

RXRS 302: Introduction to Pharmacology and Therapeutics

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Course Weight: 4 units

Days/Time/Location: Tuesday and Thursday: 2:00-3:20PM ONLINE

Catalogue description: Introductory course in pharmacology/drug development-Drug/Receptor interactions, pharmacodynamics, pharmacokinetics, toxicology, therapeutic interventions, biotransformation, pharmacogenomics, FDA, regulatory requirements and challenges, intellectual property, global challenges of drug development.

Introduction

Pharmacology is the study of substances that interact with living systems through chemical processes, especially by binding to regulatory molecules and activating or inhibiting normal body processes. These substances may be chemicals administered to achieve a beneficial therapeutic effect on some process within the patient or for their toxic effects on regulatory processes in parasites infecting the patient. "Introduction to Pharmacology and Drug Development," will provide students with an introduction to the nature of drugs and drug development including: principles of drug receptors; how drugs interact with the body (PD); and potentially damage the body (toxicology); how

the body alters the effects of the drug (PK); drug biotransformation; important drug interactions and their mechanisms of action and pharmacogenomics. The student will also learn about the regulatory challenges associated with the discovery and development of a new drug. The student will be introduced to the use of different types of pharmaceutical interventions, from the use of patented to generic to over-the counter drugs, the current approaches to dietary supplement and alternative medicines. Selected cases studies and emerging “hot” topics will be discussed. This course should have broad appeal to many science and non-science undergraduates including students interested in drug discovery research, chemistry, biology, pharmacology, biochemistry, toxicology, formulations, pharmaceutical industry, FDA, business analysts, entrepreneurs and venture capitalist interested in understanding the pharmaceuticals industry.

Chapters from the core textbook will be supplemented with a variety of source materials including online resources and articles from scientific journals.

Upon successful completion of this course, the student should be able to demonstrate a working knowledge to::

- Explain the nature of drugs and drug development
- Discuss the role and importance of different pharmacokinetic parameters (absorption, distribution, metabolism and elimination; ADME) that affect drug dosing in a patient.
- Define basic terminology used in characterizing a drug (e.g. potency, EC50, IC50, MTD, efficacy, selectivity, etc....).
- Analyze different drug-receptor interactions and the basic principles of pharmacodynamics (PD)
- Evaluate basic principles in the use of drugs to prevent and treat diseases (Pharmacotherapy).
- Discuss importance of pharmacogenomics.
- Conclude particular drugs are prescribed and how their effects are monitored (clinical pharmacology)
- Evaluate the importance of good laboratory practices (GLP), good manufacturing practices (GMP) and good clinical practices (GCP).
- Discuss and summarize processes involved in the discovery and development of new therapeutic agents.

Evaluation and Grading:

Evaluation will be based on two midterm examinations, a final examination and course quizzes.

Class/Group participation:	20 pts (10%)
1 group presentation	20 pts (10%)
4 quizzes @ 10 pts each:	40 pts (20%)
2 midterm exams @ 35 pts each:	70 pts (35%)

1 final exam (partially cumulative): 50 pts (25%)
Total: 200 pts (100%)

Attendance at all classes is expected. Participation will include asking and answering questions and being actively involved in the discussion as well as group assignments. It is expected that the students read the assigned papers prior to the lecture, prepare for group presentations and be prepared to discuss background, current understanding, treatments, and gaps in knowledge for the topic in each lecture.

There will be 1 group presentation, approximately 25 minutes and a 5 minutes Q&A. Students will be presenting in groups to discuss a content of peer-review paper, a disease state, a new drug recently approved (within last 3 years), or a new policy/legislation that would influence pharmacology and drug development. This will be 20 points contributed to the overall grade.

There will be 4 quizzes over the course of the semester that will be primarily based on questions pulled from the text book and lecture notes. The midterms (35 points each) will include multiple choice questions T/F questions fill-in the blank questions and possibly short answers.

The final exam (50 points) will include multiple choice and T/F questions as well as a series of questions involving short answers. The final exam will be cumulative but will emphasize material covered after the 2nd midterm.

There are no make-up exams. If exceptional circumstances prevent you from attending an exam, your reason for missing it must be accompanied by a written statement from a third party (e.g. a note from a medical doctor).

Notes, books, calculators, electronic dictionaries, regular dictionaries, cell phones or any other aids are not allowed during exams.

Students will be asked to complete an anonymous critical evaluation of the course at its completion.

Please note below is the “Approximate” grading scale breakdown. However, this scale is not set in stone and may slightly shift up or down based on overall scores.

Percent	Letter Grade
92-100%	A
90-91%	A-
88-89%	B+
82-87%	B

80-81%	B-
78-79%	C+
72-77%	C
70-71%	C-
60-69%	D
Below 60%	F

Class Policies Regarding Class Discussions and Etiquette

An overview of the class policies and how they relate to the discussions and interactions that will occur in this class can be found below. We expect each student to review, understand and adhere to these policies.

Respect

- Listen actively and attentively
- No name calling or other character attacks
- Always use a respectful tone
- Be aware of the fact that tone of voice and body language are powerful communicators. Some postures or facial expressions can silence, intimidate, or hurt your classmates (e.g. crossed arms, eye rolls). Other postures or facial expressions can show you are listening respectfully (e.g. making eye contact, staying quiet, nodding).

Constructiveness

- If you wish to challenge something that has been said, challenge the idea not the individual sharing it
- Ask for clarification if you are confused
- Commit to learning, not debating

Inclusivity

- Try not to silence yourself out of concern for what others will think about what you say
- Try not to let your question (or answer) run on. Give others the chance to speak, too.
- Do not remain silent. Make sure to contribute to the discussion
- Take responsibility for the quality of the discussion

Online learning Etiquette

- If it is not possible to have your webcam on during the entire class, do your best to have it on when speaking
- Turn off your microphone when not speaking
- If you need to step away from your computer during class (e.g. get a drink of water, use the bathroom, attend to a family member/pet) please do so

- quietly and without disturbing your classmates. Return to the class when you can.
- Be aware the contents of conversations typed into the chat box, even private conversations, are visible by the instructors

Course Readings

Required Readings

The text is mandatory for this course as it will greatly improve your grasp on the course content. There is a supplemental online student companion website for this course that can be accessed once the textbook is purchased. The chapters identified for your assigned reading in the in the text will support your learning process throughout the semester.

Pharmacology by Karen Whalen, Pharm.D., BCPS

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Publisher(s): Wolters Kluwer

Prerequisites: Students should have at completed at least one year of undergraduate biology and/or chemistry (e.g., BISC 220/221 or CHEM 105A/B, etc).

Other topical materials including but not limited to the syllabus, supplemental reading assignments and additional handouts will be posted on <http://blackboard.usc.edu/>. Students will also be encouraged to use the online discussions sessions (via Blackboard) as an additional learning tool.

Course Outline

This course will be in the format of a directed seminar/lecture under the guidance of the instructor for the specific session. During each weekly session the instructor will engage the students with questions and draw comments or interpretations primarily based on the assigned reading. Students are expected to ask questions and participate in an interactive fashion. Because this is an area of rapid change in policies, the readings may vary from one term to the next. Additional readings for each section that may be of added use are listed in the table below.

Course schedule is as follows:

Week	Tu/Thur	Date	Topic	Lecturer
1	Tuesday	1/19/2021	<p>Introductions, expectations and goals.</p> <p>Basic Principles of Pharmacology (Definitions)</p> <p>Assigned and Supplemental Reading (View Youtube Links below) What is Pharmacology Clinical Pharmacist in the ED The Drug Discovery Process</p>	Dr. Asante
1	Thursday	1/21/2021	<p>Principles of Pharmacodynamics 1</p> <p>Assigned and Supplemental Reading (View Youtube Links below) Pharmacodynamics Overview</p> <p>Textbook Reading Ch 2: Drug–Receptor Interactions and Pharmacodynamicsp23-36</p>	Dr. Asante
2	Tuesday	1/26/2021	<p>Principles of Pharmacodynamics 2</p>	Dr. Asante
2	Thursday	1/28/2021	<p>Principles of Pharmacokinetics 1</p> <p>Assigned and Supplemental Reading (View Youtube Links below) Pharmacokinetics Youtube</p> <p>Textbook Reading Ch 1: Pharmacokineticsp1-22</p>	Dr. Asante
3	Tuesday	2/2/2021	<p>Principles of Pharmacokinetics 2</p> <p>Assigned and Supplemental Reading (View Youtube Links below) Pharmacokinetics Clearance</p> <p>QUIZ 1 [Open from 5-10pm]</p>	Dr. Asante
3	Thursday	2/4/2021	<p>Drug Discovery and Development</p>	Dr. Asante
4	Tuesday	2/9/2021	<p>Drug Discovery and Development</p>	Dr. Asante

4	Thursday	2/11/2021	Introduction to Clinical Application of Pharmacogenetics	Dr. Phan/ Resident
5	Tuesday	2/16/2021	Clinical Considerations for Geriatric Patients: PK and PD Changes Assigned and Supplemental Reading (View Youtube Links below) Issues in Geriatric Medicine 2: Medication Compliance	Dr. Phan/ Resident
5	Thursday	2/18/2021	Student Presentation (1 group) Break Out Interactive Activity EXAM 1 [Open from 5-10PM California Time]	
6	Tuesday	2/23/2021	CNS Stimulants Pharmacology Textbook Reading Ch 15: CNS Stimulantsp194-202	Dr. Phan/ Resident
6	Thursday	2/25/2021	Antidepressants Pharmacology Textbook Reading Ch 10: Antidepressantsp128-138	Dr. Phan/ Resident
7	Tuesday	3/2/2021	Clinical Management of Major Depressive Disorder Assigned and Supplemental Reading (View Youtube Links below) Feeling Depressed vs Having Depression – How to Tell The Difference	Dr. Phan/ Resident
7	Thursday	3/4/2021	Clinical Management of G. Anxiety Disorder Assigned and Supplemental Reading (View Youtube Links below) The Connection Between Anxiety and Stomach Problems QUIZ 2 [Open from 5-10pm]	Dr. Phan/ Resident
8	Tuesday	3/9/2021	Anemia, Iron, EPO pharmacology Textbook Reading Ch 42: Drugs for Anemia p565-571	Dr. Phan
8	Thursday	3/11/2021	Clinical Management of Anemia (oral agents)	Dr. Phan
9	Tuesday	3/16/2021	Student Presentation (3 groups)	
9	Thursday	3/18/2021	Break Out Interactive Activity EXAM 2 [Open from 5-10pm]	
10	Tuesday	3/23/2021	Wellness Days	
10	Thursday	3/25/2021	Pharmacology of GI Agents + Clinical Management of GERD and PUD Textbook Reading Ch 40: Gastrointestinal and Antiemetic Drugsp540-556	Dr. Phan/ Resident

			Assigned and Supplemental Reading (View Youtube Links below) Heartburn, Acid Reflux, GERD	
11	Tuesday	3/30/2021	Estrogen, Progesterone, and Hormonal Contraceptives Textbook Reading Ch 25: Estrogens and Androgensp326-339	Dr. Phan/ Resident
11	Thursday	4/1/2021	Pharmacists initiation of hormonal contraceptives and emergency contraceptives	Dr. Phan
12	Tuesday	4/6/2021	Principals of Antimicrobials Textbook Reading Ch 28: Principles of Antimicrobial Therapyp355-367 Assigned and Supplemental Reading (View Youtube Links below) How Antibiotics Work The Antibiotic Apocalypse Explained QUIZ 3 [Open from 5-10pm]	Dr. Phan/ Resident
12	Thursday	4/8/2021	Applications of Antimicrobials and Intro to ASP	Dr. Phan
13	Tuesday	4/13/2021	Introduction to Oncology Textbook Reading Ch 35: Anticancer Drugsp454-480	Dr. Asante
13	Thursday	4/15/2021	Oncology Pharmacology	Dr. Asante
14	Tuesday	4/20/2021	Student Presentation (2 groups) QUIZ 4 [Open from 5-10pm]	
14	Thursday	4/22/2021	Wellness Day	
15	Tuesday	04/27/2021	Clinical Management of Patients with Cancer	Dr. Phan/ Resident
15	Thursday	4/29/2021	Adjunct and Supportive Therapies for Chemotherapeutics	Dr. Phan/ Resident
	FINALS	FINALS	FINALS	

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour