

2008-2010 GRADUATE CATALOG ONLINE

Cell Biology (Ph.D.)

Degree Offered:	Ph.D.
Director:	Dr. James F. Collawn
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Faculty

Anupam Agarwal, Professor (Medicine); Regulation of heme oxygenase gene expression in kidney and vascular injury

Namasivayam Ambalavanan, Assistant Professor (Pediatrics);

Agnieszka Ardelt, Assistant Professor (Neurology)

Daniel Balkovetz, Associate Professor (Medicine), Epithelial Cell Biology; Epithelial Cell Cycle Regulation; Regulation of paracellular transport across epithelial cell tight junctions

Zsuzsanna Bebok, Assistant Professor, Membrane protein biogenesis in epithelial cells (CFTR as model). Unfolded protein response.

David M. Bedwell, Professor (Microbiology); Mitochondrial Biogenesis, ABC Transporters

Susan Bellis, Associate Professor (Physiology & Biophysics)

Dale J. Benos, Professor and Chair (Physiology & Biophysics); Molecular physiology of ion channels

Etty N. Benveniste, Professor and Chair (Cell Biology); Neuroimmunology, Cytokine Production in the Central Nervous System

Michael J. Bertram, Assistant Professor (Medicine)

J. Edwin Blalock, Professor (Physiology & Biophysics); Molecular Recognition, Immune Network, Immune Neuroendocrine Interactions

Daniel Bullard, Associate Professor (Comparative Medicine); Adhesion Molecules in Inflammatory Disease

Steven L. Carroll, Associate Professor (Clinical Pathology); The Role of Neuregulin-1 in PNS Regeneration and Neoplasia

Chenbei Chang, Associate Professor (Cell Biology); Developmental Biology, Signal Transduction and Transcriptional Control in Early Frog Embryogenesis

John Chatham, Professor (Medicine); Cardiomyocyte function and metabolism in diabetes and ischemic heart disease

Igor Chesnokov, Assistant Professor (Biochemistry & Molecular Genetics); DNA Replication and Cell Cycle in Eukaryotes

James F. Collawn, Professor (Cell Biology); Molecular Mechanisms of Protein Trafficking

Laura Fraser-Cottiln, Assistant Professor (Cell Biology)

John Corbett, Professor (Medicine)

Rita Cowell, Assistant Professor, (Psychiatry); Transcriptional Regulation of Early Postnatal Brain Development: Insights into the Pathology of Autism and Schizophrenia

David Crawford, Assistant Professor (Pediatrics); The Role of G2/M-Specific Genes in Mitosis and G2 DNA Damage Checkpoint Regulation

Christine A. Curcio, Professor (Ophthalmology); Relations of Human Retinal Anatomy and Spatial Vision

Qiang Ding, Assistant Professor (Medicine); Signaling proteins and molecular mechanisms regulating cell migration and myofibroblast differentiation, and their roles in the development of pulmonary fibrosis

Jeff Engler, Professor (Graduate School); Identifying Novel Diagnostic Peptides and Cell-specific Ligands

Stuart J. Frank, Professor (Medicine); Growth Hormone Receptor Structure-Function, Growth Hormone Signaling

Andra Frost, Associate Professor (Pathology); Fibroblast-Epithelial Cell Interactions and Developmental Pathways in Breast Cancer

W. Timothy Garvey, Professor (Nutrition Sciences); Molecular, Metabolic, and Genetic basis of type 2 diabetes mellitus, insulin resistance, and obesity.

G. Yancey Gillespie, Professor (Surgery); Cell and Molecular Biology of Malignant Brain Tumors

Candece Gladson, Professor (Clinical Pathology); Angiogenesis and Cellular Signals in Glioma Tumors that Promote Proliferation and Invasion

Alecia Gross, Assistant Professor (Vision Sciences); Rhodopsin-mediated retinal degenerations and molecular mechanisms of photoreceptor membrane biogenesis

Lisa Guay-Woodford, Professor (Medicine); Characterizing molecular determinants involved PKD pathogenesis

James Hagood, Professor (Pediatrics); Role of Fibroblasts in Tissue Remodeling

Laurie Harrington, Assistant Professor (Cell Biology); Protective and Pathogenic CD4 T Cell Responses

Amjad Javed, Assistant Professor (Surgery); Genetic and Molecular Signaling for Cellular Differentiation and Skeletogenesis

Kai Jiao, Assistant Professor (Genetics) TGF-beta/Bmp signaling during cardiogenesis

Richard Jope, Professor (Psychiatry); Neuronal Signaling Mechanisms Regulating Gene Expression and Cell Death

F. Cleveland Kinney, Professor (Medicine); Research for medications for the treatment of dementia and Alzheimer's disease.

Robert Kimberly, Professor (Medicine); Autoimmunity, Molecular Mechanisms and Genetic Risk

Jeffrey Kudlow, Professor (Medicine); Transcriptional Control of Growth Factor Gene Expression

Matthieu Lesort, Assistant Professor (Behavioral Neurobiology)

Xiaohua Li, Associate Professor (Psychiatry); Glycogen synthase kinase-3, neuromodulators, and mood disorders

Fang-Tsy (Fannie) Lin, Assistant Professor (Cell Biology); Regulation of Cell Growth by G Protein-Coupled Receptor Signaling

Weei-Chin Lin, Associate Professor (Cell Biology); Cell Cycle Control and DNA Damage Response

Akhil Maheshwari, Assistant Professor (Pediatrics); The role of IL-8 in the development of the human small intestine and the mechanism of cytomegalovirus-induced inflammation in human intestinal mucosa.

Mary MacDougall, Associate Dean for Research (Dental School), Molecular Mechanisms associated with tooth formation, tissue-specific cytodifferentiation, extracellular matrix formation, tooth regeneration and related human genetic dental diseases.

Richard B. Marchase, Professor/Assoc Dean Medicine (Cell Biology); Cytoplasmic Glycosylation and Intracellular Calcium Regulation

James Markert, Professor (Neurosurgery); Surgical care of brain tumor patients, novel therapies in the treatment of brain tumors, gamma knife, clinical trials.

Guillermo Marques, Assistant Professor (Cell Biology); Developmental and adult synaptic plasticity, regulation of gene expression during nervous system development, cell signaling and signal transduction by the TGF- β /BMP pathway in neurons.

Jay McDonald, Professor and Chair (Pathology); Cellular Life and Death Signals in Cancer, Aids and Bone Disease

Michael Miller, Assistant Professor (Cell Biology); Function and evolution of intercellular communication mechanisms

Casey Morrow, Professor (Cell Biology); HIV Replication. RNA:RNA and RNA:Protein Interactions

Joanne E. Murphy-Ullrich, Professor (Pathology); Extracellular Matrix Control of Cell and Growth Factor Function

Louis Burt Nabors, Associate Professor (Neurology)

Jacqueline Parker, Assistant Professor (Pediatrics); Evaluation of fusogenic HSV for therapy of neuroblastoma

Vladimir Parpura, Associate Professor (Neurobiology); Ion channels and Synaptic Function □ Systems Neuroscience and Vision

Emma Perez-Costas, Assistant Professor (Psychiatry); Pathogenesis of dopaminergic systems in schizophrenia

Martin M. Pike, Associate Professor (Cardiovascular Disease); Nuclear Magnetic Resonance Studies of Myocardial Ion Regulation

Lucas D. Pozzo-Miller, Assistant Professor (Neurobiology); Neurotrophins on Ca²⁺ Signaling, Synapse Development, and Plasticity

Mark Prichard, Associate Professor (Pediatrics)

J. Michael Moates, Assistant Professor (Medicine); Regulation of gene expression in pancreatic islets and adipose tissue.

Gavin Rumbaugh, Assistant Professor (Neurobiology); Molecular Mechanisms of Learning and Memory

Julian C. Rayner, Assistant Professor (Medicine); Cell Biology of the Malaria Parasite, Plasmodium Falciparum

Rosalinda Roberts, Professor (Psychiatry and Behavioral Neurobiology);

Kevin Roth, Professor (Pathology); Molecular Regulation of Neuronal Cell Death

Michael J. Ruppert, Associate Professor (Medicine); Role of Zinc Finger Transcription Factors in Tumor Progression

Susan Ruppert, Associate Professor (Biochemistry); Role of Zinc Finger Transcription Factors in Tumor Progression

Lisa Marshall Schwiebert, Associate Professor (Physiology & Biophysics); Inflammatory Responses

Rosa Serra, Associate Professor (Cell Biology); Mechanism of TGF- β Action in Developmental and Disease Processes

Bingdong "Ben" Sha, Associate Professor (Cell Biology); Protein Crystallography

Gene P. Siegal, Professor (Pathology); Tumor Cell Interaction with Extracellular Matrix During Invasion

Brian Sims, Assistant Professor (Pediatrics);

Harald W. Sontheimer, Professor (Neurobiology); Regulation and Function of Ion Channels in Glia

David Standaert, Professor (Neurology); Translational Research in Neurodegenerative Diseases

Elizabeth S. Sztul, Professor (Cell Biology); Intracellular Membrane Sorting and Fusion

W. Anne B. Theibert, Associate Professor (Neurobiology); Inositol-Phosphate Second Messengers in Neurotransmitter Action in the Brain

Laura Timares, Assistant Professor (Dermatology); Engineering Dendritic Cells for Immunotherapy

Jacques Wadiche, Assistant Professor (Neurobiology); Synaptic transmission and glutamate transporters.

Linda Wadiche, Assistant Professor (Neurobiology); The function of adult generated neurons

Jianbo Wang, Assistant Professor (Cell Biology); Novel signaling pathway termed planar cell polarity (PCP) pathway and how this pathway regulates morphogenesis in mammals.

Shu-Zhen Wang, Associate Professor (Ophthalmology); Molecular mechanism of early retinal development, using the embryonic chick as a model system to answer questions with molecular biology, cell biology, genetics, and experimental embryology

Danny Welch, Professor (Pathology); Molecular Basis of Tumor Progression and Metastasis

Anne C. Woods, Professor (Cell Biology); Cell-Extracellular Matrix Interactions and Transmembrane Signaling

J. Michael Wyss, Professor (Cell Biology); Neural Control of Cardiovascular System and Limbic Cortex

Bradley K. Yoder, Professor (Cell Biology); Polycystic Kidney Disease

Huang-Ge Zhang, Assistant Professor (Medicine); Autoimmune Diseases and Cancer Immunology

Jianhua Zhang, Assistant Professor (Pathology); Mechanisms of neuron cell death, epilepsy, Parkinson's disease, autophagy, glutamate receptor activation, signaling transcription regulation

Tong Zhou, Associate Professor (Medicine); Apoptosis in Autoimmunity and Cancer Biology

Program Information

The Department of Cell Biology participates in the Cellular and Molecular Biology (CMB) Program and the Neurosciences Program, which are designed to provide a first-year curriculum to graduate students interested in the broad area of cellular and molecular biology. The CMB and Neurosciences Programs involves student recruitment, admissions, and the first-year curriculum. At the end of the first year, each CMB student chooses a mentor and elects to pursue a degree in biochemistry and molecular genetics, cell biology, microbiology, or neurobiology. Students from the Medical Scientist Training Program (MSTP) are also welcome to complete the basic science component of their training in Cell Biology.

The goal of the graduate program in Cell Biology (CB) is to prepare research-oriented individuals for careers as independent academic or industrial scientists. Each student is counseled and guided by faculty and staff and interacts with a variety of postdoctoral fellows and other graduate students. Thus, through both formal and informal discussion, the student is challenged to consider a wide range of scientific questions and methodologies and is encouraged to relate these to the particular scientific endeavor he or she is pursuing.

The student is expected to gain a broad research background through active participation in formal courses and through hands-on research. In addition to the research-oriented course offerings within the department, the student is expected to expand his or her knowledge by undertaking relevant coursework in biochemistry, statistics, physiology, molecular biology, and immunology. Each student's program is tailored to meet the student's needs and scientific interests. A student usually rotates through at least three independent laboratories (10 weeks each) before identifying a permanent laboratory where his or her formal research for the Ph.D. degree will be done. The Ph.D. program, including coursework, research, and dissertation, usually requires a commitment of at least four to five years, depending on the background of the student.

The program allows specialization in all areas of cell biology, including neurobiology. The program houses active, well-funded research projects that are indicated in the preceding faculty roster. In addition to UAB Graduate School admission requirements, the program requires a baccalaureate degree with a major emphasis in science, a B average in all courses and a slightly higher average in science coursework, and a minimum score of 1,100 on combined verbal and quantitative sections of the GRE General Test.

Ph.D. Program

Although it is expected that most students will enter the program with an advanced biological science background, exceptionally promising students with deficiencies in biological studies will be accepted into the program with the proviso that they take the necessary remedial coursework, usually while they simultaneously pursue research within the program. The successful student will, by the end of his or her graduate tenure, have an ability both to carry out independent research and to contribute to a teaching program in modern cell biology.

Following completion of basic coursework (usually one-and-a-half to two years), each student is required to pass a qualifying examination. This examination is structured to (1) test the student's ability to design a comprehensive research proposal that addresses a problem within an area of cell biology, (2) determine the breadth of the student's knowledge in modern biological sciences, and (3) examine the student's understanding of current concepts in cell biology. After successful completion of this examination by a graduate faculty committee, the student is admitted to candidacy.

All entering graduate students will be awarded fellowships plus full payment of tuition, fees, and insurance premiums. No teaching responsibilities are attendant to the fellowship acceptance.

Additional Information

Deadline for Entry Term(s):	Apply to Cellular and Molecular Program or Contact Cell Biology Program Director
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Contact Information

For detailed information, contact Dr. James F. Collawn, UAB Cell Biology Graduate Program Director, MCLM 395, 1530 3rd Avenue South, Birmingham, AL 35294-0005.

Telephone 205-975-7145

E-mail jcollawn@uab.edu

Course Descriptions

Unless otherwise noted, all courses are for 3 semester hours of credit. Course numbers preceded with an asterisk indicate courses that can be repeated for credit, with stated stipulations.

Cell Biology (CB)

712. **Developmental Biology.** Journal club. 1 hour. Pass/Fail. (Miller)

713. **Growth Factors.** Journal club. 1 hour. Pass/Fail. (Gillespie)

714. **Calcium Signaling.** Journal club. 1 hour. Pass/Fail. (Chatham)

720. **Developmental Neurobiology.** Journal club. 1 hour. Pass/Fail. (Wyss)

721. **Laboratory Rotation.** 5 hours. Pass/Fail.

722. **Vascular Biology.** Journal club. 1 hour. Pass/Fail. (Wyss)

724. **Special Topics in Cell Biology.**

728. **Advanced Cell Biology.** (Collawn)

729. **Mechanisms of Signal Transduction.** (Theibert)
730. **Molecular Basis of Conformational Diseases.** (Sztul/Wyss).
735. **Mechanisms of Writing a Scientific Paper and NIH Grant.** (Morrow)
746. **Cell Cycle and Cancer Genetics.** (Chen)
737. **Developmental Biology.** (Chang)
740. **Research in Cell Biology.** 1 hour. Pass/Fail.
747. **Cell Biology Seminar.** 1 hour. Pass/Fail. (Yoder)
748. **Special Problems in Cell Biology.** 1-5 hours.
750. **Graduate Gross Anatomy.** Lectures, demonstrations, and dissection of all systems and regions of human body. 6 hours. (M. Casey)
752. **Graduate Histology.** Light microscopic features and ultrastructure of cells, fundamental tissues, and organ systems. 5 hours. (Fraser-Cotlin)
755. **Graduate Neuroanatomy.** Gross and microscopic preparations of brain and spinal cord. Functional significance of tracts and nuclei. 4 hours. (Wyss)
779. **Special Problems in Neuroanatomy.** 1-4 hours.
788. **Directed Readings.** Specialized advanced readings in selected topics under direction of appropriate faculty member. 1-4 hours.
790. **Developmental Neurobiology.** (Wyss) 4 hours.
798. **Doctoral Nondissertation Research.** 1-15 hours.
799. **Doctoral Dissertation Research.** Prerequisite: Admission to candidacy. 1-15 hours.

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