

Course Title: *Fundamentals of Pharmacology*
Course Number: BMSC (Biomedical Sciences) F694
CRN – TBD [Same schedule as for BMSC 494]
3 credit hours (3+0), Mon-Wed-Fri or Tu-Th, time TBD, location TBD
Instructor: Dr. Todd O'Hara (tmohara@alaska.edu, office - TBD)

Pre-Requisite: BIOL F310, BIOL F360/CHEM F360, and BIOL F403 or BIOL F465 or CHEM 351; or permission of instructor (3+0)

Required textbook: "Pharmacology", 4th Edition (Elsevier), by G.M. Brenner and C.W. Stevens

Catalog Description:

Fundamentals of pharmacology with an emphasis on human and veterinary medical applications for the aspiring health practitioner and biomedical scientist.

Course Description:

Teaching the fundamentals of this discipline (pharmacology) starts with pharmacodynamics, pharmacokinetics, and drug adsorption, distribution, metabolism (biotransformation), and elimination (ADME). This includes the essentials of receptor-drug binding and dose-response relationships. Drug receptor binding and signal transduction systems linked with physiological effects is a key foundation for this course (it is how most drugs work!). The autonomic and central nervous systems are key targets and excellent systems to focus on for learning the fundamentals of pharmacology and are emphasized in the lectures and required text. Mechanism of action-based teaching and learning of many classes of drugs used to treat common human diseases, pathologies, and infections is emphasized to make this course highly relevant and to allow students to initiate the process of how to organize these drugs in their minds (enhanced comprehension). Of course, this includes prototype drugs and their clinical uses, mechanisms of actions, toxicities, and drug-drug interactions to drive home these principles for groups of drugs that act similarly. Understanding vertebrate and microbial physiology is important in this course.

Graduate students are required to prepare and submit a written report on the day of Exam 4. The subject matter for this report should be discussed with the instructor and agreed upon. However, it is recommended to submit this report approximately 2 weeks prior to the end of the course so the student can focus on studying for Exam 4. This report will consist of a detailed analysis of a drug or drug class related to a focused component of it 1) receptor interactions, 2) unique or intriguing aspects of biotransformation, 3) detailed assessment of second messengers involved, or similar characteristics. The student is encouraged to select topics of interest to them and then adequately convey this subject matter via oral presentation to the instructor following submission to and reading by the instructor. This paper will be graded and then an oral exam will be conducted during the schedule Final Exam time. For graduate students this is worth 80 points, making their total achievable score 400 points for the course (4 exams at 80 points each). The paper will be written as a well thought out essay type manuscript using Arial 11 font 1.5 space formatting with a page range of 12-15 (not including Tables, Figures, References, etc.).

Course Goals and Student Learning Outcomes: This course is intended to establish a strong foundation in pharmacology for those pursuing biomedical science degrees in research (basic

principles, mechanisms of action), and to prepare those students applying for health practitioner programs to make their applications more competitive and to enhance their aptitude in a very applied biomedical field – pharmacology (understanding of drugs).

More specifically, these students will 1. Understand receptor agonists and antagonists. 2. Appreciate the key characteristics of agonist dose-response curves, including hormesis, maximal response, potency, efficacy, and therapeutic index. 3. Define and use drug half-life, volume of distribution, and other pharmacokinetic parameters in problem solving. 4. Recognize the importance of drug adsorption, distribution, metabolism (biotransformation), and elimination (ADME). 5. Reflexively know drugs and their receptors. 6. Appreciate several signal transduction systems linked to well described receptors. 7. Understand the autonomic and central nervous systems and the drug classes affecting these systems. 8. Drug class awareness for the treatment of many diseases, and 9. An appreciation of how pharmacology integrates understanding from a variety of disciplines such as physiology (cell and animal), biochemistry, physics, molecular biology, etc. Graduate students as a part of their written and oral assignment will focus on a key aspect of a drug, or drug class, and provide a detailed assessment that will be critically reviewed as described above.

Instructional methods:

This will be very much a traditional classroom setting with lectures related to assigned readings that are outlined in a timeline over the semester. Assigned readings exclusively come from the required text. Lectures will be very much linked with the text and exam questions will be derived from the text and lecture material. The written report and oral exam are to be outside of the required text and a focused topic and effort that seeks out key review articles and primary scientific literature.

Course policies

Attendance/tardiness:

Attendance is encouraged. Much, if not all, of the exam information will be based on information from lectures and the required text (lectures will be provided as pdf) with lectures helping students in comprehension and what may be emphasized on exams. “Notes” from lectures must be obtained from another student when absence is unavoidable if a student would like to know what was discussed in class. Attendance is recorded occasionally to maintain an idea of who is actually attending as this could correlate with test performance. Out of respect for the instructor and classmates please be on time, if you have a commitment prior to class that causes the occasional tardiness please let the instructor know so we can best accommodate you and the class.

Making up an Exam

An exam may be taken ahead of schedule if a suitable time can be agreed upon if there is a **good reason**. Exams can be made up after the scheduled date but this is at the **discretion of the instructor** (i.e., it is not guaranteed) and a **very good reason** for missing the exam must be **documented**. The make-up exam, or the early exam, will not be the same exam given to the other students. There will only be one make-up exam offered per student per semester. Students who miss more than one exam will have difficulty passing the course. This stipulation does not apply to those involved with UAF sanctioned activities (e.g., athletics).

Plagiarism/Cheating (aspects of academic integrity)

Plagiarism or cheating of any kind simply will not be tolerated in any form. If you do not know what this refers to please meet with Dr. O'Hara for an explanation. Dismissal from the University is an option for the instructor and Dean of Students to choose when academic integrity has been violated.

Examinations are to be performed by the individual and any attempts to gain assistance or knowingly provide assistance during an examination will be punished according to University policy towards "cheating." Those taking early or make up exams are to not request assistance with the exams nor provide it. The exams should not be discussed until ALL members of the class have taken a specific exam. Please note plagiarism above, and that this applies to any written or oral assignments that are independent projects as well as the examinations.

Evaluation:

The letter grade assigned in this course is dependent on the performance on the 4 exams that are equally waited; and a final exam day oral exam on a paper (subject mutually agreed upon by graduate student and instructor). The paper is due on the day of Exam 4 to allow the instructor to prepare for the oral exam. It is encouraged that the paper be turned in earlier to allow the student time to study for Exam 4.

Total Points = 400 points for graduate students based on 4 exams (80%; 80 points per test); and paper and oral exam of the paper (20%).

Letter grades: no +/- grades given.

A = 90-100%, B = 80-89.5%, C = 70-79.5%, D = 60-69.5%, F <60%.

Graduate students will have different exams than undergraduates and the level of performance is expected to be higher. However, the course material in lecture will be the same for undergraduate and graduate students.

Disabilities Services

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. The Instructor will work with the Office of Disabilities Services to provide reasonable accommodation to students with disabilities. Please make the Instructor aware of any disabilities that may affect access or performance. For any questions please refer to <http://www.uaf.edu/disability/>. Office of Disabilities Services (208 WHITAKER BLDG, 474-5655) can provide reasonable accommodation to students with disabilities. Students must notify the instructor of any arrangements with ODS as they do not inform us.

Assume Monday/Wednesday/Friday schedule. First day of instruction; Tuesday, Jan. 17. Finals Tuesday-Friday, May 2-5

Week	Date	Topic (B & S 4th ed textbook chapter)
1	1/18 (Wed)	Introduction (Chapter 1+)
1	1/20	Pharmacodynamics (Chapters 1 & 3+)
2	1/23	Pharmacodynamics (Chapter 3+)
2	1/25	ADME (Chapter 2+)
2	1/27	ADME / Drug delivery (Chapter 2+)
3	1/30	Pharmacokinetics (Chapter 2+)

3	2/1	Pharmacokinetics (Chapter 2+)
3	2/3	Autonomics – Introduction (Chapter 5)
4	2/6	Autonomics – Cholinergics (Chapters 6 and 7)
4	2/8	Autonomics – Chol & Adren (Chapters 7 and 8)
4	2/10	Autonomics – Adrenergics (Chapters 8 and 9)
5	2/13	Autonomics – Adrenergics (Chapter 9)
5	2/15	Exam 1; 20% of grade
5	2/17	CV/Renal – hypertension, heart failure, diuretics (Ch 10, 12, 13)
6	2/20	CV/Renal – hypertension, heart failure, diuretics (Ch 10, 12, 13)
6	2/22	CV/Renal – hypertension, heart failure, diuretics (Ch 10, 12, 13)
6	2/24	CV/Renal Drugs – anti-anginal & - arrhythmics (Ch 11, 14)
7	2/27	CV/Renal Drugs – anti-anginal & - arrhythmics (Ch 11, 14)
7	3/1	CV Drugs – blood (anticoagulant, hematopoietic drugs) (Ch 15-17)
7	3/3	CV Drugs – blood (anticoagulant, hematopoietic drugs) (Ch 15-17)
8	3/6	CV Drugs – blood (anticoagulant, hematopoietic drugs) (Ch 15-17)
8	3/8	GI drugs (Chapter 28)
8	3/10	Exam 2 20% of grade
9	3/13-17	Spring Break No Class Monday-Friday, March 13-17
10	3/20/	CNS introduction (Chapter 18)
10	3/22/	CNS introduction to CNS drugs I (Chapter 18, 19)
10	3/24/	CNS drugs I - Anxiolytic and sedative hypnotic drugs (Chapter 19)
11	3/27/	CNS drugs II - Psychotherapeutic drugs (Chapter 22)
11	3/29/	CNS drugs III - General Anesthetics and opioids (Chapters 21, 23)
11	3/31/	CNS drugs III - General Anesthetics and opioids (Chapters 21, 23)
12	4/3/	Drugs for neurodegenerative diseases (Chapter 24)
12	4/5/	Drugs for headache, pain, and inflammation (Chapters 29 and 30)
12	4/7/	Drugs for headache, pain, and inflammation (Chapters 29 and 30)
13	4/10/	Drugs for headache, pain, and inflammation II (Chapters 29 and 30)
13	4/12/	Exam 3 20% of grade
13	4/14/	Endocrine Drugs IV – diabetes (Chapter 35)
14	4/17/	Principles of Antimicrobial therapy (Chapter 37)
14	4/19/	Principles of Antimicrobial therapy (Chapter 37)
14	4/21	Antibiotics I (Chapters 38, 39)
15	4/24	Antibiotics I to II
15	4/26	Antibiotics II (Chapters 40, 41)
15	4/28	Anti-viral drugs (Chapter 43)
	5/1	last day of class, Exam 4, 20% of grade [PAPER DUE]
	Final Exam	Graduate student paper-based oral exam, 20%