

MEDICINAL CHEMISTRY (MEDC)

MEDC 310. Medicinal Chemistry and Drug Design. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 302. This course is designed to expose undergraduate chemistry, biology and pre-medicine majors to the history, theory and practice of medicinal chemistry. The course will emphasize a combination of fundamentals and applications of drug design. In particular, the molecular aspects of drug action will be discussed. Special emphasis will also be placed on the methods used by medicinal chemists to design new drugs. Crosslisted as: CHEM 310.

MEDC 526. Research Techniques in Medicinal Chemistry. 1-4 Hours.

Semester course; 0-2 lecture and 2-8 laboratory hours. 1-4 credits. The theory and application of classical, instrumental, and computer techniques used in medicinal chemistry research are presented.

MEDC 527. Basic Pharmaceutical Principles for the Practicing Pharmacist. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Examines basic science principles in organic chemistry and biological chemistry as specifically related to the pharmaceutical treatment of disease.

MEDC 530. Bioinformatics and Genomics in Drug Research. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Covers the basic elements of cellular pathways and drug interactions, and how modern genomics comes into play. Presents bioinformatics principles being used every day in data-intensive fields of research. Introductory and concept-oriented, the course will prepare students for grasping how bioinformatics is being used in many areas of biomedical sciences. Geared toward students coming from a variety of backgrounds in biology, biochemistry and chemistry. While many of the analytical approaches are statistical in nature, there is no requirement for a background in statistics or mathematics. Each student will have the opportunity to design a small project applying bioinformatics concepts. Crosslisted as: BNFO 530.

MEDC 532. Medicinal Chemistry for Nurse Anesthetists. 3 Hours.

Semester course; 3 lecture hours. 3 credits. A review of the principles of organic chemistry and bio-organic chemistry presented as a series of lectures covering the structure-activity relationships, metabolism, and mechanism of action of selected agents.

MEDC 533. Pharmacognosy. 1 Hour.

Semester course; 1 lecture hour. 1 credits. Introduces the basic concepts of crude drugs, semi-purified and purified natural products and the basics of the regulation of herbal products. Important types of natural products and their impact on the modern medical sciences, and the evaluation of alternative and complementary medicine purity and bioavailability will be discussed.

MEDC 541. Survey of Molecular Modeling Methods. 1 Hour.

Semester course; lecture and laboratory hour. 1 credit. Introduces computational chemistry and molecular graphics with the current software used for drug design and small molecule/large molecule interactions. Computational chemistry problems will be emphasized in the laboratory.

MEDC 542. Biotechnology-derived Therapeutic Agents. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Provides the fundamentals of biotechnology-derived biological agents including structure, manufacture, stability, analysis, formulation and usage. Selected examples of biological agents in current and future therapy may also be covered.

MEDC 551. Analytical and Physical Pharmaceutical Chemistry. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to graduate students. The course presents fundamentals of physical and analytical chemistry as relevant to the pharmaceutical sciences. The overall goal is to prepare students for advanced specialized courses, work in the laboratory as well as future work in academia or industry. The course covers topics including thermodynamics, kinetics, quantum mechanics, spectroscopy, statistical thermodynamics, including principles behind instruments that analyze molecules and interactions. Secondly, the course instills an analytical approach to data and measurements by a survey of the analytical chemistry practice. Applications of the fundamentals to real life examples will be an important component of the course.

MEDC 552. Organic and Biochemical Pharmaceutical Chemistry. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to graduate students. The course presents the fundamentals of synthetic organic chemistry, physical organic chemistry and biochemistry as relevant to the pharmaceutical sciences at the graduate level. The overall goal is to prepare students for advanced specialized courses, work in the laboratory, oral and written comprehensive exams in the graduate program and future work in academia or industry. The course covers organic chemistry topics including structure of small molecules, making and breaking bonds, reaction mechanisms, functional group structures, functional group interconversions and use of various analytical techniques as they relate the characterizing the product of synthetic chemistry transformations. Secondly, the course covers biochemistry topics including basic structure and function of biomolecules, post-translational modifications, metabolism, essential endogenous pathways and immunochemistry. Applications of the fundamentals to real life examples will be an important component of the course.

MEDC 553. Concepts in the Medicinal Chemistry of Therapeutics Agents. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Introduces topics in medicinal chemistry common to all drug classes, including structure activity relationships, principles of drug action, drug design and drug metabolism. Drugs acting on the autonomic nervous system are presented as a case study illustrating applications of the general principles.

MEDC 555. Fundamentals of Drug Discovery I. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Students will work individually or in groups to learn the fundamentals of medicinal chemistry and drug discovery. The course utilizes formal lectures, informal group discussions, literature research and formal oral and/or written assignments to impart knowledge and practice of drug discovery. The course focus will be on molecular biology and pharmacological aspects of medicinal chemistry.

MEDC 556. Fundamentals of Drug Discovery II. 3.5 Hours.

Semester course; 3.5 lecture hours. 3.5 credits. Students will work individually or in groups to learn the fundamentals of medicinal chemistry and drug discovery. The course utilizes formal lectures, informal group discussions, literature research and formal oral and/or written assignment to impart knowledge and practice of drug discovery. The course focus will be on methodologies and techniques of medicinal chemistry.

MEDC 591. Special Topics in Medicinal Chemistry. 1-3 Hours.

Semester course; 1-3 lecture hours. 1-3 credits. A course in which students may choose to participate in individual or group study in one or more areas of medicinal chemistry. The course can take the form of formal lectures, informal group discussions, literature research and/or laboratory research. Students must have the permission of the individual instructor before registering for this course.

MEDC 601. Advanced Medicinal Chemistry I. 2.5 Hours.

Semester course; 2.5 lecture hours. 2.5 credits. This course is designed to expose graduate students to the history and practice of medicinal chemistry with an emphasis on drug development, design, structure-activity relationship studies and their association with diseases to prepare students for future work in academia or industry.

MEDC 609. Advanced Organic Synthesis: A Target-oriented Approach. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: permission of instructor. A study of chemical transformations in organic chemistry, their mechanisms and their application to the synthesis of complex target molecules.

MEDC 610. Advanced Medicinal Chemistry II. 2 Hours.

Semester course; 2 lecture hours. 2 credits. Prerequisite: MEDC 601 or permission of instructor. Introduces concepts for understanding the medicinal chemistry of the central nervous system.

MEDC 614. Research Techniques. 1-4 Hours.

Semester course; variable hours. Variable credit. Credit will be given on the basis of 1 credit per 45 hours of laboratory time. Prerequisite: approval of research adviser. Provides new graduate student with the laboratory skills necessary to perform research in the chosen discipline. The training time required will depend upon the discipline. Graded as pass/fail. Crosslisted as: PCEU 614/PHAR 614.

MEDC 620. Advanced Medicinal Chemistry III. 2 Hours.

Semester course; 2 lecture hours. 2 credits. Prerequisite: MEDC 601 or the permission of the instructor. Reviews the concepts necessary for enzyme inhibitor design. Emphasizes the design of new agents to treat disease states by enzyme inhibition.

MEDC 630. Theoretical Methods in Drug Design. 2 Hours.

Semester course; lecture and laboratory hours. 2 credits. Prerequisites: MEDC 601, MEDC 610 or MEDC 620, or permission of instructor. A study of the theoretical methods of drug structure-activity analysis, including molecular orbital theory, topological indexes and physical property correlations. Computational chemistry problems will be emphasized in the laboratory.

MEDC 642. Nucleoside, Nucleotide, Carbohydrate and Peptide Chemistry. 3 Hours.

Semester course; 1 lecture hour. 1 credit. Surveys nucleoside, nucleotide, carbohydrate and peptide chemistry with emphasis on their synthesis.

MEDC 643. Regioselective Drug Metabolism. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Surveys drug biotransformation reactions. Emphasizes the molecular aspects of Phase I and Phase II drug metabolism.

MEDC 644. Asymmetric Synthesis. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Reviews the major asymmetric chemical transformations, including mechanisms, scope and synthetic utility.

MEDC 645. Introduction to Heterocyclic Chemistry. 3 Hours.

Semester course; 1 lecture hour. 1 credit. Introduces the chemistry of heterocyclic compounds. Emphasizes heterocyclic nomenclature and the reactions/reactivity of heterocyclic systems.

MEDC 670. Advanced Molecular Modeling Theory and Practice. 3 Hours.

Semester course; 3 lecture/laboratory hours. 3 credits. Prerequisite: MEDC 641 or permission of instructor. Examines the principles and application of computational chemistry and molecular graphics to current problems in drug design. Lectures focus on the application of specific computational methods and techniques to solve problems in drug/molecular design. Workshop sessions provide hands-on experience using state-of-the-art hardware and software for molecular modeling.

MEDC 690. Departmental Research Seminar. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Reports presented by students, staff and visiting lecturers, current problems and developments in pharmaceutical and medicinal chemistry are discussed. Graded as PR in first semester of enrollment, with a letter grade assigned in the following semester.

MEDC 691. Special Topics in Medicinal Chemistry. 1-4 Hours.

Semester course; 1-4 lecture hours. 1-4 credits. Lectures, tutorial studies, and/or library assignments in selected areas of advanced study not available in other courses or as a part of the research training.

MEDC 697. Directed Research in Medicinal Chemistry. 1-15 Hours.

Semester course; 1-15 research hours. 1-15 credits. May be repeated for a maximum of 30 credits. Research leading to the M.S. in Pharmaceutical Sciences or Ph.D. in Pharmaceutical Sciences. Graded as satisfactory/unsatisfactory.