USC School of Pharmacy

RXRS 302: Pharmacology and Drug Development

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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 regarding:

• The nature of drugs and drug development
• The role and importance of different pharmacokinetic parameters (absorption, distribution, metabolism and elimination; ADME) that affect drug dosing in a patient.
• The basic terminology used in characterizing a drug (e.g. potency, EC50, IC50, MTD, efficacy, selectivity, etc....).
• Different drug-receptor interactions and the basic principles of pharmacodynamics (PD)
• The basic principles in the use of drugs to prevent and treat diseases (Pharmacotherapy).
• The importance of pharmacogenomics.
• Why particular drugs are prescribed and how their effects are monitored (clinical pharmacology)
• The importance of good laboratory practices (GLP), good manufacturing practices (GMP) and good clinical practices (GCP).
• The 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 or current news events relating to pharmacology, pharmaceutical sciences, or regulatory aspects. 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.

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
Format: Paperback w/ Access Code
Pub. Date: 2019
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:

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<thead>
<tr>
<th>Week</th>
<th>Tu/Thur</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Tuesday</td>
<td>1/19/2021</td>
<td>Introductions, expectations and goals. Basic Principles of Pharmacology (Definitions)</td>
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<tr>
<td>1</td>
<td>Thursday</td>
<td>1/21/2021</td>
<td>Principles of Pharmacodynamics 1</td>
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<tr>
<td>2</td>
<td>Tuesday</td>
<td>1/26/2021</td>
<td>Principles of Pharmacodynamics 2</td>
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<td>2</td>
<td>Thursday</td>
<td>1/28/2021</td>
<td>Principles of Pharmacokinetics 1</td>
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<td>3</td>
<td>Tuesday</td>
<td>2/2/2021</td>
<td>Principles of Pharmacokinetics 2 QUIZ 1 [Open from 5-10pm]</td>
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<td>3</td>
<td>Thursday</td>
<td>2/4/2021</td>
<td>Application of Pharmacogenetics</td>
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<td>4</td>
<td>Tuesday</td>
<td>2/9/2021</td>
<td>Drug Discovery and Development</td>
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<td>4</td>
<td>Thursday</td>
<td>2/11/2021</td>
<td>Drug Discovery and Development</td>
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<td>5</td>
<td>Tuesday</td>
<td>2/16/2021</td>
<td>Student Presentation</td>
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<td>5</td>
<td>Thursday</td>
<td>2/18/2021</td>
<td>Break Out Interactive Activity EXAM 1 [Open from 5-10pm]</td>
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<tr>
<td>6</td>
<td>Tuesday</td>
<td>2/23/2021</td>
<td>CNS Stimulants Pharmacology</td>
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<td>6</td>
<td>Thursday</td>
<td>2/25/2021</td>
<td>Antidepressants Pharmacology</td>
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<td>7</td>
<td>Tuesday</td>
<td>3/2/2021</td>
<td>Clinical Management of ADHD + ADD</td>
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<td>7</td>
<td>Thursday</td>
<td>3/4/2021</td>
<td>Clinical Management of G. Anxiety Disorder QUIZ 2 [Open from 5-10pm]</td>
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<td>8</td>
<td>Tuesday</td>
<td>3/9/2021</td>
<td>Anemia, Iron, EPO pharmacology</td>
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<td>8</td>
<td>Thursday</td>
<td>3/11/2021</td>
<td>Clinical Management of Anemia (oral agents)</td>
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<td>Monday</td>
<td>Friday</td>
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<td>9</td>
<td>Tuesday 3/16/2021</td>
<td>Student Presentation</td>
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| 9  | Thursday 3/18/2021 | Break Out Interactive Activity  
EXAM 2 [Open from 5-10pm] |
| 10 | Tuesday 3/23/2021 | Pharmacology of GI agents |
| 10 | Thursday 3/25/2021 | Clinical Management of GERD and PUD |
| 11 | Tuesday 3/30/2021 | Estrogen, Progesterone, and Hormonal Contraceptives |
| 11 | Thursday 4/1/2021 | Pharmacists initiation of hormonal contraceptives and emergency contraceptives |
| 12 | Tuesday 4/6/2021 | Principals of Antimicrobials  
QUIZ 3 [Open from 5-10pm] |
| 12 | Thursday 4/8/2021 | Applications of Antimicrobials and Intro to ASP |
| 13 | Tuesday 4/13/2021 | Introduction to Oncology |
| 13 | Thursday 4/15/2021 | Oncology Pharmacology |
| 14 | Tuesday 4/20/2021 | Clinical Management of Patients with Cancer |
| 14 | Thursday 4/22/2021 | Adjunct and Supportive Therapies for Chemotherapeutics  
QUIZ 4 [Open from 5-10pm] |
| 15 | Tuesday 04/27/2021 | Student Presentation |
| 15 | Thursday 4/29/2021 | Break Out Interactive Activity |
|    | 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