

Medicinal Chemistry: An International Perspective Chemistry 260

January 2008 Extended Course Description

Location: Kingston, Jamaica
Professor: Bob Hanson, Chemistry
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Major/Program Credit: Chemistry, Biomedical Studies
Prerequisites: Chemistry 248
Cost: \$3800
Maximum Enrollment: 16



Course Description

Medicinal chemistry is the application of chemistry in the context of human medicine. In this course students will gain an appreciation for the drug development process, including how biologically active natural products are isolated, how the structure of a drug relates to its activity, and how basic research into the biochemical mechanism of disease leads to the targeted development of drugs. Students will go beyond a traditional classroom medicinal chemistry course, participating in an international conference on medicinal chemistry and gaining first-hand experience in the daily routine of academic research labs at the University of the West Indies in Kingston, Jamaica. Issues relating to medicinal chemistry in a developing-world context, medicinal plants, and the chemical basis of folk medicine will be discussed. We will be using a textbook specifically designed for undergraduate use, *An Introduction to Medicinal Chemistry*, by Graham Patrick.

In addition, this course will also include the opportunity to tour a major pharmaceutical company and attend an international conference on medicinal and natural product chemistry. The Mona Symposium, held at the University of the West Indies (UWI) in Kingston, Jamaica, will provide an opportunity for students to meet professional medicinal chemists and graduate students from around the world in a casual environment focused on science. We also plan to stay at the Discovery Bay Marine Laboratory, a research facility associated with UWI on the north coast of Jamaica, where we will learn about current research projects relating to the discovery of marine natural products with antimicrobial activity. Students with scuba diving certification or an interest in snorkeling will be able to explore the local coral reefs and tidal areas first hand. Besides the Mona Symposium, Chemistry 260 will provide extensive opportunities for cross-cultural learning, including meeting UWI graduate students and undergraduates, field trips to cultural sites, guest presentations related to Jamaican history, culture, and economy. Itinerary and all activities subject to change.

Overall Itinerary

Wednesday, Jan. 2	depart MSP; arrive Indianapolis, Indiana
Thursday, Jan 3	introduction to Medicinal Chem.; tour Eli Lilly
Friday, Jan 4	travel to Montego Bay, Jamaica; bus to Kingston
Sat, Jan 5 – Wed, Jan 23	mornings in seminar-style class; afternoons and Sundays: free or field trips; Jan 7-10 Mona Symposium (tentative dates)
Thu, Jan 24 – Mon, Jan 28	Port Antonio area, Discovery Bay Marine Laboratory, and north shore environs
Tues Jan 29	Montego Bay; free time, final banquet
Wed, Jan 30	depart Montego Bay for MSP

Grading

Assessment will involve a mix of participation (30%), quizzes and exams over the textbook material (35%), and written work (35%).

Course Outline

Throughout the course, specific drugs will be discussed in terms of their molecular structure and how that structure relates to their specific function within known biochemical pathways. This outline will be adjusted based upon the background and interests of the students selected for the course and the time available. Sessions will be in the form of seminars, with individual students or groups of students responsible for preparing handouts, initiating the discussions and providing additional input based on past coursework.

PART I: Drug Action. Definition of “drug”; drug targets: lipids, carbohydrates, proteins, nucleic acids; drugs targeting enzymes and receptors; drug action at nucleic acids.

PART II: Drug Discovery, Design, and Development. Disease targeting, bioassays, lead compounds, drug metabolism and pharmacokinetics, prodrugs, manufacturing issues, clinical trials, pharmacophores, drug modification strategies.

PART III: History of Drug Development. Antibacterial agents; cholinergics, anticholinergics, and anticholinesterases; adrenergics; analgesics.

Daily Schedule

The daily schedule will depend upon where we are in the above proposed itinerary. During the conference, students will be occupied with attending talks, socializing with and interviewing conferees, and participating in evening “debriefing” sessions where students will share their experiences with their peers and pick up on the chemistry necessary for a full understanding of their next day of scientific “immersion.” For the next two weeks, students will have a 2-hour classroom experience during the morning built around the textbook and then, in the afternoon, take part in a variety of experiential activities designed to get students thinking about how medicinal chemistry is carried out in the “real world.” Proposed activities include interviewing graduate students and professors at UWI, taking field trips to scientific and cultural sites, and guest presentations by health professionals, professors in the area of medicinal and natural products chemistry, Peace Corps and USAID staff, and others. Three Sundays will be free days with organized cultural events in the vicinity of Kingston. During the last week of January we will visit the Port Antonio area, where there is a Peace Corps office working with local herbalists, and then move to the Discovery Bay Marine Laboratory for two days of instruction and relaxation on the north shore. This venue will be the base for visits to some of the more tourist-oriented areas of Jamaica, including Dunn’s River Falls, Glistening Waters, Green Grotto Caves, and Cranbrook Flower Forest. We will conclude the interim with a day in Montego Bay, in the heart of the resort area of northwestern Jamaica.

Housing

Students will be housed in a secluded townhouse complex in the Liguanea/New Kingston area about a mile from the Mona campus. These two-level townhouses include a fully equipped kitchen, living room, dining room, and patio downstairs and two bedrooms, each with two beds and its own bathroom, upstairs.

Safety

The Mona campus is in one of the loveliest, safest areas of the city. Nonetheless, Kingston is known for a relatively high level of crime and violence. Like all cities, that violence is mostly restricted to specific areas, and prudent behavior can minimize one’s exposure to crime. There are places one simply does not go, either at night or during the day, and there will be strict rules relating to traveling around the city. We will have graduate student liaisons who can accompany students on excursions, and we will have our own private bus transportation for group travel.

For additional information, see <http://www.stolaf.edu/people/hansonr/jamaica>.