

MEDICAL SCIENCE (MEDS)

MEDS 5309. Molecular Basis of Disease. (2 Credits)

Seminar and discussion based course that reviews the molecular understanding of human disease.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205309>)

MEDS 5310. Responsible Conduct in Research. (1 Credit)

Introduction to ethical and legal issues associated with the practice and reporting of science. Uses a case study approach and requires in-class student participation.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205310>)

MEDS 5313. Biomaterials and Tissue Engineering. (3 Credits)

(Also offered as BME 5700.) A broad introduction to the field of biomaterials and tissue engineering. Presents basic principles of biological, medical, and material science as applied to implantable medical devices, drug delivery systems and artificial organs.

Enrollment Requirements: Recommended preparation: BME 3700.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205313>)

MEDS 5322. Developmental Biology. (2 Credits)

History, concepts, and experimental strategies in both classical and modern developmental biology. Topics ranging from early fertilization, to early embryonic development, to the formation of adult structures are considered and compared in a range of model organisms. One hour of lecture by instructors and one hour of literature analysis and discussion by students each week. Course grade will combine results of class participation and a final exam.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205322>)

MEDS 5323. Genetics and Developmental Biology Journal Club. (1 Credit)

Reading and discussion of current research in the fields of genetics and developmental biology with emphasis on molecular aspects. Periodic presentation of research papers and active discussion will be expected of all participants.

May be repeated for a total of 24 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205323>)

MEDS 5329. Immunobiology. (4 Credits)

This course will first introduce the basic components that comprise the immune system, and then explore how the immune system impacts health and disease.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205329>)

MEDS 5335. Advanced Molecular and Cellular Immunology I. (4 Credits)

Major areas covered include: (1) Development of the immune system with respect to lymphoid organs and lymphocyte subsets; (2) Mechanisms of antigen processing and presentation; (3) Lymphocyte activation including the role of costimulatory molecules and (4) Regulation of the immune response including tolerance induction, cytokine interactions and signal transduction.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205335>)

MEDS 5341. Molecular Neurobiology of Excitable Membranes. (3 Credits)

Emphasizes the relation between structure and function of biological interfaces that comprise electrically excitable and chemically excitable (synaptic) membranes. Models of electrically-and chemically-induced regulation of ion movement via channels and transporters are examined. Genetic manipulation of channel composition is evaluated with attention to altered function and inferences about their structure.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205341>)

MEDS 5351. Biochemistry II. (3 Credits)

Fundamentals of biomolecular interactions and protein structure. Structure/function of select proteins and enzymes essential to the following: metabolic pathways, DNA/RNA transactions, gene expression, cell cycle and signal transduction, and the cytoskeleton.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205351>)

MEDS 5369. Advanced Genetics and Molecular Biology. (3 Credits)

An advanced course emphasizing approaches to the genetic analysis of eukaryotic systems including yeast, fungi, Drosophila, mice, and humans. Topics include genome organization, DNA replication, regulation of gene expression, development, and differentiation.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205369>)

MEDS 5371. Systems Neuroscience. (3 Credits)

Part of the core series in the Neuroscience graduate program. Functional organization of neural systems underlying sensation, movement, language, learning/plasticity, and emotion/arousal. Sensory systems will include the somatosensory, auditory, visual, vestibular, and chemosensory systems. Motor systems will include the spinal cord, brain stem, cerebellum, vestibular system, oculomotor system, basal ganglia and cerebral cortex.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205371>)

MEDS 5372. Neuroscience: Cellular and Molecular Neuroscience. (3 Credits)

Part of a core series in the Neuroscience Program, this course provides an introduction to basic concepts in the study of cell biology, neuroanatomy, neurophysiology, neurochemistry, and molecular biology of the nervous system.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205372>)

MEDS 5375. Neuroscience: Current Research Topics/Methods. (1 Credit)

Familiarizes students early in their education (first or second year) with various key methodologies to which they will be exposed in courses, journal club presentations, and seminars. After a brief overview of basic concepts, applications, controls, and permutations of the method in the classroom, students will observe and participate in a demonstration of important technical aspects of the method in the laboratory setting. Targeted toward students with an interest in neuroscience or neuroimmunology.

May be repeated for a total of 4 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205375>)

MEDS 5377. Neurobiology of Hearing. (3 Credits)

Provides in-depth analysis (using the Auditory System as a model system) with application of interdisciplinary approaches of cell and molecular biology, developmental neurobiology, neuroanatomy, neurophysiology/biophysics, neurochemistry, neural modeling, psychophysics, and plasticity, with state-of-the-art methods used in neuroscience research today. The team of faculty members contribute a variety of complementary fields of study.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205377>)

MEDS 5378. Computational Neuroscience. (3 Credits)

Students study the function of single neurons and neural systems by the use of simulations on a computer. Combines lectures and classroom discussions with conducting computer simulations. The simulations will include exercises and a term project. Each student will complete a term project of neural simulation to be developed during the second half of the semester. The topic of the term project should be approved by the instructors by the middle of the semester. The grade will be based on the exercises and the term project. Course includes: analysis of electrical circuits modeling neuronal cell membrane and the related differential equations; the Hodgkin-Huxley model of voltage- and time-dependent sodium and potassium conductances in the squid axon; voltage-clamp and current-clamp; the relationship between two rate constants versus the steady-state value and time constant underlying each conductance; neuronal response properties that are related to voltage-dependent and calcium-dependent ion channels; single- and multi-compartment models with ionic conductances simulating specific neuronal response properties described in the literature; excitatory and inhibitory postsynaptic currents and underlying ligand-gated ion channels; dendritic electrotonus and synaptic integration; temporal and spatial interactions of synaptic inputs to the dendritic tree and the cell body; action potential propagation in axons; neural circuits.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205378>)

MEDS 5382. Practical Microscopy and Modeling for Cell Biologists. (2 Credits)

Introduction to the students the most recent achievements in the field of intracellular signaling and regulation. Each of the participating faculty members will give an introductory lecture to provide an overview of signaling events in their field of expertise and discuss the most important recent papers.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205382>)

MEDS 5383. Neurobiology of Disease. (3 Credits)

Discussion and lecture, run by clinician and basic scientist, on diseases of the nervous system.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205383>)

MEDS 5384. Brain Microcircuits. (2 Credits)

Brain microcircuitry is an upper level course.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205384>)

MEDS 5385. Molecular Mechanisms of Neurobiological Disorders. (3 Credits)

Discussion of current papers relevant to molecular analyses of neurobiological diseases.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205385>)

MEDS 5395. Independent Study. (1-6 Credits)

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205395>)

MEDS 5415. Craniofacial and Oral Biology. (2 Credits)

Combination lecture and literature discussion course with a focus on the on the underlying biochemical, molecular and genetic mechanisms involved in the pathogenesis of craniofacial and oral disorders, the identification of unsolved questions, and consideration of possible approaches to investigate these questions.

May be repeated for a total of 4 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205415>)

MEDS 5418. Stem Cells and Regenerative Biology. (3 Credits)

A literature based course on the fundamental aspects of stem cells; their nature, origin, self-renewal and differentiation during embryogenesis and tissue regeneration. Taught by a team of experts. Grade based on mid-term tests, class participation and presentation.

Enrollment Requirements: MEDS 5322 or MEDS 5327 or MEDS 5380.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205418>)

MEDS 5420. Molecular Genomics Practicum. (3 Credits)

Coupling classical molecular biology techniques to high throughput sequencing for nucleic acid detection has revolutionized how scientists study biology. Students will be introduced to the command line and gradually build upon concepts and skills so that they will be capable of building workflows to process and analyse high throughput sequencing data. After basic concepts and command line competency are established, the course will focus on the analysis of ChIP-seq, RNA-seq, and ATAC-seq data. Students will learn to use many common genomics software packages to perform such tasks as genome alignment, peak calling, motif analysis, and differential expression analysis. Students will be introduced to the statistical computing language R and perform analyses and visualization using an R interface.

Enrollment Requirements: Instructor consent.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%205420>)

MEDS 6372. The Neurobiology of Glia. (2 Credits)

Detailed introduction and advanced, in-depth discussion on specific topics related to the cellular biology and pathobiology of glia. First part of the course will be didactic lectures covering each of the types of glia in the central and peripheral nervous systems. Second part of the course will provide focused paper discussions on the specific roles of glia in particular diseases of the nervous system that may change with time to stay current with recent publications and innovations in the field.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206372>)

MEDS 6411. Clinical Practicum. (12 Credits)

Clinical experience in the major disciplines including: Medicine, Surgery, Obstetrics and Gynecology, Psychiatry, Family Medicine, and Pediatrics. May be repeated for a total of 24 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206411>)

MEDS 6412. Advanced Clinical Practicum. (11 Credits)

Advanced clinical work with opportunities in the major clinical disciplines. View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206412>)

MEDS 6413. Cancer Biology. (2 Credits)

This is a survey course to explore the genetics and pathobiology of cancer by focusing on a variety of current research topics. Understanding the disease process requires studying normal mechanisms of growth control. Emphasis will be on topics such as differentiation, apoptosis, growth factors, oncogenes, tumor suppressor genes, viruses and signal transduction.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206413>)

MEDS 6444. Medical Microbiology. (4 Credits)

Provides first and second year graduate students with a broad understanding of the molecular and medical aspects viruses and bacteria. For viruses, topics include entry, genome replication and gene expression, assembly, viral transformation, pathogenesis, host immune responses, clinical presentations viral immunology, treatment principles including vaccines and antiviral therapeutics, and emerging and re-emerging viruses that threaten human health. For bacteria, topics include development and differentiation, bacterial genetics and genomics, bacterial cell cycle (DNA replication, chromosome segregation and cell division), cell-cell communication, pathogenesis, host immune responses, clinical presentations and treatment principles. The course will include lecture, discussion of primary literature and student presentations. Grading will be based on class participation, student presentation and a short paper.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206444>)

MEDS 6445. Skeletal Biology. (2 Credits)

A comprehensive survey of the cellular and molecular mechanisms that regulate the development, growth, differentiation, remodeling, and repair of the skeletal system.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206445>)

MEDS 6448. Foundations of Biomedical Science I. (4 Credits)

Encompasses topics considered fundamental to any student pursuing a Ph.D. in any Area of Concentration in the Biomedical Science Graduate Program. Combines an introduction to fundamental concepts along with a more in-depth analysis of the research that underlies some of these ideas. A variety of topics will be examined in approximately one-week modules that will include a basic, introductory one hour lecture on Mondays, a more in-depth discussion of one to two critical historical papers on an aspect of the topic on Wednesdays and then a small group discussion on a more modern paper related to the area on Fridays. Periodically, the course will include Consolidation weeks that discuss key methodologies in the context of new concepts or concepts previously discussed.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206448>)

MEDS 6449. Foundations of Biomedical Science II. (4 Credits)

Encompasses topics considered fundamental to any student pursuing a Ph.D. in any Area of Concentration in the Biomedical Science Graduate Program. Combines an introduction to fundamental concepts along with a more in-depth analysis of the research that underlies some of these ideas. A variety of topics will be examined in approximately one-week modules that will include a basic, introductory one hour lecture on Mondays, a more in-depth discussion of one to two critical historical papers on an aspect of the topic on Wednesdays and then a small group discussion on a more modern paper related to the area on Fridays. Periodically, the course will include Consolidation weeks that discuss key methodologies in the context of new concepts or concepts previously discussed.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206449>)

MEDS 6450. Optical Microscopy and Bio-imaging. (3 Credits)

(Also offered as BME 6450.) Presents the current state of the art of optical imaging techniques and their applications in biomedical research. The course materials cover both traditional microscopies (DIC, fluorescence etc.) that have been an integrated part of biologists' toolbox, as well as more advance topics, such as single-molecule imaging and laser tweezers. Four lab sessions are incorporated in the classes to help students to gain some hand-on experiences. Strong emphasis will be given on current research and experimental design.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206450>)

MEDS 6455. Introduction to Systems Biology. (3 Credits)

Guides students into a biology world as seen by engineers, physicists, mathematicians and computer scientists. Discussion of different kinds of predictive mathematical models and their dynamical behavior; stability, switching and stochasticity of a biological system; resources needed to start building a model; models exchange, simulation and visualization; public databases and software tools available for a modeler. Provides the necessary background to read modeling papers, choose Systems Biology resources that will help in biological projects, and be able to select a modeling technique appropriate for a given biological project.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206455>)

MEDS 6461. Clinical Radiation Sciences: Physics and Biology (Part A). (2 Credits)

A continuous pair (i.e., MEDS 6461 and 6462) of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry, and quality assurance will be covered through critical readings in texts and the literature. Available to individuals enrolled in residency programs of medical radiology, oral and maxillofacial radiology, and other specialties engaged in patient imaging. Some of these students will be enrolled in a concurrent degree program, either Master of Dental Science or PhD in Biomedical Sciences. Also available to individuals in Master's or PhD level graduate studies who desire an in-depth study of radiation sciences, and how they apply to patient care.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206461>)

MEDS 6462. Clinical Radiation Sciences: Physics and Biology (Part B). (2 Credits)

A continuous pair (i.e., MEDS 6461 and 6462) of semester lecture/seminar courses which examines the physical and biological principles underlying the uses of radiation and allied radiation sciences in clinical diagnosis and therapy. Characteristics of imaging systems, Nuclear Medicine, Radiation Therapy, biological effects of ionizing radiation, radiation measurement and dosimetry, and quality assurance will be covered through critical readings in texts and the literature. Available to individuals enrolled in residency programs of medical radiology, oral and maxillofacial radiology, and other specialties engaged in patient imaging. Some of these students will be enrolled in a concurrent degree program, either Master of Dental Science or Ph.D. in Biomedical Sciences. Also available to individuals in Master's or Ph.D. level graduate studies who desire an in-depth study of radiation sciences, and how they apply to patient care.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206462>)

MEDS 6495. Independent Study. (1-6 Credits)

A reading course for those wishing to pursue special topics in the biomedical sciences under faculty supervision.

May be repeated for a total of 24 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206495>)

MEDS 6496. Laboratory Rotation. (1-6 Credits)

May be repeated for a total of 24 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206496>)

MEDS 6497. Graduate Seminar. (1-6 Credits)

Reading and discussion of recent research developments in various areas of biomedical science.

May be repeated for a total of 24 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206497>)

MEDS 6498. Special Topics in Biomedical Science. (1-4 Credits)

May be repeated for a total of 16 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206498>)

MEDS 6501. Communications for Biomedical Scientists. (1 Credit)

This course is designed to introduce or reinforce biomedical science graduate students to some basic concepts in written and oral communication. The majority of the class will focus on writing as a fundamental skill for a variety of career options in the biomedical science field. The course will be comprised of interactive sessions on storytelling, basic sentence and paragraph composition skills, specific science-related writing including grants and manuscripts and effective oral presentation of scientific research. The different sections will involve lecturing as well as in-class and out-of-class writing exercises.

Enrollment Requirements: Instructor consent, open only to students in the Biomedical Science Field of Study.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206501>)

MEDS 6502. Experimental Design, Rigor and Biostatistics. (1 Credit)

This course is designed to provide a general overview of the key components required for conducting rigorous and reproducible biomedical research. Experimental design, reagent authentication, biostatistics and other related topics will be covered with an emphasis on how they each contribute to the overarching goal of establishing rigor. The biostatistics section will cover commonly used analyses, with an emphasis on determining the most appropriate analysis for particular data sets. Additionally, considerations in analyzing human clinical versus animal-based research will be discussed, and statistical approaches such as meta-analysis and bioinformatics will be introduced to familiarize students with these techniques so that they can more effectively read and critique current scientific literature.

Enrollment Requirements: Open only to second-year students the Biomedical Sciences Ph.D. program.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206502>)

MEDS 6503. First Year Graduate Experience in Biomedical Science. (2 Credits)

This course is structured as four blocks, which are completed in two semesters. The course will begin a 7-week exploration block in which first-year students are introduced to the research themes in each area of concentration (AOC) of Biomedical Science. Students will attend activities and research presentations given by each AOC, meet with faculty who can serve as research rotation instructors, and attend a weekly graduate seminar. In each of the subsequent 3 blocks (one in the fall semester and two in the spring semester), students will perform a research rotation under the direction of faculty instructor and attend a weekly graduate seminar that aligns with the rotation instructor's primary AOC. Each student will present a rapid-fire talk (5 minutes) on their research topic at the end of each rotation block.

Enrollment Requirements: Open only to first year students in the Biomedical Science Ph.D. program.

May be repeated for a total of 4 credits

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206503>)

MEDS 6504. The Genetics of Model Organisms. (3 Credits)

The course is required for all students in the Genetics and Developmental Biology area of concentration and all students supported by the UConn/JAX Training Program in Genomic Science T32, although any other students in the Biomedical Sciences Graduate Program are welcome to enroll. The course is designed to provide students an in-depth overview of modern genetic approaches to studying biology. Genetics is a powerful and variable approach to dissect gene and organismal function. Through time, increasingly specific and sophisticated genetic approaches have been developed that further increase the power of genetics to studying biology. The course will investigate the full breadth of experimental paradigms for genetic analysis in six model genetic organisms (*S. cerevisiae*, *Drosophila melanogaster*, *C. elegans*, Zebrafish, mouse and human) through a structured series of lectures with a focus on the primary research literature. A series of research paper discussions will also be integrated with the lectures. In addition, the final session in each module will be a detailed discussion of a classical genetic paper using the organisms discussed in that module.

View Classes (<https://catalog.uconn.edu/course-search/?details&code=MEDS%206504>)