Virginia)  
*Professor Emeritus*  
Neurobiology of behavior; insect locomotion and brain studies

Martin J. Rosenberg, PhD  
(State University of New York, Stony Brook)  
*Senior Instructor Emeritus*  
Herpetology; vertebrate biology; human anatomy and physiology

Norman B. Rushforth, PhD  
(Cornell University)  
*Professor Emeritus*  
Epidemiology; animal behavior; population biology

Joanne Westin, PhD  
(Cornell University)  
*Senior Instructor Emerita*  
Neurobiology and behavior; physiology

## Programs

- Biology, BA
- Biology, BS
- Biology, Minor
- Biology, MS
- Biology, PhD
- Natural Sciences, BA
- Natural Sciences, Minor
- Neuroscience, BS
- Systems Biology, BS

## Dual Degrees

- Programs Toward Graduate or Professional Degrees