

MSCI - MEDICAL SCIENCES

MSCI 601 Contemporary Topics in Advanced Cell Biology I

Credits 5. 5 Lecture Hours. Advanced cell and molecular biology examining the molecular basis of cellular functions relevant to human health; specific topics will vary but focus on the basic structures, functions and properties of proteins, nucleic acids and lipids; emphasis on recent developments and the primary literature.

MSCI 602 Contemporary Topics in Advanced Cell Biology II

Credits 5. 5 Lecture Hours. Continuation of MSCI 601. Advanced cell and molecular biology course examining the molecular basis of cellular functions relevant to human health. Specific topics will vary but the course will focus on emergent properties of complex cellular systems. There will be an emphasis on recent developments and the primary literature. **Prerequisites:** MSCI 601 or equivalent.

MSCI 603 Tumor Microenvironment and Cancer Metastasis

Credits 3. 3 Lecture Hours. Focus on the role of components of the tumor microenvironment in promoting cancer progression and distant metastasis and understanding of different types of cancer therapeutics; review the existing cutting-edge technologies and multi-disciplinary approaches to address fundamental questions in cancer biology with an emphasis on targeted therapies and translational research. **Prerequisite:** Graduate classification and approval of instructor.

MSCI 604 Foundations of Biotechnology

Credits 2. 2 Lecture Hours. Overview of cutting-edge, innovative technologies; discussion on how scientists apply these technologies in the biomedical sciences; review of strategies used in the biotechnology field to develop effective therapeutics and for manipulation of biological systems to generate effective therapeutics. **Prerequisites:** Graduate classification.

MSCI 605 Foundations of Biomedical Informatics

Credits 3. 3 Lecture Hours. Medical decision-making; performance of diagnostic tests clinical decision support; mobile health and telemedicine; systems biology; visual analytics; data mining; medical information retrieval; public health informatics; algorithms; software engineering in healthcare; electronic health records; consumer health informatics. **Prerequisite:** Graduate classification or approval of instructor.

MSCI 607 Life Science Entrepreneurship

Credits 3. 3 Lecture Hours. Independent study designed as an introduction and overview of the commercialization process involved in moving a research discovery from the bench to the market.

MSCI 608 Development and Commercialization of Human Therapeutics

Credits 2. 2 Lecture Hours. Survey the principles and concepts of commercializing a human pharmaceutical drug within the context of a startup biotechnology; emphasis on the issues and concepts encountered in either academic or industrial careers in moving potential pharmaceutical drug towards approved therapeutic.

MSCI 609 Responsible Conduct of Research

Credit 1. 1 Lecture Hour. Responsible Conduct of Research (RCR) is defined by NIH as the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research. Responsible conduct of research is an essential component of research training. This course is designed as a survey of basic topics that trainees will need to understand as they enter into the practice of research. The course will utilize outside reading assignments, online modules, class presentation and discussion of cases associated with each topic.

MSCI 610 Pathogenesis of Human Disease

Credits 1 to 4. 1 to 4 Lecture Hours. Molecular mechanisms of human disease processes; the main goal of the course is to provide students with an understanding of basic disease processes such as cardiovascular disease, cancer, inflammatory disease, AIDS, tuberculosis, diabetes, Alzheimer's disease and spinal cord injury.

MSCI 612 Current Topics in Cell Signaling

Credits 3. 3 Lecture Hours. The course provides an overview of intracellular signal transduction pathways utilized by various classes of growth factor, cytokine, integrin and G-protein coupled receptors. The course also will provide a clear understanding of the importance of these pathways in regulating cell growth, differentiation, apoptosis and other cellular processes, both under normal physiologic conditions as well as diseases.

MSCI 615 Introduction to Medical Physiology

Credits 4. 4 Lecture Hours. Introduction to Medical Physiology; development of an appreciation and understanding of the functional organization of the human body; principal concepts in human systems physiology; emphasis on the physiology of many control systems for physiologic parameters, such as blood pressure, body fluid composition, etc., in maintaining homeostasis in health and in disease pathogenesis; membrane potential and transport, neurophysiology, hemodynamics, microcirculation, blood pressure and blood flow regulation, skeletal/cardiac/smooth muscle structure and function, cardiac excitation/contraction coupling, cardiac pump, regulation of cardiac output, and integrative cardiovascular physiology, respiratory physiology (respiration, ventilation, lung mechanics, respiratory transportation, pulmonary circulation/function and respiratory pathology), renal physiology (body fluids, glomerular filtration rate, renal blood flow, tubular transport, clearance, concentration/dilution, body water/sodium, acid-base), gastrointestinal physiology (GI system, oral, stomach/intestine, intestinal function) endocrinology (hypothalamus/pituitary, thyroid, pancreas, Ca/PO₄ metabolism, adrenal, male and female reproduction biology) and integration of human organ systems. **Prerequisites:** Graduate classification.

MSCI 620 The Scientific Basis of Medicine

Credit 1. 1 Other Hour. Journal club in which recent research papers relevant to medicine are presented by students and discussed by students and faculty. May be taken four times for credit.

MSCI 625 Foundations of Psychiatric Research

Credits 2. 2 Lecture Hours. Examination of pathology and presentation of major mental health disorders; advanced and current techniques in psychiatric research including clinical research, neuroimaging, computational psychiatry, genome wide association studies, animal models, and molecular biology; evaluation of current and relevant mental health literature. **Prerequisites:** Graduate classification or approval of instructor.

MSCI 626 Principles of Successful Fellowship Writing for the Medical Sciences

Credits 2. 2 Lecture Hours. Focus on the process of grantsmanship and fellowship grant writing in biomedical sciences disciplines; emphasis on writing and revising based on mentor and peer feedback, and clarity of written communication; use of visual aids; focus on general skills in hypothesis design and testing, constructing a logical argument, and writing organization; preparation of draft pre-doctoral fellowship grant proposal. **Prerequisites:** MSCI 601 or approval of instructor.

MSCI 627 Physical Exam Skills and Patient Communication

Credits 3. 3 Lecture Hours. Physical exam techniques; patient communication skills; perform a head-to-toe physical examination; skills for excellent physician/patient communication, history taking, and documentation. **Prerequisites:** Graduate classification.

MSCI 630 Pathogenesis of Human Disease

Credits 4. 4 Lecture Hours. Upon completion of this course, the student will be able to recognize and describe the molecular events responsible for various human diseases. The student will be able to differentiate between various types of diseases and independently assemble a concise presentation on a particular disease topic.

MSCI 633 Pathogenesis of Human Disease – Infectious Disease

Credit 1. 1 Lecture Hour. Upon completion of this course, the student will be able to recognize and describe the molecular events that occur in response to bacterial and viral pathogens responsible for respiratory, gastrointestinal and urogenital disease, as well as AIDS and other viral infections.

MSCI 634 Pathogenesis of Human Disease – Neurodegenerative and Genetic Disease

Credit 1. 1 Lecture Hour. Upon completion of this course, the student will be able to recognize and describe the molecular events that occur in Alzheimer's, Parkinson's neurodegenerative disease in women, Muscular Dystrophy, neoplasia, tumor metastasis and dissemination, and breast cancer.

MSCI 635 Mammalian Immunobiology

Credits 3. 3 Lecture Hours. Detailed survey of the mammalian immune system; topics include organization, composition and effector responses of the innate immune system; B and T lymphocyte development, effector function, and immunological memory; mammalian immune responses to intracellular and extracellular pathogens; immune system contribution to human diseases, including autoimmunity, allergy and hypersensitivity, cancer and neurological disorders. **Prerequisite:** Graduate classification.

MSCI 636 Intermediate and Translational Immunology

Credits 2. 2 Lecture Hours. This course is designed to build on students' basic understanding of the immune system. Course consists of lectures on a clinical problem/disease by the director/guest lecturer; followed by student presentations describing how the immune system may impact the disease of interest, either positively or negatively, and a group discussion on how to modify clinical outcomes with immune-based interventions that translate basic understanding to clinical treatments. All participants will review and discuss current publications in the field.

MSCI 650 Foundations of Clinical and Translational Research

Credits 3. 3 Lecture Hours. Lecture series to promote clinical and translational research expertise with topics linked to a core of six competencies: experimental design; rigor, reproducibility, transparency; leadership and management; research compliance; communication; innovation. **Prerequisite:** Approval of course director.

MSCI 681 Seminar

Credit 1. 1 Lecture Hour. Focus will be on critical scientific thinking. Emphasis placed on oral communications, scientific writing and grant preparation. **Prerequisite:** Approval of instructor.

MSCI 684 Professional Internship

Credits 1 to 6. 1 to 6 Other Hours. A directed internship in an organization to provide students with on-the-job training with professionals in settings appropriate to the student's career objectives. May be repeated one time for credit. **Prerequisites:** Doctoral classification; approval of advisory committee chair and the director of graduate studies.

MSCI 685 Directed Studies

Credits 1 to 6. 1 to 6 Lecture Hours. Limited investigation in fields other than those chosen for thesis or dissertation. **Prerequisite:** Approval of instructor.

MSCI 687 Professionalism and Ethics

Credit 1. 1 Lecture Hour. Students learn about professionalism and ethics in the medical sciences.

MSCI 689 Special Topics

Credits 1 to 4. 1 to 4 Other Hours. Selected topics in an identified area of medical sciences. May be repeated for credit when topics vary.

Prerequisite: Approval of instructor.

MSCI 691 Research Credit: Medical Science

Credits 1 to 15. 1 to 15 Other Hours. Research for thesis or dissertation.

Prerequisites: Approval of supervisory professor in chosen field.

MSCI 920 The Scientific Basis of Medicine

Credit 1. 1 Other Hour. This course is a journal club in which recent research papers relevant to medicine are presented by students and discussed by students and faculty. May be repeated for credit four times.