

COURSE TITLE: Principles of Drug Action and Therapeutics I**I. Contact Information**

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II. Course Prerequisites/Corequisites

Acceptance into the COP and enrollment or credit in PHRD ILS I

III. Course Description

This course focuses on the molecular-level composition of living organisms in relationship to the biochemical and molecular biopharmaceutical bases of therapeutic intervention with medicinal substances, and associated foundational concepts of medicinal and pharmaceutical chemistry, pharmacology, and toxicology.

IV. Curricular Objectives and Outcomes

4. Identify, Interpret, and Evaluate Literature Needed for the Provision of Drug Information and Pharmaceutical Care.
6. Think Critically.
7. Demonstrate Appropriate Interpersonal, Professional, and Ethical Behaviors.

V. Course Specific Objectives and Outcomes

The constant objective for the course is to introduce the student to basic principles of the ways that medications work in the body. Additionally some time will be spent introducing how to select certain medications for certain patients.

At the end of this course, the student should be able to:

- To understand the metabolism of medications and other substances in the human body.
- Understand activation of prodrugs and why they are utilized in therapy.
- Understand and apply ADME properties to medications.

VI. Course Topics

Listed at the end of the syllabus

VII. Instructional Methods and Activities

Instructional methods may include: traditional and technology-driven lectures with in-class discussion, quizzes and exams, and outside of class assignments.

VIII. Evaluation and Grade Assignment

- Quizzes and class participation 10%
- Completed assignments 30%
- 4 Exams (*including comprehensive final*) 60% (15% each exam)

An overall class grade of $\geq 70\%$ is required to pass the course. Students scoring $\geq 90\%$ will receive an "A" grade, those scoring $\geq 80\%$ but $< 90\%$ will receive a "B" grade, and those scoring $\geq 70\%$ but $< 80\%$ will receive a "C" grade.

Undergraduate mid-term grades will be posted on-line for students to view via Arrow. Mid-term grades indicate a student's status at mid-semester only and do not indicate the final performance outcome of a student.

IX. Class Policies and Procedures

At a minimum, all policies stated in the current ULM *Student Policy Manual & Organizational Handbook* should be followed (see <http://www.ulm.edu/studentpolicy/>). Additional class policies include:

- **Preparation for class:** For each class there will be lecture notes posted online at least 3 days before the class day. For each lecture notes, there will be *Expected Outcomes* mentioned in the outline which should be met at the conclusion of the topic. The notes may also contain few problems which should be worked out by the student before attending the class. These problems will be the basis of discussion in the class. Therefore, it is mandatory that you come prepared to discuss the scheduled topic and problems.
- **In-Class quizzes:** For each class period, there will be a quiz administered either at the beginning, during or at end of the class. The quizzes will contain multiple choice, true/false, and/or fill in the blank type questions. As there could be unexpected emergencies, a student is allowed to miss up to 2 quizzes during the course period. There is no need to submit proof of medical condition or the situation you were involved in. As you have the convenience to miss two quizzes, there will be no make-up quizzes administered. Students, who are able to take all the quizzes, will have the option to drop their two lowest grades from consideration.
- **Take-home assignments:** Assignments for each lecture will be available simultaneously with the class notes and are due on the date mentioned in the *class schedule*. There will also be a few sets of practice problems with answers posted which will be similar to the actual assignment. The students should work on these practice problems before working on the assignments. The grades of these assignments will be added to the final grade. As you will have ample time to work on and submit each of the assignments online before the due date, there are no make-up assignments available.
- **Exams:** Four examinations will be administered during the course. The dates of exams are mentioned in the *class schedule*. While the first three exams (*Exam 1, 2 & 3*) will be progress exams covering only selected lecture topics mentioned in the *class schedule*, the final exam (*Exam 4*) will be comprehensive in nature covering ALL the topics covered in the course.

Additionally, as your knowledge of the course builds up based on proper understanding of preceding lecture topics, it shouldn't be surprising to expect occasionally some overlapping material, belonging to preceding lecture topics, asked in later progress exams.

An unexcused absence for an exam will result in a grade of zero for that exam. If the absence was unpredictable (e.g. medical emergency), a written notice should be submitted as soon as possible along with the supporting document to the instructor and/or the office of student affairs. If the absence for an exam is predictable (e.g. scheduled surgery), a prior approval should be obtained from the instructor and/or the office of student affairs. When deemed legitimate, a make-up exam similar to the actual exam will be administered to the absentee.

A. Textbook(s) and Materials:

- Lecture handouts (provided online)
- Access to computer with internet (outside of class)

The following textbooks and materials were primarily consulted while preparing the class notes

Books

B. Attendance Policy:

Class attendance is required. Class attendance is regarded as an obligation as well as a privilege, and students are expected to know attendance regulations and to attend regularly and punctually at classes in which they are enrolled. Failure to do so: (1) may prevent access to the classroom during regularly scheduled times; (2) may jeopardize a student's scholastic standing; and (3) may lead to suspension from the college or University. Students shall submit excuses for all class absences to professor within three class days after returning to classes. Professors shall accept an official University excuse. With the following exceptions professors are to determine whether absences are excused or unexcused: 1) Absences arising from authorized trips away from the University or from special duties at the University shall be excused. 2) Absences arising from a student's confinement in a hospital or other in-patient facility or doctor's excused absences shall be excused. Students are responsible for verifying this information to the faculty. 3) Absences arising from a death in the immediate family shall be excused. The immediate family is defined as spouse, child, step-child, mother, father, sister, brother, grandmother, grandfather, step-mother, step-father, step-brother, step-sister, aunt, uncle, mother-in-law or father-in-law.

C. Make-up Policy:

Excused make-ups will be within one week of the student's return to class at the convenience of the instructor. Excused absences will be determined using the guidelines stated in the University Catalog.

D. Academic Integrity: Faculty and students must observe the ULM published policy on Academic Dishonesty (see Page 4 in ULM *Student Policy Manual* - <http://www.ulm.edu/studentpolicy/>).

Cheating, plagiarism, or other inappropriate conduct will not be tolerated. Academic cheating includes but is not limited to the accomplishment or attempted accomplishment of the following:

1. Copying or obtaining information from another student's test paper.*
2. Using, during a test, materials not authorized by the person giving the test.**

3. Collaborating, conspiring, or cooperating during an in-class or take-home test with any other person by giving or receiving information without authority.
4. Stealing, buying, or otherwise obtaining all or part of an unadministered test.
5. Selling or giving away all or part of an unadministered test or any information concerning specific questions and items on an unadministered test.
6. Requesting, bribing, blackmailing, or in any other way causing any other person to obtain an unadministered test or information about an unadministered test or a test in the process of being administered.
7. Substituting for another student, or permitting any other person to substitute for oneself to take a test.
8. Submitting as one's own, in fulfillment of academic requirements, any work prepared totally or in part by another person.
9. Any selling, giving, or otherwise supplying to another student for use in fulfilling academic requirement any work.
10. Submitting artificially produced data or information in the place of descriptive, experimental, or survey results.
11. Any other devious means of securing an unearned grade in a non-credit course or in a course offered for credit.
12. Using, during a test, any electronic storage device, wireless and/or internet-based technology, or any other means that provides information not authorized for use during the testing period.

*A student looking on another student's paper is considered cheating.

**The presence on one's person (or in close proximity thereto) of a condensation of test information which could be regarded as a "cheat sheet" will be considered adequate evidence to establish cheating.

Plagiarism is the use of any other person's work (such work need not be copyrighted) and the unacknowledged incorporation of that work in one's own work offered for credit.

Censures (Penalties)

Academic dishonesty will result in a referral to Committee on Ethical and Professional Standards with a recommendation for a grade of "F" for the course and expulsion from the College. Academic dishonesty includes but is not limited to the use of information taken from others work or ideas, the provision of help to others on non-collaborative evaluations (tests, quizzes, etc.), collaboration on take home exams, or the use of unapproved information or electronic devices to assist in obtaining an answer to the question.

E. Course Evaluation Policy: Students are expected to complete the on-line course evaluation. It is requested that they also complete the College of Pharmacy course and instructor evaluations, including providing comments. In addition, individual feedback is encouraged throughout the course.

F. Student Services: Information concerning student services in the College of Pharmacy can be found in the College of Pharmacy Student Handbook. In particular, students should pay special attention to the Colleges technical standards and policies concerning students with special needs (<http://www.ulm.edu/studentpolicy/studentpolicy.pdf>, pages 21-22). ULM student services, such as Student Success Center (<http://ulm.edu/cass/>), Counseling Center (<http://ulm.edu/counselingcenter/>), and Student Health Services, is available at the following Student Services web site <http://ulm.edu/studentaffairs/>

G. Emergency Procedures: (Include appropriate emergency information)

Please review the emergency escape plan in the classrooms and hallways of the Bienville building. Move quickly and orderly to the appropriate stairwell and exit the building. The

meeting place for this class will be the far end of the north parking lot between Bienville and Broadmoor Blvd. Under no circumstances is the elevator to be used for emergency evacuation. Any student needing assistance should notify the professor immediately. For emergencies, to contact University Police, call 1-911 from landlines and **342-5350** from cell phones.

H. Discipline/Course Specific Policies: Students are responsible for all course information on Moodle and/or instructor websites. They are expected to check these sources regularly to access class materials, required readings, assignments, and other information necessary to excel in this course.

X. Tentative Course Schedule

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Topics:

Molecular structure as it relates to acidity and basicity of organic molecules; solution ionization review of ionic equilibria of biochemically common functional groups

Proteins: Brief review/overview of their various biological functions

Molecular recognition: weak (noncovalent) intramolecular interactions, the hydrophobic effect, and the nature of molecular recognition (basic thermodynamics and kinetics; conformational equilibria);

Myoglobin and hemoglobin function as prototypical systems for illustrating...

- ligand-protein interaction;
- protein structure vs. function;
- multimeric protein assemblies;
- allosteric cooperativity and regulation.

Enzymology, with particular emphases as pertains to drug action:

- enzyme kinetics and effects of inhibitors
- allosteric enzymes; allosteric activators and inhibitors
- enzyme catalysis: molecular mechanisms of biocatalysis overview, including vitamin derived cofactors as applicable

Enzyme inhibition strategies for drug design (overview)

Receptors and associated concepts,

- affinity; association, dissociation, and other molecular-level processes
- efficacy; introduction to molecular pharmacodynamics, including agonists, antagonists, partial agonists, inverse agonists
- target-level dose-response relationships

Molecular-level membrane structure and functions, with a review of lipids

Membrane transport basics

Membrane transporters, ion channels, and other special aspects of membrane biochemistry, Round 1

Molecular determinants of drug absorption

Molecular determinants of drug distribution

Molecular determinants drug excretion

Cellular energetics (thermodynamics and energy “currency”)

Metabolic pathways: overview, characteristics of multi-enzyme pathways, and pathway regulation; the following topics will serve for introductory exemplification:

glycolysis, tricarboxylic acid cycle;

lipid metabolism: fatty acid catabolism and ketone bodies, lipids biosynthesis

glycogen metabolism; gluconeogenesis

Electron transport and oxidative phosphorylation

Metabolic integration; hormonal regulation of metabolism (Round 1)

Biotransformation of xenobiotics (including drugs)

Overview

Phase I metabolism, including some enzymology

Phase II metabolism, including some enzymology

Significance of drug biotransformation, and brief introduction to “pharmacogenomics”

Prodrugs and soft drugs—an introduction