Proposal for an Online Undergraduate Minor in Medical Pharmacology

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Department of Biological Chemistry and Pharmacology, The Ohio State University College of Medicine

Executive Summary
We are proposing a fully online undergraduate minor in Medical Pharmacology to be implemented in the Fall Semester, 2018. This minor will educate undergraduate students in core areas of Medical Pharmacology in preparation for admission to medical, dental, veterinary, optometry and nursing schools, and to biomedical sciences graduate programs. All component courses are currently offered several times during the academic year and all have active student enrollment. The online nature of the proposed minor and the high frequency of course offerings will allow for flexible participation of students whose schedules would otherwise preclude them from in-class instruction. The Department of Biological Chemistry and Pharmacology in the College of Medicine will be responsible for the administration of the minor.

Background Information
The Department of Biological Chemistry and Pharmacology in the College of Medicine is a recently combined department comprised of faculty who conduct research and teach medical, graduate, undergraduate and professional students in the general areas of molecular biochemistry, neuroscience and medical and clinical pharmacology. The understanding of pharmacological principles underlies the treatment of all human diseases. However, it is a complex field that presents considerable difficulty for many of our students. One of the problems is that pharmacological subject matter is often presented as a long list of drugs and their properties. In the proposed minor, we have attempted to place drugs and their effects in the context of well understood problems. We believe that this approach makes medical pharmacology easier to learn, provides a better understanding of the mechanisms of drug action, and affords a clearer rationale for use of specific drugs in human disease.

The courses comprising the proposed online Medical Pharmacology Minor (BIOPHRM 5600: Introduction to General Pharmacology (3 credits); BIOPHRM 5300: Molecular Pharmacology (2 credits); BIOPHRM 5400: Chemotherapeutic Drugs for Cancer and Infectious Diseases (2 credits); BIOPHRM 5500: Cardiovascular Pharmacology (2 credits); BIOPHRM 5050: Molecular Basis of Oxidative Stress (3 credits); BIOPHRM 6824: Foundations of Neuropsychopharmacology (2 credits). Each course is currently offered online (see attached TABLE). The initial team-taught class, ‘Introduction to General Pharmacology’ has been online for several years and forms the basis of the minor. It is offered every semester. The additional 5 classes are self-contained and may be taken in any order. They may also be taken concurrently. Together, the proposed courses review most of the pharmacological content areas (see course descriptions in attached Table) required for entry into careers in the medical pharmacological sciences.

Comparative Data
An increasing number of US and Canadian institutions have begun to offer this highly focused undergraduate training opportunity in pharmacology as a major. These include the University of California Santa Barbara, University of Wisconsin, Duke University, The State Universities of New York at Buffalo and at Stony Brook, University of Southern California, McGill University, University of Toronto, and the University of Minnesota. In addition, the College of Pharmacy at The Ohio State University offers an undergraduate major in the broader discipline of pharmaceutical sciences, which includes pharmacology as one of it’s components.

The College of Pharmacy at The Ohio State University also offers an undergraduate minor in pharmaceutical sciences, which is currently taught in a classroom setting but will also be available online beginning SU18. The OSU College of Pharmacy minor has one required classroom course (PHR 2500) covering the drug discovery, development, and delivery process within the U.S. healthcare system. It explores the roles of vested stakeholders (e.g. patients, pharmaceutical industry, providers, insurers, society, etc.) during a drug’s “bench to bedside” development. Additionally, the course discusses post-approval issues with respect to access,
social impact, and safety. In addition, students choose 9 units of electives from a total of 35 courses, 3 of which (PHR 4000, 4420 and 4440, overlap with the currently offered online courses in the proposed Medical Pharmacology minor (i.e. BIOPHRM 5300 “Molecular Pharmacology”, 5600 “Introduction to General Pharmacology” and 6824 “Foundations of Neuropharmacology”). Thus, the major differences between the existing Pharmaceutical Sciences minor and the proposed Medical Pharmacology minor are that (1) the two programs have a different disciplinary focus. The Pharmaceutical Sciences are a broad group of interdisciplinary areas of study concerned with the design, action, delivery, and disposition of drugs. They include several specific specialties, with four main branches: pharmaceutics, pharmaceutical chemistry, pharmacognosy and pharmacology. Medical pharmacology is a more restricted discipline which focuses solely on the study of the biochemical and physiological effects of drugs on human beings; (2) the proposed Medical Pharmacology minor includes individual courses focused on Cardiovascular Pharmacology, Cancer Pharmacology and Infectious Diseases Pharmacology, all of which are essential components of Medical Pharmacology. (3) The former (Pharmaceutical Sciences) can be completed without taking courses at or above the 4000+ level, whereas the latter (Medical Pharmacology) consists solely of courses at the 5000+ level.

Specific Actions
Within OSU, the College of Pharmacy’s minor in Pharmaceutical Sciences has a broad focus on drug discovery, drug design/synthesis, drug action, industry careers and societal implications of drug use. Although containing some areas of overlap, the proposed Medical Pharmacology minor is entirely focused on the biological/molecular mechanisms underlying drug action in specific human diseases. The proposed classes are fully online, thus serving both OSU and off-campus students that require flexible academic schedules. Approval of the proposed online undergraduate minor in Medical Pharmacology is expected to increase student accessibility to this medical discipline.

Reviews and Approvals
The proposal has been reviewed by the department of Biological Chemistry and Pharmacology and the College of Medicine. The College of Pharmacy has concurred with this proposal. The Office of Distance Education and eLearning has determined that no review by ODE is required.

Description of Documentation
This proposal contains a tabulated list that includes descriptions of the classes required for completion of the minor.

Resources
The proposed minor will be fully supported and staffed by the Department of Biological Chemistry and Pharmacology

Supporting Documents
Letter of concurrence from the College of Pharmacy
# TABLE 1: Course Requirements for an Online Minor in Medical Pharmacology

<table>
<thead>
<tr>
<th>course name</th>
<th>description</th>
<th>credits/weeks</th>
<th>prerequisites</th>
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</thead>
<tbody>
<tr>
<td>BIOPHRM 5600: Introduction to General Pharmacology</td>
<td>An online, introductory course emphasizing the general principles of pharmacology using systems-based and mechanism-based approaches.</td>
<td>3/14</td>
<td>Biochemistry 4000 level Physiology 3000 level</td>
</tr>
<tr>
<td>BIOPHRM 5300: Molecular Pharmacology</td>
<td>Identification of drug receptor genes and their second messenger pathways provides information unavailable from traditional pharmacological approaches. In this online course, we will examine how this information is used to develop new medications to treat a wide range of disorders with improved efficacy and safety.</td>
<td>2/7</td>
<td>Biochemistry 4000 level Physiology 3000 level Or Instructors permission</td>
</tr>
<tr>
<td>BIOPHRM 5400: Chemotherapeutic drugs for cancer and infectious diseases</td>
<td>Over the last century, a wide variety of drugs has been developed for the treatment of cancer and infectious disease. The mechanism of action of these drugs involves diverse biological processes. We will examine the molecular components targeted by anticancer, antimycobacterial, antifungal, antiprotozoal, anthelmintic and antiviral drugs in this online course.</td>
<td>2/7</td>
<td>Biochemistry 4000 level Physiology 3000 level Or Instructors permission</td>
</tr>
<tr>
<td>BIOPHRM 5500: Cardiovascular Pharmacology</td>
<td>This online course covers the basic principles of drug action for specific drug classes used to treat cardiovascular disease. It includes chemical properties, mechanisms of drug action, clinical uses, disposition, contraindications, adverse reactions, clinically significant drug interactions, and drug-disease interactions.</td>
<td>2/7</td>
<td>Biochemistry 4000 level Physiology 3000 level Or Instructors permission</td>
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<tr>
<td>BIOPHRM 5050: Molecular basis of oxidative stress</td>
<td>The interrelationships between reactive species and development of human diseases and their pharmacological treatment will be the topics of online lectures and discussions.</td>
<td>3/14</td>
<td>Biochemistry Or Instructors permission</td>
</tr>
<tr>
<td>BIOPHRM 6824: Foundations of neuropharmacology</td>
<td>Pharmacological agents are valuable tools with which to probe the molecular and cellular basis of brain function. The scientific rational underlying the use of drugs to treat a wide range of neurologic and psychiatric disorders will be examined in this online course.</td>
<td>2/7</td>
<td>Biochemistry 4000 level Physiology 3000 level Or Instructors permission</td>
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</table>

Total credits 14
Hi Dr. Rotter,

I apologize for the delay in getting this information to you.

The undergraduate program committee at the College of Pharmacy has reviewed the College of Medicine’s request to create an online Medical Pharmacology minor. They concur with the proposal, but with the following clarifications about redundancy between the proposed minor and the Pharmaceutical Sciences minor:

- Beginning in SU18, the Pharmaceutical Sciences minor will be able to be completed entirely online, so that would not be a distinction of the proposed program.
- The Pharmaceutical Sciences minor could be completed with all pharmacology coursework (with the exception of the Drug Discovery, Development, and Delivery course). As such, the proposed program is not the only avenue in which a pharmacology minor could be achieved.

We request that this clarifying information be conveyed to OAA.

Best,

Nicole

Nicole Cartwright Kwiek, Ph.D.
Clinical Associate Professor
Director of Undergraduate Studies
Co-Director, The Generation Rx Initiative
Ohio State University College of Pharmacy
496 W. 12th Avenue | 402 Riffe Building
Columbus, OH 43210
Phone: 614-688-5951
Credit Hour Explanation

<table>
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<tr>
<th>Program credit hour requirements</th>
<th>A) Number of credit hours in current program (Quarter credit hours)</th>
<th>B) Calculated result for 2/3rds of current (Semester credit hours)</th>
<th>C) Number of credit hours required for proposed program (Semester credit hours)</th>
<th>D) Change in credit hours</th>
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<td>Total minimum credit hours required for completion of program</td>
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Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

**Program Learning Goals**
- To train a cadre of undergraduate students with educational backgrounds in science in core areas of Medical Pharmacology in preparation for admission to medical, dental, veterinary, optometry and nursing schools, and to biomedical sciences.

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? No

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Pre-Major

Does this Program have a Pre-Major? No
Attachments

- Medical Pharmacology Minor Proposal.pdf: proposal  
  (Program Proposal. Owner: Berner,Jessica Anne)
- Letter of concurrence from the College of Pharmacy.pdf: concurrence  
  (Support/Concurrence Letters. Owner: Berner,Jessica Anne)
- Online Pharm Minor List of Courses.pdf: list of courses  
  (List of Semester Courses. Owner: Berner,Jessica Anne)

Comments

Workflow Information

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