Graduate School of Biomedical Sciences

Luis Reuss, M.D., Dean

About the Program

Development of a strong program of graduate education in the basic biomedical and related health sciences is one of the responsibilities and goals of the Texas Tech University Health Sciences Center. Present-day medicine cannot exist outside the academic framework and intellectual discipline which the biological, chemical, and medical sciences provide. Graduate training in these areas, an integral component of the overall program of the Health Sciences Center, is provided by the Graduate School of Biomedical Sciences.

Opportunities are offered for study and research leading to the following degrees:

- Master of Science in Biotechnology
- Master of Science in Cell and Molecular Biology
- Master of Science in Biochemistry and Molecular Genetics

Individual program descriptions may be found within the specific department or program sections in this catalog.

Students interested in pursuing a career in academic medicine as a physician-scientist may apply to the M.D.–Ph.D. program. The M.D.–Ph.D. program permits a student to complete the requirements of both the degrees in one of the approved graduate programs. M.D.–Ph.D. students may receive a stipend, tuition scholarships for both the medical and graduate portions of the program, and health insurance for the duration of the stipend. This program is designed to be completed in seven years and will provide the student with rigorous training in both clinical medicine and biomedical research. Students interested in this program should indicate their interest on the application forms submitted to the Texas Medical and Dental Schools Application Service (TMDSAS) at www.utsystem.edu/tmdsas.

The graduate courses listed in this section are available to graduate students at Texas Tech University or other qualified applicants as

Harry M. Weitlauf, M.D., Chairperson

Professors: Chilton, Everse, Faust, Hutson, Reid, Stocco, Weitlauf
Associate Professors: Beale, Coates, Cornwall, Coué, Hardy, Lee, Little, MacDonald, Pelley, Pfarr, Sridhara, Whelly, Schneider Williams, Wright
Assistant Professors: Dufour, Thomas, Urbatsch, Webster

About the Program

This department o□ers study in the following graduate degree programs:

- Master of Science in Cell and Molecular Biology
- Master of Science in Biotechnology
- Master of Science in Biochemistry and Molecular Genetics
- Doctor of Philosophy in Cell and Molecular Biology
- Doctor of Philosophy in Biochemistry and Molecular Genetics

Cell and Molecular Biology. The purpose of the Ph.D. program is to prepare students for careers in cellular, developmental, and molecular biology. Employment opportunities for graduates of this program include traditional university professorships, positions in the biotechnology industry, and governmental appointments. The curriculum centers around three courses: Cell Function and Structure, Advanced Cell Biology, and Biochemistry. During the □rst year of study, the student will progress through a minimum of three laboratory rotations in order to determine his or her research interest. Dissertation topics can be pursued in the following areas: Regulation of gene expression, RNA processing, the role of transcription factors in cellular transformation and di□erentiation, cell cycle, cell and molecular biology of intercellular communication, control of microtubular function, embryo implantation, molecular mechanisms of epididymal sperm function, proliferation and di□erentiation of gonadal cells, molecular basis of gamete interactions, molecular regulation of ovarian development and function, development and regeneration of the nervous system, genetics of human cancer and congenital human disorders, diagnosis and treatment of human cancer, molecular basis of sex di□erences in maintenance and repair of connective tissues, morphogenesis, developmental genetics, actin cytoskeleton, embryonic development, cellular genetics, cell biology of epithelia, immune privilege and transplantation, molecular mechanisms of ABC transporters in cholesterol homeostasis and multidrug resistance of cancer cells.

The Master of Science program in Cell and Molecular Biology o□ers two instructional tracks. The research track is designed for students who need extra preparation for the Ph.D. program or whose career track is geared toward technical or sta□ level positions in industry or universities. Students undertake study and research in similar areas as that of the Ph.D. program. The education-medical track is designed for students whose eventual goal is towards a teaching career in the anatomical sciences. Students in the education-medical track take courses in the anatomical sciences and in modern instructional methods and design, and will participate in the teaching mission of the medical school as teaching assistants.

Students with undergraduate degrees in biology and chemistry are well suited for this program. Please contact Terri Lloyd at 806.743.2701 for more information concerning admission to this program.

cadavers. The experience in surgical anatomy will provide students with a relevant correlation of anatomy to applied surgical procedures.

5331. Advanced Training in Histology (3:0:3). Students will participate in the histology laboratories as teaching assistants and attend all pre-laboratory meetings in preparation for the laboratory sessions. The students will also assist in preparing the practical exams. Prerequisites include successful completion of the first year course work of the Masters Track Program in Anatomy.

5332. Advanced Training in Anatomy (3:0:3). Students will participate in the gross anatomy laboratories as teaching assistants and attend all pre-laboratory meetings in preparation for the laboratory sessions. The students will also assist in preparing the practical exams. Prerequisites include successful completion of the first year course work of the Masters Track Program in Anatomy.

5340. Educational Project in Biomedical Sciences (3:0:0). A requirement of the Masters Track in Anatomy, students will design and carry out an educational project in either Anatomy or Histology. The project will be designed according to the needs of these courses and matched to the interest of the student. Examples of project might include self-directed learning units/sessions, or upgrading or creation of educational materials as presented on WebCT.

5510. Biology of Cells and Tissues (5:5:5). Biology of Cells and Tissues is designed to provide students with fundamental information concerning the traditional areas of biochemistry, genetics, and cell biology. The principles presented in this course will proceed from molecules to cells and then to tissues integrating structure and function.

5611. Gross Anatomy (6:2:10). A highly integrated introductory course of anatomical study (including human prosection) which embodies the gross morphology of the body and coordinates it with the clinical, developmental, and microscopic aspects of the human body.

6000. Master's Thesis (V1-6).

6340. Cell Function and Structure (3:3:0). Topics include structure/function relationships involved in DNA replication, transcription, protein tracking, cytoskeletal organization and function, cell division, and adhesion.

6620. Advanced Cell Biology (6:6:0). Prerequisite: GANM5321. This course will cover advanced topics in cell biology and is designed for senior students who have completed introductory cell biology courses. The topics covered will include regulatory mechanisms that control the development of metazoan organisms, cell cycle regulation, cancer, and reproductive and stem cell biology.

7000. Research (0 9vd

6701

current research methods in pharmaceutical sciences under direct guidance of a faculty member.

5310. Drug Design and Discovery (3:3:0). Prerequisite: GPSC 5304. Overview of new methods for quantitative SAR, computer-aided drug design, mass screening, and combinatorial chemistry.

5320. Drug Metabolism (3:3:0). Analysis of primary metabolic enzymatic systems involved in the clearance of drugs from the body and the mechanisms that regulate their activity.

5325. Medicinal Chemistry (3:3:0). A comprehensive study of the chemistry molecules and their interactions to aid in the understanding of concepts such as drug discovery and design.

5326. Cancer Biology and Therapeutics (3:3:0). This course is designed for graduate students studying molecular and cellular basis of cancer. It o□ers principles of cancer biology from origin of cancer to therapeutic intervention principles. Admission to the Pharmaceutical Sciences Graduate Program and basic knowledge of biochemistry and cell biology are required. Permission from the advisor and the team leader are also required.

5330. Pharmacokinetics (3:3:0). A quantitative treatment at the graduate level of the dynamics of drug disposition in the body and the national design of drug dosage regimens.

5335. Physiology-based Pharmacology Part 1. (3:3:0). Drug classes and mechanisms of action. Drugs acting on chemical mediators. Drugs a□ecting major organ systems including the cardiovascular, peripheral and central nervous systems.

5336. Physiology-based Pharmacology Part 2. (3:3:0). Drug classes and mechanisms of action. Drugs acting on chemical mediators. Drugs a□ecting major organ systems including the cardiovascular, peripheral and central nervous systems.

5340. Molecular Drug Action (3:3:0). Analysis of drug action at the molecular level, including molecular biology and signal transduction.

6332. Principles of Toxicology II (3:3:0). Prerequisite: GPHM 6331. Second half of a two-semester course. Covers remaining toxicological mechanisms, toxic agents, and applied toxicology.
7000. Research (V1-12).
7101. Pharmacology Seminar (1:1:0). Prerequisite: Consent of instructor. This weekly seminar is designed to provide training in research data presentation and analysis. A required course for pharmacology and neuroscience graduate students, it is taken during the fall and spring semesters. Students present seminars to the entire department. Seminar topics vary but the two primary formats are journal club and presentation of data involving the student's research. Part of the grade is determined by class participation.
8000. Doctoral Dissertation (V1-12).

Department of Cell Physiology and Molecular Biophysics

Luis Reuss, M.D., Chairperson

Professors: Davies, Janssen, Kurtzman, Laski, Lutherer, Orem, Pressley, Reuss, Strahlendorf