

**Pharmaceutical Sciences 3110**  
 Pharmaceutical Biochemistry  
 Fall, 2009 - Section #11108-001 - 3 credit hours

Course Coordinator: Dr. Patrick M. Woster, Professor of Pharmaceutical Sciences  
 3132 Applebaum Hall, Phone: 313-577-1523  
 E-Mail: [pwoster@wayne.edu](mailto:pwoster@wayne.edu)  
 URL: <http://www.cphs.wayne.edu/research/profile.php?id=222>  
 Office Hours: 11:15- 12:15 MTWThF

Instructor: Dr. Henry C. Wormser, Professor of Pharmaceutical Sciences  
 3605 Applebaum Hall, Phone: 313-993-4244  
 E-Mail: [aa2241@wayne.edu](mailto:aa2241@wayne.edu)  
 URL: <http://www.cphs.wayne.edu/wormser.html>  
 Office Hours: 11:15- 12:15 T and Th

Time/Location: Monday, Thursday and Friday, 9:05 a.m. - 10:00 a.m.  
 Room 540 Applebaum Hall

**WWW Page for PSC 3110: <http://wiz2.pharm.wayne.edu/biochem/main.html>**

Course Objectives and Corresponding Ability-Based Outcomes (ABOs):

This course presents a wide variety of information in the fields of organic chemistry, biochemistry and cell biology. All of this information is central to understanding the rationale for the development of new therapeutic agents based on the molecular modification of cellular metabolism. Specific learning objectives for the course and the ABOs they address are as follows.

- Understand the acid/base properties, stereochemistry and functional group chemistry of biomolecules and their basic building blocks (ABOs 1.5 and 1.16).
- Identify the basic chemical building blocks (amino acids, sugars, fatty acids, steroids) within each class of biomolecule, and describe how they contribute to biomolecular structure (ABOs 1.5 and 1.16).
- Understand the structure, function and biosynthesis of proteins (ABOs 1.5 and 1.16)
- Understand the primary, secondary, tertiary and quaternary structure of proteins, and be able to describe their role in protein function (ABOs 1.5 and 1.16).
- Understand the principles of enzyme structure, mechanism and action, the mechanism of enzyme cofactors and the basic kinetics of enzyme inhibition (ABOs 1.5 and 1.16).
- Understand the structure, function and biosynthesis of carbohydrates (ABOs 1.5 and 1.16).
- Understand the structure, function and biosynthesis of lipids, lipoproteins and steroids (ABOs 1.5 and 1.16).
- Understand the cellular functions of peptide and steroid hormones (ABOs 1.3, 1.5, 1.7, 1.8, 3.2, 4.1, 4.4).
- Understand the structure, function and biosynthesis of nucleic acids (ABOs 1.5 and 1.16).
- Understand the cellular utilization and production of energy (ABOs 1.5, 1.16, 4.1, 4.4).
- Understand the metabolic pathways involved in intermediary metabolism and their control (ABOs 1.5, 1.16, 4.1, 4.4)
- Understand the role of aberrations in intermediary metabolism, and their role in disease (ABOs 1.5, 1.7, 1.8, 1.9, 1.16, 2.7, 4.1, 4.4).
- Identify the effects of biochemical intervention into metabolism, and the potential benefit to patients

(ABOs 1.5, 1.7, 1.8, 1.9, 1.16, 2.7, 4.1, 4.4).

- Use self-learning and group learning techniques to complete group assignments and self-assess individual performance (ABOs 1.4, 1.5, 1.16, 2.7, 4.1, 4.2, 4.4, 4.5).

**Required** Textbook: "Harper's Illustrated Biochemistry" Robert K. Murray, Darryl K. Granner, Peter A. Mayes and Victor W. Rodwell, Eds., 27th Edition, 2006, The McGraw-Hill Companies, Inc., New York, NY.

This text is available through the Shiffman Medical Library web site at no cost, and can be accessed from any WSU computer, or from off campus locations through the WSU proxy server:

<http://www.accessmedicine.com/resourceTOC.aspx?resourceID=18>

Other Materials: Examinations from previous years are on reserve in the Learning Resource Center

### Detailed Schedule of Class Presentations

Date	Topic	Reading Assignment
8-31 (PW)	Course Intro/Protein Structure and Function	Chapters 3, 4, 5 and 6
9-3	Protein Structure and Function	
9-4	Protein Structure and Function	
9-7	Protein Structure and Function	
9-10 (HW)	Enzyme Cofactors and Minerals	Chapter 7, Section 4 Chapter 44
9-11	Enzyme Cofactors and Minerals	
9-14	Enzyme Cofactors and Minerals	
9-17 (PW)	Enzyme Structure, Function and Regulation	Chapters 7, 8 and 9
9-18	Enzyme Structure, Function and Regulation	
9-21	Enzyme Structure, Function and Regulation	
9-24	Enzyme Structure, Function and Regulation	
9-25 (HW)	Carbohydrate Structure and Function	Chapter 14
9-28	<b>Examination 1</b> (Proteins/Enzymes/Cofactors)	
10-1	Carbohydrate Structure and Function	
10-2	Carbohydrate Structure and Function	
10-5 (PW)	Carbohydrates Metabolism and Energetics	Chapters 10–13 and 16-21
10-8	Carbohydrates Metabolism and Energetics	
10-9	Carbohydrates Metabolism and Energetics	
10-12	Carbohydrates Metabolism and Energetics	
10-15 (HW)	Lipids	Chapter 15
10-16	Lipids	
10-19 (ALL)	<i>Review Session 1</i>	

10-22	EXAM WEEK ( <b>Examination 2</b> will occur during this week at a time to be determined. This exam will be cumulative, covering Proteins/Enzymes/ Cofactors and Minerals/Carbohydrate Structure/ Carbohydrate Metabolism and Energetics)	
10-23	EXAM WEEK	
10-26	Lipids	
10-29 (PW)	Lipid Metabolism	
10-30	Lipid Metabolism	Chapters 22-24
11-2	Lipid Metabolism	
11-5	Lipid Metabolism	
11-6 (HW)	Lipoprotein and Cholesterol Metabolism	Chapter 25 and 26
11-9	Lipoprotein and Cholesterol Metabolism	
11-12 (HW)	Steroid Hormone Biosynthesis and Function	Chapter 15, Section 7 Chapter 41, Section 7
11-13	<b>Examination 3</b> (Lipids and Membranes, Lipid Metabolism, Lipoprotein and Cholesterol Metabolism)	
11-16	Steroid Hormone Biosynthesis and Function	
11-19	Steroid Hormone Biosynthesis and Function	
11-20 (HW)	Nucleic Acid Metabolism	Chapters 32-34
11-23	Nucleic Acid Metabolism	
11-26	Thanksgiving Recess	
11-27	Thanksgiving Recess	
11-30	Nucleic Acid Metabolism	
12-3 (PW)	Amino Acid Metabolism	Chapters 27-30
12-4	Amino Acid Metabolism	
12-7	Amino Acid Metabolism	

12-10 (ALL)	Research Day
12-11 (ALL)	<i>Review Session 2</i>
12-14	<b>Examination 4</b> (Cumulative, covering Lipids and Membranes, Lipid Metabolism, Lipoprotein and Cholesterol Metabolism, Steroid Hormones, Nucleic Acids and Amino Acid Metabolism)

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## Student Teams

At the beginning of the term, students will be assigned to teams of **no more than 8 members**, and will work with these teams throughout the semester. Team members should work together to discuss strategy and learning objectives for each series of lectures. In-class team activities, if any, will be independent of traditional instruction, but the Instructor will be present and will act as a facilitator. Some team objectives will need to be completed outside of the classroom. The material presented in subsequent lectures in each series will reflect the outcome of these team efforts. Each member of the team will be expected to participate in the active learning process. Students will be expected to develop and enforce informal guidelines for group participation and division of labor.

## Internet Resources

Each WSU student is supplied with an E-mail account Access ID upon admission to the University, and as such each student has the ability to send and receive E-mail. **Scores will only be given out by picking up your graded exam or by E-mail** when requested by the student in an electronic message. State law prohibits me from giving any grades to students other than the person who earned that grade. In addition, a listserv has been established for the course at the following address:

pharmclass2013@lists.wayne.edu

This list will be used for posting questions from students and faculty responses. In all probability, some material will be broadcast that is not mentioned in class. You will be added to this list automatically, as identified by your Wayne State Access ID. In addition to the E-mail functions mentioned above, many of the lectures you will receive in class are on the World Wide Web at:

<http://wiz2.pharm.wayne.edu/biochem/main.html>

*You will be responsible for any material that appears on the class **LISTSERV**.*

## Suggested Internet Configuration

The WSU Division of Computing and Internet Technology (C&IT) supplies each student with an Access ID (mine is ad5526) and password, so that you can have FREE access to the Internet. They also supply, on request, a CD-ROM Internet Toolkit that contains a variety of public domain programs that will aid in using the net. Once you have the Toolkit and your Access ID, you will be ready to access my course materials, and all WSU sites such as Pipeline and Blackboard. I **strongly** recommend that you invest in a high speed connection such as Comcast, AT&T or Wide Open West. Best results will be obtained if you use Netscape.

Mozilla or Safari as your browser. Some other systems will work OK, but many are unreliable. **I will only correspond with you using your unique WSU access ID E-Mail address. I will not respond to messages from AOL, Hotmail, Yahoo or any other non-WSU system.** I will respond to messages sent through Facebook, which is also a good place to learn about your course coordinator.

### Attendance Policy

Attendance is mandatory.

### Assessment

Your course grade will be based on your performance on two 15-point group assignments, and on four full-length examinations. Group assignments will be handed out at the appropriate time during the semester. Examinations will be given during regular class periods, or during exam week, as indicated on the syllabus. There will be no final examination. Examinations will have the following point distribution:

Exam 1:	70 points
Exam 2:	120 points (cumulative for first 18 lectures)
Exam 3:	60 points
Exam 4:	120 points (cumulative for the last 18 lectures)
Assignments	<u>30 points</u> (15 points each)
Total	<b>400 points</b>

If you have a compelling reason for missing a quiz or an examination, please notify the instructor before the quiz or examination so that arrangements for a makeup can be made. **An unexcused absence from a quiz or an examination will result in no credit for that quiz or examination.**

### Special Learning Needs

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Please refer to the Student Disability Services website for further information about students with disabilities and the services provided for faculty and students: <http://studentdisability.wayne.edu/>

### Grading Policy

Final grades will be based on the distribution of cumulative point totals at the end of the semester; thus, *a grading scale will not be established until the course has been completed and all examinations have been graded.* Each student will then be assigned a letter grade of "A", "B", "B+", "C", "C+" or "E" (there will be no "D" grades or minus letter grades assigned). Once during the semester, students will be allowed to complete an elective assignment to earn 15 additional points, if desired. No elective assignments will be accepted for grading after the fourth examination has begun on December 9<sup>th</sup>, 2008.

Please note that assigned seating will be used for all examinations. It is your responsibility to know and remember your assigned seat, which will not change throughout the year. **Failure to use your assigned seat will result in a grade of zero for that examination!**

### **In the Event of Course Failure**

All assigned grades are final, and no makeup exams, extra credit assignments or exam retakes will be offered.

### **Academic Misbehavior**

A practicing Pharmacist must be able to be trusted to regulate the dispensing of controlled substances and to enforce all laws pertaining to the ethical dispensing of medication. If you feel that cheating on examinations is the only way for you to pass courses and obtain a Pharmacy degree, you have aspired to the wrong profession. Any student caught cheating will be dealt with according to the University Due Process Statute, Section 10:

"In any instance of academic misbehavior occurring in this course as defined in Section 3.0 of the University Due Process Statute, the provisions of 10.0 of the Statute will be implemented as follows: The grade for the course will be reduced to an "F". In addition, charges MAY be filed, as provided for in Section 10.2 of the Statute, which may lead to further sanctions up to and including expulsion from the College or the University."

Note: The policy outlined above will be **strictly enforced with zero tolerance!** Anyone who is caught cheating in any fashion on an examination or quiz will be removed from the room immediately, and their paper will be confiscated. You worked hard to get here - don't risk expulsion by trying to take the easy way out!

**Ability Based Outcomes - Doctor of Pharmacy Program**  
**Eugene Applebaum College of Pharmacy and Health Sciences**  
**Wayne State University**  
**Approved by the Faculty - September 19, 2007**

The purpose of this document is to define a set of concise program level outcomes for students completing the Doctor of Pharmacy program at Wayne State University. The outcomes outlined in this document are ability based outcomes (ABOs). ABOs define what students will be able to do as a result of completing the Doctor of Pharmacy program at Wayne State University. ABOs do not define the knowledge skills and attitudes which enable students to meet the outcomes. They define what graduates can do as a result of knowledge, skills and attitudes gained through completing the entire curriculum.

The ABOs will be used in conjunction with other content area measures for curricular design and assessment. A curricular map will be developed which defines the relationship between individual courses and the ABOs.

Upon completion of the doctor of pharmacy program, the student will be able to:

1. Provide patient care in cooperation with patients, patients' agents, prescribers, and other members of an interprofessional health care team.
  - 1.1 Gather, generate, and organize relevant patient or population specific data.
  - 1.2 Interpret relevant patient or population specific data.
  - 1.3 Identify pharmacotherapy problems
  - 1.4 Work effectively as a member of an interprofessional team.
  - 1.5 Develop a therapeutic plan, utilizing a comprehensive knowledge of the biomedical and pharmaceutical sciences, evidence based literature, emerging technologies, and evolving changes in the health sciences.
  - 1.6 Incorporate the potential effects of the patient's health literacy, psychosocial, economic, and cultural background into the therapeutic plan.
  - 1.7 Identify therapeutic outcomes.
  - 1.8 Implement the pharmacotherapeutic plan.
  - 1.9 Monitor outcomes and modify therapeutic plan as needed.
  - 1.10 Document pharmaceutical care activities and associated outcomes.
  - 1.11 Deliver comprehensive pharmaceutical care in a legal and ethical manner.
  - 1.12 Ensure the safe and accurate distribution of medications.

- 1.13 Demonstrate professional skills, attitudes, and values and a sense of personal responsibility to patients, patients' agents, and other health care providers.
  - 1.14 Manage a successful patient-centered practice (including being compensated for services and providing medication therapy management).
  - 1.15 Utilize informatics, epidemiologic and pharmacoeconomic data, medication-use criteria, medication use review and risk reduction strategies to develop disease prevention and management programs in order to provide patient and population based care.
  - 1.16 Retrieve, analyze and interpret scientific literature to disseminate drug information to patients, patients' agents, health care professionals, administrators, policy makers, payers, and the public.
  - 1.17 Communicate effectively and persuasively with patients, patients' agents, health care professionals, administrators, policy makers, payers and the public.
2. Manage and use resources of the health care system.
    - 2.1 Effectively supervise pharmacy personnel.
    - 2.2 Promote efficient and cost-effective utilization of physical, medical, informational, and technological resources.
    - 2.3 Perform responsibilities in accordance with legal, ethical, social and professional principles.
    - 2.4 Incorporate the resources available from regional and national pharmacy and medical organizations into system improvement plans.
    - 2.5 Assume responsibility for all aspects of medication distribution process.
    - 2.6 Provide, assess and coordinate accurate, time sensitive medication distribution.
    - 2.7 Incorporate emerging technologies into the medication use system.
    - 2.8 Prepare and be able to oversee the preparation of extemporaneous and parenteral products.
    - 2.9 Ensure the integrity of drug products.
    - 2.10 Utilize data from quality improvement strategies to optimize patient outcomes.
    - 2.11 Participate in medication safety and error reduction programs to minimize medication misadventures.
    - 2.12 Interpret and apply drug use policy, health policy, and pharmacy benefit plans and provide feedback to health care benefit programs as appropriate.
    - 2.13 Communicate and collaborate effectively with patients and other health care professionals.
3. Promote health improvement, wellness, and disease prevention.

- 3.1 Promote the availability of effective health and disease prevention services in a legal and ethical manner.
  - 3.2 Apply population specific data, quality assurance strategies, informatics and research processes to identify and resolve public health problems.
  - 3.3 Communicate and collaborate with health care personnel, policy makers, payers, community members, and at risk populations to identify and resolve public health problems, including health disparities.
  - 3.4 Apply population specific data, quality assurance strategies, and research processes to develop pharmacy related health policy.
4. Demonstrate commitment to a high professional standard.
    - 4.1 Maintain professional competence by identifying and analyzing emerging issues, products, and services.
    - 4.2 Possess the skills and attitudes required to be a motivated, self-directed, independent, life-long learner.
    - 4.3 Be an advocate for the patient, profession and quality health care.
    - 4.4 Recognize and solve complex problems related to all elements of the profession.
    - 4.5 Recognize, initiate and advocate change in the profession of pharmacy that improves patient care.