CELL BIOLOGY
GRADUATE PROGRAM
HANDBOOK
March 2019
The Cell Biology Graduate Program (CBGP) at the University of Texas Medical Branch at Galveston (UTMB) includes a diverse range of researchers, who work on many different aspects of cell and molecular biology as it relates to several physiological functions and diseased states. The program boasts an interdisciplinary faculty, who come from all of the basic science departments in the school of medicine, ten clinical departments in the school of medicine, and one department in the school of health professions. The faculty are affiliated with fourteen centers and three institutes at UTMB.

The Cell Biology Graduate Program office is housed in the Department of Neuroscience, Cell Biology, and Anatomy. Areas of research strengths in the program include, but are not limited to: 1) neuronal cell biology, including development, trauma, regeneration, neurodegenerative diseases, and vision; 2) reproductive and placental biology; 3) neuro and gut immunology; 4) nutrition and metabolism; 5) stem cells/wound healing and cancer; 6) infectious and immune diseases, and role of microbiota, and; 7) organ response to drugs and toxins and environmental biology.

Several state-of-the-art techniques are used in the laboratories of the Cell Biology faculty in addition to support from Core Facilities. These include:

1) DNA Recombinant Laboratory that helps to make and analyze DNA constructs and includes DNA microarray analysis, RNA Seq analysis etc.;
2) Transgenic Core Facilities that help to generate transgenic and knockout animals;
3) Affymetrix Gene Array system that examines differences in gene expression between samples;
4) State-of-the-art bioinformatics facility that helps analyze gene chip array data and provides support for genomic research;
5) A state-of-the-art protein core facility that analyzes known and unknown proteins using mass spectrometry, NMR, protein chips and the latest technology in proteomics, and helps investigators express large scale proteins;
6) Custom electrophysiological rigs in various laboratories that measure ocular, auditory and pain responses;
7) Microinjection and confocal microscopy that examines function of specific molecules at single cell level;
8) Small animal MRI facility that measures changes in specific body components;
9) Highly sophisticated optical facilities for performing in vitro and in vivo multi-photon imaging;
10) A well-furnished clinical research center that helps investigators conduct translational research. Research specific equipment is available in the laboratory of the Cell Biology faculty that allows one to conduct routine laboratory techniques in the field of molecular and cellular biology including: electrophysiology; electron, fluorescent and light microscopy; protein analysis by HPLC, RIA's, immunocytochemistry, enzymatic assays and Western blot methods; and routine anatomical methods including stereology, retrograde and intergraded tracing of neural pathways, etc.
The Cell Biology Graduate Program is designed for students seeking a Ph.D. degree and cooperates with the M.D.-Ph.D. program for students seeking joint degrees. In year one, students take didactic courses offered by the Basic Biomedical Science Curriculum and the Cell Biology Program. In year one, the Cell Biology students will also begin laboratory based training by choosing to do a maximum of three, seven-week rotations, in the laboratories of their choice. Students will be provided with a list of CBGP faculty who have funds available for supporting a graduate student in their laboratories, and who have agreed to mentor a student. Students can choose a laboratory from this list or find another laboratory that has funds available for training and supporting the student for their graduate studies. It is expected that the students will have completed their laboratory rotations with at least two faculty members by the summer of year one, to select an advisor and an area in which to concentrate their research efforts. Students are also encouraged to take advanced courses offered by the different graduate programs as electives, that focus on his/her chosen sub discipline related to the laboratory of his/her mentor, in years one and two. The sub disciplines might include neurosciences, toxicology, tumor biology, reproductive biology, neuro-endocrinology, wound healing and stem cell biology, trauma research, or aging and developmental biology. The combination of required courses and electives ensures a broad background upon which students can build a research career. In the fall semester of year two, the Cell Biology graduate students develop their dissertation proposal while taking the required courses in Advanced Academic Skills, and are expected to take their qualifying exams soon afterwards in the spring or latest by the summer of year two. Thus all the required course work, laboratory rotations and qualifying exams are expected to be completed during the first 1½-2 years. By the end of year two, the CBGP students are expected to be in candidacy. The students can continue to take didactic courses in their senior years, if their mentor(s) agree and approve.

The dissertation proposal, in the form of a grant application in the NIH RO1 format, is submitted for the qualifying exam and examined by an examination committee. If approved, the proposal is presented as a seminar, before the end of year two, at which time the student is subjected to an oral examination by a faculty committee. Typically, this committee will become the Supervisory Committee for the Student’s dissertation research. During the 3rd and 4th years, the student completes research for the dissertation. Typically, the student is ready to write his/her dissertation near the end of the 4th year. The completed dissertation is presented to the Supervisory Committee and successfully defended in an oral examination within 4½-5 years of joining the graduate program. Students are also expected to apply for extramural funding for pre-doctoral fellowships from the NIH in year 3.

Applicants who are accepted for admission are automatically considered on a competitive basis for financial aid in the form of graduate assistantships and fellowships. Doctoral candidates in our program receive stipends of $28,000 (2014-2017), $29,000 per year (2017-2018). No special application for financial aid is necessary for consideration for these stipends.

For Further Information, Contact:

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Cell Biology Graduate Program  
Room 120-E Basic Science Building  
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CELL BIOLOGY FACULTY AND RESEARCH INTERESTS

Nicola Abate, M.D.
Professor and Chief, Internal Medicine, Division of Endocrinology
Research Interest: Pathogenesis of insulin resistance; obesity; dyslipidemia; the metabolic syndrome

Sherif A. Abdel-Rahman, Ph.D.
Associate Professor, Obstetrics and Gynecology-Maternal Fetal Medicine
Research Interest: Understanding how inherited genetic characteristics influence the susceptibility of individuals to environmental agents and affect their response to drug therapy

Bill T. Ameredes, M.S., Ph.D.
Professor, Internal Medicine, Division of Pulmonary/Critical Medicine; Biochemistry & Molecular Biology; Pharmacology and Toxicology
Research Interest: Mechanisms of functional resolution of allergic airway inflammation and asthma through molecular and cell-signaling pathways involving IL-10, NO, and beta-receptors

Maria Belalcazar, M.D.
Associate Professor, Internal Medicine, Division of Endocrinology
Research Interest: Lifestyle interventions including nutritional interventions for the prevention of cardiovascular disease; weight loss; physical fitness; diabetes; obesity

Shelly Buffington, Ph.D.
Assistant Professor, Neuroscience, Cell Biology, and Anatomy
Research Interest: Host-microbe interactions regulating synaptic plasticity and behavior, with emphasis on environmentally- and genetically-induced mouse models of autism spectrum disorder.

Jiyang Cai, Ph.D.
Associate Professor, Ophthalmology; and Neuroscience, Cell Biology, and Anatomy
Research Interest: Mechanisms of age-related RPE degeneration; regulation of retinal microglial and endothelial cell function by RPE exosome; autologous transplant of RPE derived from inducible pluripotent stem cells

Yan Chen, Ph.D.
Assistant Professor, Ophthalmology; Neuroscience, Cell Biology, and Anatomy
Research Interest: Molecular pathways in the pathogenesis of age-related macular degeneration

Ashok Kumar, Chopra, Ph.D., C.Sc.
Professor, Microbiology & Immunology
Research Interest: Understanding cell signaling events in host cells after infection with various bacterial agents (e.g., Bacillus anthracis, Yersinia pestis, Salmonella enterica, Aeromonas hydrophila, etc.). Our studies also involve genomics and proteomics approaches as well as immunological parameters to develop new generation vaccines against these deadly pathogens. Our focus has also been on neurodegenerative disorders which are mediated through a regulatory molecule that modulates phospholipase activity in the host cells.

Jin Mo Chung, Ph.D.
Professor and Chair, Neuroscience, Cell Biology, and Anatomy
Research Interest: Somatosensory system; mechanisms of neuropathic pain; cell signaling and reactive oxygen species
Yingzi Cong, Ph.D.
Professor, Microbiology & Immunology; Pathology
Research Interest: Mucosal immunology; host-microbial interaction in intestines; pathogenesis of inflammatory bowel disease

Larry Denner, Ph.D.
Professor, Internal Medicine, Division of Endocrinology
Research Interest: Signal transduction pathways in growth regulation of stem cells; human and animal studies of diabetes; steroidogenesis/reproductive endocrinology; molecular mechanisms of learning and memory in Alzheimer's disease; mass spectrometry approaches to signaling; systems biology in health and disease

Douglas DeWitt, Ph.D.
Professor, Anesthesiology; Director, Charles R. Allen Research Laboratories; Director, Moody Center for Traumatic Brain & Spinal Cord Injury/Mission Connect
Research Interest: Experimental traumatic brain injury, cerebral vascular regulation

Cornelis (Kees) Elferink, Ph.D.
Professor, Pharmacology & Toxicology; Mary Gibbs Jones Distinguished Chair in Environmental Toxicology; Director, Sealy Center for Environmental Toxicology; Scientist, Sealy Center for Cancer Cell Biology
Research Interest: Molecular mechanisms involved in liver homeostasis

Lisa A. Elferink, Ph.D.
Professor, Neuroscience, Cell Biology, and Anatomy; Assistant Dean for Educational Affairs
Research Interest: Molecular regulation of receptor trafficking; pre-clinical studies of pancreatitis and pancreatic cancer; inflammation and carcinogenesis; receptor signaling in drug addiction

Mark R. Emmett, Ph.D.
Professor, Biochemistry and Molecular Biology
Research Interest: Mass spectrometry; in vivo pharmacology animal experience including surgical procedures, drug delivery, microdialysis; in vivo and in vitro biochemical assays; receptor binding and robotic automation

Perenlei Enkhbaatar, M.D., Ph.D., FAHA
Professor, Department of Anesthesiology; Director, Translational Intensive Care Unit; Charles Robert Allen Professor in Anesthesiology
Research Interest: Cardiovascular and pulmonary pathophysiology during sepsis; thermal injury and toxic gas inhalation; stem cell; nitric oxide; coagulation; and neutrophils

Celeste Finnerty, Ph.D.
Associate Professor, Department of General Surgery; Shriners Burns Hospital
Research Interest: Proteomic and genomic response to burn injury; attenuation of post burn hypertrophic scarring; adipose derived stem cells for wound healing; insulin resistance; inflammation; tissue regeneration following injury

Christopher Fry, Ph.D.
Assistant Professor, Nutrition and Metabolism
Research Interest: Skeletal muscle physiology, muscle stem cell biology, skeletal muscle plasticity

Gary D. Hankins, M.D.
Professor and Chair, Obstetrics and Gynecology
Research Interest: Maternal and fetal physiology; critical care obstetrics; operative obstetrics; normal and abnormal labors; hypertensive disorders in pregnancy
Hal K. Hawkins, M.D., Ph.D.
Clinical Professor, Pathology
Research Interest: Mechanisms of acute inflammation; reactions to injury in the airways; roles of neuropeptides and epithelium inflammation; wound healing

Helen Hellmich, Ph.D.
Associate Professor, Anesthesiology
Research Interest: Molecular mechanisms of neuronal survival and neuronal cell death after traumatic brain injury

Mark R. Hellmich, Ph.D.
Professor, General Surgery
Research Interest: Elucidation of the role of paracrine mediators in gastrointestinal inflammation, carcinogenesis, tumor progression and metastasis

David N. Herndon, M.D.
Professor, General Surgery; Chief of Staff, Shriners Burn Hospital
Research Interest: Pathophysiology of thermal burns; wound healing; protein synthesis; inhalation injury; anabolic agents in the treatment of burns; rehabilitation

Jonathan Hommel, Ph.D.
Assistant Professor, Pharmacology and Toxicology
Research Interest: CNS circuits that regulate addictive behavior and food reward; how neuropeptides such as Neuromedin U modulate neuronal populations to regulate food and drug reinforcement

Amjad Hossain, Ph.D.
Associate Professor, Obstetrics & Gynecology
Research Interest: Reproductive biology; andrology; embryology; infertility

Rakez Kayed, Ph.D.
Professor, Neurology; Neuroscience, Cell Biology, and Anatomy
Research Interest: Protein misfolding and aggregation; amyloid fibrils and various other aggregates characteristic of amyloid (misfolding) diseases; these include Alzheimer’s disease, immunoglobulin-light-chain disease, type II diabetes, Parkinson’s disease, Huntington’s disease, prion disease, serum amyloidosis, and familial amyloid polyneuropathies

Neslihan Muge Martinez, Ph.D.
Associate Professor, Biochemistry & Molecular Biology; Neuroscience, Cell Biology, and Anatomy
Research Interest: RNA splicing factors in cardiac development and disease.

Jere W. McBride, Ph.D.
Professor, Pathology; Microbiology & Immunology; Director, Experimental Pathology Graduate Program
Research Interest: Obligately intracellular bacteria; molecular pathogen-host interactions; immunity and vaccines

Ramkumar Menon, Ph.D.
Associate Professor, Obstetrics & Gynecology, Division of Maternal-Fetal Medicine & Perinatal Research
Research Interest: Molecular mechanisms of term and preterm parturition; placental senescence; feto-maternal signaling
Andrew Murton, Ph.D.
Assistant Professor, Surgery, Shriners Burns Hospital
Research Interest: Assessment of human whole-body and muscle metabolism

John Papaconstantinou, Ph.D.
Professor, Biochemistry & Molecular Biology
Research Interest: Molecular and genetic mechanisms of aging and longevity determination; role oxidative stress; mitochondrial dysfunction in development of aging phenotype

Bi-Hung Peng, Ph.D.
Assistant Professor, Neuroscience, Cell Biology, & Anatomy
Research Interest: Modification of blood-brain barrier function by biochemical and inflammatory mediators; Pathogen entry and spread in the central nervous system

Iryna Pinchuk, Ph.D.
Associate Professor, Internal Medicine, Division of Gastroenterology
Research Interest: Mucosal immune responses in the gut; mesenchymal cells in chronic and acute GI inflammation; effect of vitamin A on colon biology; inflammatory bowel disease; GI cancer

Donald S. Prough, M.D.
Professor and Chair, Anesthesiology
Research Interest: Physiologic responses to traumatic brain injury; changes in gene and protein expression in response to traumatic brain injury; treatment of acute and chronic traumatic brain injury with stem cells or drugs; clinical management of acute traumatic brain injury

Blake B. Rasmussen, Ph.D.
Professor and Chair, Nutrition & Metabolism
Research Interest: Nutritional and metabolic biology; human skeletal muscle; sarcopenia

George R. Saade, M.D.
Professor, Obstetrics & Gynecology, Division Maternal-Fetal Medicine
Research Interest: Maternal and fetal physiology; particularly relating to cardiovascular adaptations to pregnancy, as well as fetal development and its relationship with long term consequences

Partha Sarkar, Ph.D.
Associate Professor, Neurology; Neuroscience, Cell Biology, and Anatomy
Research Interest: Toxic CUG RNA; chronic oxidative stress and mechanism of skeletal muscle wasting in myotonic dystrophy type 1 (DM1); polyglutamine expansions; mechanism of genome instability; neuronal dysfunction and neurodegeneration in spinocerebellar ataxia type 3 (SCA3)

Pomila Singh, Ph.D.
Professor, Neuroscience, Cell Biology, and Anatomy; Director, Cell Biology Graduate Program
Research Interest: Growth factors; cell-signaling; cell and molecular biology of colon cancer and colon carcinogenesis; dietary prevention and cancer stem cells

Linda Sousse, Ph.D.
Assistant Professor, Surgery, Shriners Burns Hospital
Research Interest: Oxidative and nitrosative stress; vitamin E supplementation in burned patients

Lawrence Sowers, Ph.D.
Professor and Chair, Pharmacology & Toxicology
Research Interest: DNA damage and repair; epigenetics; chemotherapy development; and structural biology
Giulio Taglialatela, Ph.D.
Professor, Neurology; Director, Mitchell Center for Neurodegenerative Diseases; Neuroscience, Cell Biology, and Anatomy
Research Interest: Mechanisms of neurodysfunction and neurodegeneration in Alzheimer’s disease and related amyloid diseases

Shao-Jun Tang, Ph.D.
Professor, Neuroscience, Cell Biology, and Anatomy
Research Interest: The pathogenic mechanism of HIV-associated neurological disorders

Alfredo Torres, Ph.D.
Professor, Microbiology & Immunology; Pathology
Research Interest: Vaccine development and virulence mechanisms of bacterial pathogens

Demidmaa Tuvdendorj, M.D., Ph.D.
Assistant Professor, Internal Medicine, Division of endocrinology
Research Interest: Stable isotope tracer techniques that allows one to measure in vivo kinetics of different substrates.

Randall J. Urban, M. D.
Professor and Chair, Internal Medicine; VP and Chief Research Officer
Research Interest: Ovarian steroidogenesis; aging and hormonal effects on muscle function; traumatic brain injury and pituitary dysfunction; umbilical cord blood stem cells: isolation and transdifferentiation into islets

Gracie Vargas, Ph.D.
Professor, Neuroscience, Cell Biology, and Anatomy; Scientist, Center for Biomedical Engineering
Research Interest: Advanced intravital microscopy (nonlinear optical microscopy, endomicroscopy) in injury or disease; noninvasive optical diagnostics in cancer; use of contrast agents and molecular specific probes for enhanced image contrast; applications of advanced imaging in infectious diseases.

Elena Volpi, M.D., Ph.D.
Professor, Internal Medicine; Division of Geriatrics; Neuroscience, Cell Biology, and Anatomy; Nutrition and Metabolism; Daisy Emery Allen Distinguished Chair in Geriatric Medicine; Director, Claude D. Pepper Older Americans Independence Center; Associate Director, Institute for Translations Sciences
Research Interest: Muscle aging and sarcopenia; protein metabolism; diabetes; nutrition; exercise

Ping Wu, M.D., Ph.D.
Professor, Neuroscience, Cell Biology, and Anatomy
Research Interest: Stem cell biology and therapy for neurological disorders such as traumatic brain injury; spinal cord injury; amyotrophic lateral sclerosis; alcohol addiction

Qing Yang, Ph.D.
Assistant Professor, Neuroscience, Cell Biology, and Anatomy
Research Interest: To understand mechanisms underlying chemotherapy and traumatic injury-induced neuropathy, with a major goal to identify potential therapeutic targets that can be used to effectively treat chemotherapy- and traumatic injury-induced complications
Kangling Zhang, Ph.D.
Assistant Professor, Pharmacology & Toxicology
Research Interest: Epigenetics; analytical biochemistry; mass spectrometry; proteomics; metabolomics

Wenbo Zhang, Ph.D.
Professor, Ophthalmology
Research Interest: Mechanisms for retinal injury in ischemic retinopathy; retinal neuronal injury; retinal vascular leakage and degeneration; and in retinal pathological angiogenesis

ADJUNCT FACULTY

Melinda Sheffield Moore Ph.D.
Professor, Department of Internal Medicine, Division of Endocrinology
Research Interest: Cancer cachexia and sarcopenia of aging; human clinical researcher studying the mechanisms behind skeletal muscle loss with aging and cancer. Perform outcome and interventional studies using androgens, exercise, nutrition and pharmacologic agents that enhance perfusion to facilitate muscle hypertrophy and reduce muscle atrophy in humans. Stable isotopic methodologies to examine muscle protein metabolism in humans and signaling molecules responsible for the hypertrophy and atrophy of skeletal muscle.
CELL BIOLOGY STUDENTS

Suzan Alharbi  Javier Allende  Camille Brightwell  Anu Egbejimi
David Flores  Carl Grim  C’Brionne Hendrix  Maggie Hsu
Narmada Lavu  LaNisha Patterson  Lauren Richardson  Urmia Sengupta
Ashley Smith  Jeffrey Snowden  Shinji Strain  Gabriela Uribe
Jennie Wang  Eric Wright
CURRENT BBSC STUDENTS
RECRUITED BY CELL BIOLOGY GRADUATE PROGRAM

Caitlin Byerly
Lizette Rios
Zachary Watson
OBJECTIVES OF THE PROGRAM

The objectives of the Cell Biology Program are threefold:

To expose students to the basic sciences underlying our understanding of how cells, tissues and organs function;

To provide laboratory experiences that will allow students to do independent research and contribute to our knowledge base; and

To provide students with an opportunity to learn how to communicate with others about their research and its underlying science. Graduates of our program should be able to function as researchers and/or teachers in academic institutions, government laboratories or industry.

ESSENTIAL FUNCTIONS REQUIRED FOR COMPLETION OF PROGRAM

OBSERVATION (to include the various sensory modalities)

Students must be able to decode written documents and hear in situations when not able to read lips. Students must be capable of learning and assimilating laboratory skills. They must be able to accurately observe near and distant objects in order to learn techniques, conduct experiments, and gather reliable data using a variety of sensory modalities. For instance, students must be able to observe and comprehend an instructor's/mentor's physical movements as they manipulate laboratory equipment, experimental animals, cells and reagents; a patient's gait or verbal response; a chemical reaction or experimental results (e.g., color change, banding on gels, odor, viscosity, temperature); a microscopic or computer image or gross anatomical specimen. They must be able to process auditory information such as signals from instruments, animal vocalizations, and verbal input from instructors, colleagues or experimental subjects/patients. Students must be able to process, retain, and integrate information from a variety of sources, including, but not limited to: oral delivery by instructor(s) or student(s); blackboard data and diagrams; printed material (handouts, journals, manuals, books, medical records, computers, computer print-outs); PowerPoint presentations; overhead transparencies; slides; film and video segments; audio recordings; live demonstrations; one-to-one and group interactions in the classroom; demonstrations; and internet based or teleconferences.

COMMUNICATION

Communication skills are critically important in science, academics and research, since teaching is done, results are reported, and information is shared. Students must be able to communicate (speak, write, read, comprehend) effectively and efficiently in the English language.

They must be capable of communicating the background, hypothesis, goals, results and interpretations of their research projects to other students, faculty and visitors. In addition, they must be able to communicate basic information in their area of research and related fields to other students, workers and visitors. They must be able to respond to questions asked or problems formulated and to ask pertinent questions in a one-on-one, small group or large group format.

PSYCHOMOTOR SKILLS

Students must have sufficient motor capacities and mobility to attend class. They must be able to manipulate a standard or adapted computer keyboard. Physically, they must be able to carry out laboratory experiments at a standard height or adapted laboratory bench. They must be able to dress in protective clothing such as lab coats and disposable gloves. Students must have sufficient motor capacity (e.g., strength, dexterity and coordination) to be able to use multiple
types of laboratory equipment including but not limited to microscopes, centrifuges, spectrophotometers, computers, and dissecting/surgical instruments. Students must be able to independently retrieve from storage, lift, move, and manipulate equipment (some of which is highly delicate and sophisticated with fine controls), animal cages, cans and bottles of reagents and other essential supplies as necessary to execute various types of experiments. If appropriate to their research, they may also have to become proficient in the handling of experimental animals. Students must also be able to perform fine motor tasks such as stereotactic surgery, dissections, or positioning of micropipettes or recording electrodes with the aid of micromanipulators. They must be able to handle, transfer and manipulate, using acceptable protocol, reagents in quantities as appropriate to their research, including hazardous materials such as radio labeled materials and hazardous chemicals.

**INTELLECTUAL AND COGNITIVE ABILITIES**

Students must be able to think creatively and systematically. They must be able to measure, calculate, reason, analyze, synthesize, integrate, remember and apply information for the purposes of developing models, analyzing data, writing papers, and making presentations. Creative problem solving and reasoning require all of these intellectual abilities in order to generate and test hypotheses. Students must be able to comprehend three-dimensional relationships and understand the spatial relationships of structures. They must be able to translate information from printed reports to actual hands-on laboratory experiences. This will involve the integration of their classroom experiences with those obtained from interaction with other scientists and trainees, from reports in the literature as well as knowledge developed from working in the laboratory. They must be able to apply information from these varieties of sources to their own research problems and generate and test working hypotheses. They must develop and sustain a strong motivation for biomedical research. They must be able to develop new techniques as needed to advance their research project. Each must become proficient in the statistical analysis and interpretation of experimental observations.

**PROFESSIONAL AND SOCIAL ATTRIBUTES**

Students must exercise good judgment and promptly complete all responsibilities expected by the courses, curriculum and program in which they are enrolled. They must develop mature, sensitive and effective professional relationships with peers, colleagues and faculty, be able to function as a part of a team, and negotiate conflicts satisfactorily and fairly. They must be capable of significant workloads that require long hours, attention to detail, and accurate and thorough recording of experiments and data, hence students must be able to adapt positively to stress and assume responsibility and accountability for their actions. They must be able to adapt to changing environments, display flexibility, patience and open-mindedness, and function in the face of uncertainties and ambiguities. Concern for others, appreciation of the support of the public, competence in inter-personal relationships, and demonstrated motivation and commitment are expected of all students. Students must be able to focus their attention on activities and decision-making. They must show respect for research animals and valuable equipment. Each must conduct original research that is reproducible and reliable. They must be able to be punctual, tolerant of the views of others, and capable of assuming responsibility for their actions. They must be able to recognize and employ socially acceptable actions and behaviors corresponding to environmental and situational demands.

**APPLICATION OF LEGAL/ETHICAL PRINCIPLES AND PROFESSIONAL STANDARDS**

Students must demonstrate the highest standards of professional ethics, attitudes and behavior in course work, laboratories and interactions with others. They must demonstrate honesty, integrity and reliability and adhere to standards reflecting the values and functions of the scientific profession. This includes a responsibility to acquire and share data in an honest and timely manner, rights of privacy, and respect for research animals and valuable equipment. Students must apply an ethical decision making process in their studies (e.g. writing of papers,
data collection), avoid plagiarism and adhere to the other legal/ethical standards set forth by the Graduate School of Biomedical Sciences of the University of Texas Medical Branch.
CURRICULUM

The curriculum emphasizes the development of research, teaching and communication skills. It provides:

- a strong background in cell and molecular biology, with an opportunity to:
  - pursue specific interests in greater depth;
  - exposure to current research topics and techniques;
  - an opportunity to learn how to teach and how to present seminars; and
  - an opportunity to learn how to write and defend research proposals.

REQUIRED COURSES

All students are expected to take the following courses (some are listed as optional):

**Basic Biomedical Science Curriculum**

BBSC 6043 Laboratory Rotations (1 in fall during 2nd 8-weeks; 2 in spring; both 8-weeks. Total of 3 minimum with no more than two in one lab)
BBSC 6129 Responsible Conduct in Biomedical Research (fall, spring, summer)
BBSC 6130 Small Sampling of Big Data (summer, 1st 8-weeks)
BBSC 6131 General Laboratory Safety (fall, 1st 8-weeks)
BBSC 6222 Biostatistics (spring term)
BBSC 6302 Cell Biology (fall term)
BBSC 6401 Biochemistry (fall term)
BBSC 6403 Molecular Biology and Genetics (spring term)
Specific to Cell Biology students:
CELL 6195 Seminar (must be take every term until completion)

Required Electives - may choose other electives from other programs or the BBSC to total the 6 credit hours

**CELL BIOLOGY CURRICULUM**

CELL 6217 Advanced Academic Success Skills Part I
CELL 6218 Advanced Academic Success Skills Part II
CELL 6008 Lab Rotations (in rare cases, only if needed)
CELL 6097 Research
CELL 6099 Dissertation
CELL 6195 Seminar (must be taken every term until graduation)
CELL 6401 Cellular & Molecular Mechanisms in Health & Disease

Students must complete six hours of electives before admission to candidacy. Additional electives may be taken as needed to strengthen areas of weakness or to provide background for research or teaching.

**Recommended Electives**

CELL 6207 Imaging in Biology
CELL 6324 Teaching Gross Anatomy
CELL 6701 Gross Anatomy
CELL 6401 Maternal-Fetal Reproductive, Biology, Physiology and Pathology (Biennially-Even Years
PHYSICAL FACILITIES

The Cell Biology Program is based in the Department of Neuroscience and Cell Biology, but many program faculty have primary or joint appointments in other departments of the university. Each faculty member has a research laboratory containing the equipment required for his or her specific research objectives. A variety of shared research facilities are also available on campus, including a Protein Chemistry Core Facility, a Biomolecular Synthesis Facility, a Molecular Genetics Center, animal care facilities, an electronics shop, photographic services, a well-developed computer network, library etc.

COURSE DESCRIPTIONS
(Required and Electives)

The course offerings are contingent upon adequate student enrollment.

CELL 6X96 (Elective) 1-3 Credits
SPECIAL TOPICS Study of special topics in cell biology. Topics are selected and study programs arranged on an individual basis with staff members.

Prerequisites: Permission of instructor
Term offered: I, II, III
Year offered: Annually
Hours per week: Variable, format to be arranged

CELL 6195 (Required) 1 Credit
SEMINAR

Prerequisites: None
Terms offered: I, II, III
Year offered: Annually
Hours per week: 1; 16 weeks

The objectives of this course are to expose students to a wide range of current research topics in cell biology, and to allow students to organize and present seminars in their own fields of interest. **All Cell Biology Graduate Program students must register for seminar course every term irrespective of status in the program.** Generally the class will be graded S/U. However, in the semester the student presents a seminar, the student will receive a letter grade from an assigned faculty member.

Specific expectations for achieving a grade of satisfactory are as follows:

E. Seminars

The objectives of this course are to expose students to a wide range of current research topics in cell biology, and to allow students to organize and present seminars in their own fields of interest. **All Cell Biology Graduate Program students must register for seminar course every term, irrespective of their status in the program.** In the term the student presents a seminar, the student will receive a letter grade from an assigned faculty member.

The journal club sponsored by the Society of Cell Biology (SoCB) is mandatory for all students, irrespective of the candidacy status. Students will receive credit for attending journal clubs. Students will be allowed a maximum of two absences per semester for attending the required (mandatory) seminars.
Pre-candidacy students

By the end of each term, pre-candidacy students are required to attend 12 seminars. The 12 seminars include seminars in the following categories.

**Cell sponsored seminars**

All pre-candidacy students are required to attend all Cell student seminars, including oral qualifying exam presentations and oral defense presentations, and faculty candidate seminars. Students are also required to attend seminars of invited speakers, if the speaker has been invited by the Cell Program.

For cell student seminars, oral qualifying exams, oral defense presentations, and faculty candidate seminars, a sign in sheet will be posted on the door of the seminar room/auditorium. You must sign in to be given credit for attending.

**Seminars by experts in their field**

Pre-candidacy students need to additionally attend other seminars, given by invited speakers, in the areas of their research interests. A spreadsheet will be sent to you via email at the beginning of the term. This form should be completed by you. A faculty member who is present at the seminar must sign your spreadsheet as confirmation that you attended the seminar in the 2nd category.

**Candidacy students-On campus**

While seminar attendance is still an essential part of your training as a doctoral student, you are not required to document 12 seminars per term. You are required to attend all Cell student seminars, Faculty candidate seminars, and Cell program sponsored seminars by experts in different fields. A sign in sheet will be posted on the door. Your signature is required on this sheet as proof of your attendance.

**Candidacy students-Off campus**

Candidacy students who are off-campus are required to attend 6 seminars per term. A spreadsheet will be sent to you via email at the beginning of the term. This spreadsheet should be completed by you. Your mentor at the off-site location should sign the spreadsheet confirming you have attended the seminar. One week before the end of the term, the completed form should be sent to the coordinator via email.

**Excused Absences for category 1 seminars (Cell student or cell sponsored faculty/invited seminars)**

Excused absences will only be granted with pre-approval of the Course Director. An email to the course director (copy the program director and the coordinator) is mandatory in order to receive an excused absence. Failure to attend a required seminar, without an excused absence, will result in an unsatisfactory (U) grade. An excused absence does not count towards your required 12 seminars, if you are a pre-candidacy student.

**Annual seminar requirement by pre-candidacy students.**

Pre-candidacy students are required to give a seminar once a year which describes the research project they have worked on either during a lab rotation or after the student has chosen a laboratory to work on their research proposal. The seminar given as part of the oral qualifying exam, can serve as the required annual seminar in year 2. The term in which the student gives a seminar, the student will receive a letter grade (A-C) from assigned faculty/examination committee members.
Annual seminar requirement by in-candidacy students

In-candidacy students are expected to present their research once per year, and can include the seminar given at the time of oral exam/oral defense. The annual seminars may be coordinated with a committee meeting. In the term the student presents their research seminar, the student will receive a letter grade (A-C).

**CELL 6217** (Required) 2 credits
ADVANCED ACADEMIC SUCCESS SKILLS PART I
**CELL 6218** (Required) 2 credits
ADVANCED ACADEMIC SUCCESS SKILLS PART II

Academic Success is heavily dependent on scientific communication and writing skills. Successful scientists can spend anywhere from 50-80% of their time reading, writing and presenting their data. For this course, the lecturer works with each student and facilitates the students to develop their specific dissertation proposal in the NIH RO1 format. In Part I of the course, the students learn how to improve their presentation skills as an oral seminar, and learn how to present their dissertation proposal as an oral seminar in allocated time. In Part II of the course, the students learn how to develop their dissertation proposal in the NIH RO1 format. The schedule for Part I and Part II of the course is flexible and developed with the students who are taking the course. All the work in this course will be graded on an A-F scale. Class participation and home assignments (which must be e-mailed/submitted 1 day before the indicated class date), accounts for ~25% of the final grade for both Parts I and II. 75% of the final grade is based on the quality of the oral presentation of the dissertation proposal (Part I), and written research proposal (Part II). The grade for the oral and written proposals is given by an assigned examiner. Students will be excused from having to present a seminar in the academic year they give their oral exam/presentation for AASC course and/or for the oral qualifier.

Prerequisites: Must have chosen the primary mentor and an area of research in which the student will work for their dissertation research. Preferably the student will have developed the specific focus of their research in the mentor's laboratory, and generated some preliminary data towards their goals/hypothesis
Term offered: Fall, spring
Year offered: Annually
Hours per week: 4 for both Parts I and II (which run concurrently)

**CELL 6008** (Not an elective) 1-9 credits
LABORATORY ROTATION

A majority of the students will have completed their lab rotations in year 1 while enrolled in the required BBSC 6043 laboratory rotation course. The students are expected to have chosen their mentor before starting year 2. In rare cases, the students who have yet not been able to choose a mentor and a research laboratory in which they will conduct their dissertation research, can register for cell laboratory rotation, with the approval of the program director.

The objective of this course is to acquaint students with the research activities of individual faculty members and to assist students in selecting their areas of specialization. Upon mutual agreement with faculty, the students will rotate through 1-2 laboratories during each term in year 2, and spend approximately 7 weeks in each laboratory. During this time the student will observe and participate in specific research projects. It is expected that the student will spend a minimum of 12 hours in the laboratory per week. Grading will be based on a written report describing the project worked on in each laboratory. Course may be repeated for credit
Prerequisites: Permission of instructor, and the Program Director
Term offered: Fall, spring, summer
Year Offered: Annually
Hours per week: Laboratory 12-36

**CELL 6097** (Not an elective) **3-9 credits**
RESEARCH

Formal research directed toward Master of Science or Doctor of Philosophy degree programs. Grading will be based upon the student’s level of performance as reported by the student’s research supervisor and will be assigned as satisfactory or unsatisfactory.

Prerequisite: None
Term offered: Fall, spring, summer
Year offered: Annually
Hours per week: Laboratory 3-27

**CELL 6098** (Offered only under special circumstances) **3-9 credits**
THESIS

The Cell Graduate Program does not recruit students for the Master of Science Degree. However under extraneous circumstances, students who had been conducting research for obtaining a Doctorate of Philosophy Degree, but are unable to continue with their research program, maybe allowed to complete their education and obtain a Master of Science Degree.

Formal research and writing, leading to the preparation and completion of the thesis for the Master of Science degree is expected under the direction of the student’s supervisory committee. Grading will be based upon the student’s level of performance as reported by the chairperson of the student’s supervisory committee and will be assigned as satisfactory or unsatisfactory. *Students who decide to re-register for Thesis, due to extraneous circumstances as described above, are expected to register for a total of 9 credit hours.*

Prerequisite: Admission to candidacy for the Master of Science degree
Term offered: Fall, spring, summer
Year offered: Annually
Hours per week: Conference or discussion, 1; Research, 3-7 hours

**CELL 6099** (Not an elective) **3-9 credits**
DISSERTATION

Formal research and writing, leading to the preparation and completion of the dissertation for the Doctor of Philosophy degree is expected under the direction of the student’s supervisory committee. Grading will be based upon the student’s level of performance as reported by the chairperson of the student’s supervisory committee and will be assigned as satisfactory or unsatisfactory. *Students registering for Dissertation are expected to register for a total of 8 credit hours.*

Prerequisite: Admission to candidacy for the Ph.D. degree
Term offered: Fall, spring, summer
Year offered: Annually
Hours per week: Variable
CELL 6222 (Elective) 2 credits
MATERNAL-FETAL REPRODUCTIVE BIOLOGY, PHYSIOLOGY, AND PATHOLOGY

The course will advance the interest and knowledge in the area of reproductive biology, physiology and pathophysiology, specifically in maternal and fetal medicine. The students should achieve a broad perspective of reproductive systems and process, and become familiar with modern experimental approaches, both in vitro and in vivo. It is designed to enable the student to understand: 1) the development and function or reproductive system; 2) reproductive biology; 3) physiological processes that affect maternal and fetal well-being; 4) the mechanisms of fetal programming and adult onset diseases; 5) pathology of reproductive tissues. Experience gained by working with the faculty and the other students in an active class discussion. This course will provide basic knowledge of reproductive system biology and how endocrine, paracrine signaling during pregnancy and parturition. Emphasis is also on reproductive tissue including placental pathology and developmental programming of chronic adult onset diseases.

Prerequisites: None
Term offered: Summer
Year offered: Biennial-Even Years
Hours per week: Lecture, 2

CELL 6701 (Elective) 7 credits
GROSS ANATOMY

Lectures, conferences and laboratory work cover the gross anatomical structure and function of the human body. Additional bi-weekly conferences focus on such topics as the history of anatomy, anatomical terminology, developmental anatomy, and anatomical topics in current medical and scientific literature. Exposure to Problem-Based-Learning is also likely. Laboratory sessions involve the complete dissection of a human cadaver (4-5 students/cadaver). Laboratory study is aided by anatomical models, permanent glass-mounted dissections, roentgenograms, computer-based cross-sectional anatomy exercises and gross pathology demonstrations. Grading will be based on midterm and final examinations which will include written and laboratory practical formats. This examination will determine the majority of the course grade with PBL and small group discussion contributing the remainder.

Examination scores will be based on an adjusted percentage correct with 70% level as passing as used in examinations for School of Medicine students taking this course. Although traditionally offered in the fall semester, actual dates and times of the course will be determined by the anatomy teaching staff. Enrollment requires prior consultation with and approval of course director. Depending on various circumstances, the course may not be offered every calendar year.

Prerequisite: None
Term offered: Fall
Year offered: Annually (Only post candidacy students can take this course if approved by their mentor. Year 1 students can take this course, only if they have tested out of the required BBSC courses in the fall.
Hours per week: 7 (Laboratory and Lecture)

CELL 6324 (Elective) 3 credits
TEACHING: GROSS ANATOMY

This course provides additional training in gross anatomy for graduate students anticipating future teaching responsibilities in this discipline. Enrollment is only open to those students who have had significant previous training in human gross anatomy, including extensive dissection experience. This course requires performance as a teaching assistant in the gross anatomy lab
on a daily basis and may include gross anatomical prosection dissections and formal presentations of the dissected regions to the SOM freshman medical class, senior medical students, and/or PA/PT students in the School of Health Professions. Participation in a clinical anatomy journal club is also required. Grading (S/U) will be determined by the Course Director based on observation of performance in the laboratory, knowledge of and skill in demonstrating anatomical structure, student evaluations, and presentations in small group setting. Students will receive periodic written feedback during the course regarding their performance. Although traditionally offered in the fall semester, actual dates and times of the course will be determined by the anatomy teaching staff. Enrollment requires prior consultation with and approval of Course Director. Depending on various circumstances, the course may not be offered every calendar year.

**Prerequisite:** Previous training in human gross anatomy as described above.

**Term offered:** Fall

**Year offered:** Annually (Can be taken only if you have obtained at least a B grade in CELL 6701 or an equivalent course, and needs approval by dissertation mentor).

**Hours per week:** 3-6 Laboratory and Lecture

**CELL 6207** (Elective) 2 credits

**TEACHING:** IMAGING IN BIOLOGY

This is a two-credit 16-week course that will cover the basic principles of imaging. It will start with the principles of imaging which will cover the basic properties of electromagnetic waves, laser/nonlaser radiation, interaction of light with molecules and cells and tissues, fundamentals of spectroscopy and imaging, laboratory demonstrations and paper discussions. The second section will deal with fluorescence microscopy from both the theoretical and practical point of view. There will be a series of lectures as well as practical applications including image processing and a laboratory covering light microscopy (phase and DIC), confocal and multiphoton laser scanning microscopy. The last segment of this course will leave the realm of optical imaging and cover single molecule detection and manipulation, including atomic force microscopy. In addition to lectures this last segment will also have demonstrations and group discussions.

A letter grade (A-F) will be given. The final grade in this course will be determined from class participation, student presentations and written exam. No prerequisites are required. The course will be taught from a syllabus that will be available the first day of the course (there is no assigned textbook but there will be assigned readings throughout the modules).

**Prerequisites:** None

**Term offered:** Fall

**Year offered:** Annually

**Hours per week:** 2

**CELL 6401** (Required) 4 credits

**CELLULAR & MOLECULAR MECHANISMS IN HEALTH & DISEASE**

The course is designed to teach latest advances in Cell Biology, with emphasis on molecular mechanisms and signaling pathways. Topics will be taught by faculty who have the expertise and conduct research in the subject matter. A total of 12-15 topics will be taught. Students will receive the suggested reading material, for each topic to be covered in the course, on Friday, prior to the week in which the topic will be taught. Suggested reading material will help the students to gain basic and current understanding of the topic. In addition, instructors will email a sub-topic to the students on Friday, prior to the week in which the topic will be taught. However, only the assigned student for that week will develop the sub-topic for presentation, on day two (Wednesday) of the week. Daily calendar of the course, will list the assigned student(s) for each week. The maximum number of times a student will present a topic is once/month.
On Day 1 (Monday) of the week, faculty will present an overview of the topic and query the students for knowledge they are expected to have gained by reading the suggested literature. On Day 2 (Wednesday), assigned student(s) will lead the discussion on the assigned sub-topic, and present the sub-topic as a power point presentation. Each student will develop a presentation for a sub-topic for a maximum of 1 per 4 weeks, or a total of 3 in the entire course. After presentation of the sub-topic, student(s) will lead the discussion and faculty will facilitate the discussions to ensure that all students contribute to the discussion. The instructor will test the critical thinking skills of the students on Day 2. On Day 3 (Friday), students and faculty will mutually agree to a laboratory tour for demonstration of unique methods/instrumentation in the lecturer’s laboratory. Grades will be based on: student knowledge (day 1), participation (days 1 and 2), quality of oral presentation by the assigned student(s) (day 2), and critical thinking skills (day 2).

Prerequisites: All graduate students, other than MD-PhD students, should have passed BBSC 6401, 6302, 6403, 6222, or have authorization to enroll from the course director.

Term offered: Summer
Year offered: Annually
Hours per week: 4

STUDENT APPEALS FOR GRADING

Any appeals for grading changes must be submitted to the instructors responsible for the writing and grading of the question within 5 business days after the return of the graded assessment to the student. The instructor must report any grade changes to the course director.

Academic and Social Activities Organized by Cell Biology Graduate Program: Role of the Student Body

The student chapter of the Society for Cell Biology (SoCB) organizes many academic and social functions throughout the academic year, with the help of the Program Director, Program Coordinator, and the Department of Neuroscience and Cell Biology. Students are nominated by their peers, and elections are held for the positions of President, Vice-President, Secretary and Historian May-June, every year by the student body. Some of the activities organized for the CELL BIOLOGY student body, which are supported by the Program and the Department of NCB, are:

JOURNAL CLUB - A journal club is held ~ 9 times/year, and is organized by SoCB officers. Student volunteers present a chosen topic, during the lunch hour. The Program arranges for the lunch.

HOLIDAY POT LUCK LUNCH - A holiday pot luck luncheon is held either for the Thanksgiving or Christmas holidays, each year, and organized by the SoCB, with the help of the PD and coordinator. A class and group photo is taken at that time.

WELCOME PARTY - Each September, the SoCB arranges a welcome party for the incoming BBSC students, who have been recruited by the CELL program.

Annual Cell Biology Student Symposium and Mason Guest Lecture - The SoCB and the Program Director, with the help of the student body, selects a Key Note Speaker for the annual Mason Guest Lecture. The one day annual CBGP symposium is organized in conjunction with the Mason Guest Lecture, by the SoCB, with the help of the Program staff. Each student in the program, other than the 1st year BBSC students, are required to submit an abstract, and present their research work, either as an oral or poster presentation in 3-4 sessions. Faculty, with no known conflict, judge the presentations, and students with the highest scores in the different sessions, receive a certificate of merit and some monetary awards, from the Key Note speaker. Additionally, Cell Biology students are encouraged to organize other altruistic and fun activities on their own, to further improve interactions and collaborations.