Principles of Pharmacology and Toxicology

Syllabus [3 units]

Part 1: Course Information

Instructor Information

**Instructor of Record:** Professor Birgit Puschner  
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Course Description – Why take this class?

This online course will provide training in core concepts of pharmacological and toxicological sciences and prepare students to develop higher-order problem solving and critical thinking skills. This course will also apply pharmacology and toxicology concepts in a practical context, such as: comparing beneficial versus toxic effects of drugs in clinical practice, applying toxicology knowledge toward developing public health policy, and understanding how to clinically treat people, pets or livestock that were poisoned.

The course is designed for advanced undergraduate students with interests in pursuing graduate degrees in pharmacology, toxicology, physiological sciences, and for students with an interest in pursuing DVM, MD, Pharmacy, Dentistry and Nursing professional degrees. Students who pursue careers in environmental sciences, public health management, and epidemiology may also benefit from the subject matter presented in this course.

**Prerequisite**

**Required:**
- Upper division standing in a science major
- Chemistry through organic chemistry, general biology, or consent of instructor
- Good standing with the university
- Computing capability (use MS Word®, Excel®, PowerPoint, menu driven software programs, Course LMS)
- Own a computer or have ready access to a computer with broadband internet access
Recommended:
• Systemic Physiology (NPB 101), and Cell Biology (BIS 104)

Textbook & Course Materials & Library Access

Required Text
• Course LMS resources (marked “required” resources)

Recommended Texts & Other Readings
• Other readings will be made available on Course LMS (marked “recommended” resources).

Access the UC Davis library website
• Go to the UC Davis Library website: http://www.lib.ucdavis.edu/ul/services/connect/ and follow the instructions to connect from off campus. When you search the UCD subject guides and access a database or search engine, there will be a UC Davis link to download papers and citations.

Course Requirements

Internet connection (DSL, LAN, or cable connection desirable)
Access to Course LMS (learning management system)
Self-directed learning activities such as scientific library research, discussion blogs, and team-based activities

Course Structure

This course will be delivered in a fully online format with approximately 50% of learning activities based on videos and self-directed learning/reading, and
50% taking place through interactive asynchronous and synchronous discussions that allow students to engage with the course content and interact with each other and the instructors. The course structure places considerable emphasis on preparation prior to online discussions, and completion of assignments. Online interactive sessions will be spent as asynchronous and synchronous discussions, individual and group presentations, and student interactions. We plan to use the Piazza portal for asynchronous discussions. For online synchronous discussions, we plan to use Adobe connect. Students will use Course LMS (learning management system) to login to the course from the UC Davis login page. We will administer the course through a campus LMS that provides access to online lessons, course materials such as videos and written documents, links to open source material, assignments, and access to Piazza and Adobe Connect.

Online Course Etiquette (Netiquette)

Ground Rules:

- **Think before you type**—both about what you want to say and about how your comments might affect others. Be constructive, direct, and stay on point.
- **Use Proper Writing Style:** This is a must. Write as if you were writing a term paper. Correct spelling, grammatical construction and sentence structure are expected in every other writing activity associated with scholarship and academic engagement. Online discussions are no different.
- **Be polite and collegial.** Treat your interactions as you would if you were discussing a topic face-to-face. Don’t type anything you wouldn’t be willing to say in person.
- **Participate:** No lurking in the cyberspace background. It is not enough to login and read the discussion thread of others. For the maximum benefit to all, everyone must contribute.
- **Emoticons and Texting:** Social networking and text messaging has spawned a body of linguistic shortcuts that are *not* part of the academic dialogue. Please refrain from :-) faces and c u l8r’s.
- **Report Glitches:** Discussion forums are electronic. They break. If for any reason you experience difficulty participating, please call, email, or otherwise inform me of the issue. Chances are others are having the same problem.
- **Cite Your Sources:** Another big must! If your contribution to the conversation includes the intellectual property (authored material) of others, e.g., books, newspaper, magazine, or journal articles—online or in print—they must be given proper attribution. Understand and avoid plagiarism: [http://sja.ucdavis.edu/files/plagiarism.pdf](http://sja.ucdavis.edu/files/plagiarism.pdf)
- **Respect Diversity:** We live in an ethnically rich and diverse, multi-cultural world. Use no language that is—or that could be construed to be—offensive toward others. Racists, sexist, and heterosexist comments and
jokes are unacceptable, as are derogatory and/or sarcastic comments and jokes directed at religious beliefs, disabilities, and age.

- **No YELLING:** Step carefully. Beware the electronic footprint you leave behind. Using bold upper-case letters is bad form, like stomping around and yelling at somebody.

- **No Flaming:** Criticism must be constructive, well-meaning, and well-articulated. Please, no tantrums. Rants directed at any other contributor are simply unacceptable and will not be tolerated. The same goes for profanity. The academic environment expects higher-order language.

- **Be mindful:** Remember: Language is your only tool in an online environment. How others perceive you will be largely—as always—up to you. Once you’ve hit the send button, you can’t un-ring the bell.

- **Review** the Code of Academic Conduct: [http://sja.ucdavis.edu/cac.html](http://sja.ucdavis.edu/cac.html). We consider violation of the UC Davis Code of Academic Conduct as a sign of disrespect to the course instructors and your classmates. Out of fairness to all students, any violations (e.g., cheating, plagiarism) will be reported to Student Judicial Affairs.

**Synchronous activities: dialogue, discussions, presentations**

- **Log-in on time and do not disconnect before the online session ends.**
- **Be prepared:** do assigned readings prior to the online sessions and, when appropriate, be ready to discuss them.
- **Ask questions:** chances are that if you ask a question, many people will benefit from the ensuing answer, clarification, or discussion.

**Asynchronous activities: “office hours”, group and peer interactions**

- **Office hours:** during specific times each week, instructors will be available on piazza to answer questions. All posts will be available to all students. Piazza is the course communication tool.

- **Groups interactions:** Piazza can be a platform for your specific group to work on group-based activities

- **Peer learning:** we can all learn a lot from each other. Posting questions or thoughts are a stimulating, encouraging way to learn and to develop skills to express scientific reasoning.

**Email: (rarely used)**

- **Students should send email only in situations where the questions or concerns are of a private nature**

- **All other questions about content, assignments, or processes should be posted to the appropriate course discussion board so that all students have the benefit of the instructor’s answer**
**LMS Access**

This course will be delivered online through the UC Davis online LMS. To access this course, you will need access to the Internet and a supported Web browser (Internet Explorer, Firefox, Safari).

**Technical Assistance**

If you need technical assistance at any time during the course or to report a problem with the LMS please contact your campus IT department.

**Important Note:** This syllabus, along with course assignments and due dates, are subject to change. It is the student’s responsibility to check for corrections or updates to the syllabus. Any changes will be clearly noted in a course announcement through the LMS.
Part 2: Class Format/Schedule

This is a 100% online course. There are no face-to-face in-class meetings. There is one weekly 1-hour webinar. Please note that the midterm and final examination must be proctored according to UC Davis regulations; time and place will be announced. [http://catalog.ucdavis.edu/academicinfo/exams.html](http://catalog.ucdavis.edu/academicinfo/exams.html).

Each week will follow a similar structure. Week-specific learning resources will be uploaded at the beginning of a given week on the course LMS. Students will:

1. Read assigned reading materials, which may include book chapters from Pharmacology Principles and Practice (Hacker, Bachmann, Messer), published papers, and other relevant documents.
2. View videos and/or animations
3. Complete ungraded, self-assessment questions that allow students to gauge their understanding of the weekly assigned material.
4. Complete group or individual assignments. We will give specific assignment instructions and expectations, deadlines, and the estimated time needed for completion,
5. Complete a graded quiz at the end of the week on Course LMS.

The components of the course are:

1. Self-paced learning: students complete reading, library and assignments individually on their own time.
2. Online office hours: TAs and instructors will be available online during weekly, predetermined office hour times to provide assistance to students and answer any questions. Office hours will utilize the LSM chatroom function to provide all students with the content.
3. Asynchronous activities: Instructors and students will post questions on Piazza – students will be expected to comment, agree, or disagree, and provide constructive feedback. Some of these activities may be required for a given assignment.
4. Synchronous activities: We will use Adobe Connect for real-time conversation and debate during live online meetings. This form of discussion will be used to develop and foster ideas that students develop after completing their researched weekly assignments.

Online synchronous sessions are for:

1. Explaining and practicing difficult concepts
2. Expanding on the textbook to include newer and more advanced information
3. Getting an overview of major concepts, minor points, and how they fit together
4. Asking and answering questions
5. Guest speakers
6. Giving presentations and assessing quality of presentations
## Time commitment

<table>
<thead>
<tr>
<th>Course Activity</th>
<th>Time (contact hour)</th>
<th>Carnegie Rule (outside work)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viewing videos, reading required material (Web Virtual Lecture = WVL)</td>
<td>0.25 hour/week</td>
<td>0.75 hours/week</td>
<td>1 hour</td>
</tr>
<tr>
<td>Required online participation activities per week (asynchronous &amp; synchronous) (Web-based activity = WEB)</td>
<td>1.5 hours/week</td>
<td>3 hours/week</td>
<td>4.5 hours</td>
</tr>
<tr>
<td>Project (group-based) (Project = PRJ)</td>
<td>1.5 hours/week</td>
<td></td>
<td>1.5 hours</td>
</tr>
<tr>
<td>Recommended number of preparation and study time per week * (including study quiz) (Autotutorial = AUT)</td>
<td>2 hours/week</td>
<td></td>
<td>2 hours</td>
</tr>
</tbody>
</table>

**Total time per week**  
5.5 hours  
4 hours/week  
9 hours

(Also weekly 30 min quiz)

*Preparation and Study time includes some combination of: reading text, using paper or online study resources, creating and using flashcards, reviewing notes, attending supplemental instruction or academic coaching, and self-assessment of knowledge with an online study quiz.*
Part 3: Course Objectives and Learning Activities

Learning Objectives (LO)

By successfully completing this course, students will

1. develop effective self-directed learning skills
2. locate and properly use a variety of information resources, including pubmed, webofscience, google scholar
3. develop effective scientific reasoning and problem-solving skills
4. read and analyze pharmacology and toxicology publications at a level that demonstrates understanding of basic principles
5. become proficient in critical analysis of pharmacology and toxicology publications
6. demonstrate expertise in pharmacological and toxicological calculations; understand dose-response relationships
7. explain absorption, distribution, metabolism and excretion (ADME, kinetics) of drugs and toxicants and how the physiochemical properties of the drug/toxicant influence ADME
8. describe key targets/signal transduction pathways for drugs and toxicants
9. synthesize and summarize the design of pharmacological or toxicological studies
10. explain the cornerstones of drug development
11. explain the mechanisms of drug action for the treatment of diseases and disorders, such as: hypertension, Type II diabetes, anxiety, and chronic pain
12. describe some of the major pathways of drug dependency and addiction
13. synthesize and summarize thoughtful decisions about drug use and misuse in their personal lives
14. explain how drugs and toxicants affect public and environmental health

General Education Requirement

GE3 Oral Skills and Scientific Literacy Justification:
The students will do presentations during weekly discussions, within groups, presenting on behalf of their groups, for the end-of-quarter project, and during interactions in the weekly synchronous and asynchronous discussions. Students will individually present for 3-5 minutes at the beginning of class at least twice during the course to illustrate comprehension of material and develop presentation skills. The group and end-of-quarter projects will be formal online presentations. Each presentation will provide an understanding of the fundamental scientific concepts, scientific methods, and current research gaps.
Principles of Pharmacology and Toxicology

The presentations will provide a platform for students to translate complex scientific data and terminology in ways the target audience will understand. Students will learn how to deliver key scientific information based on what they know about the target audiences’ scientific knowledge, literacy, and interests. Students will develop communication strategies to communicate important messages related to public policy.

Detailed Schedule, Activities and Linked LOs

Developed each year and available on LMS prior to course beginning

Outline of weekly topics and activities:

<table>
<thead>
<tr>
<th>Week</th>
<th>Title</th>
<th>Leader</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intro to Pharm/Tox</td>
<td>BP</td>
<td>SDL, SQ, TQ, IA, WE</td>
</tr>
<tr>
<td>2</td>
<td>Pharm/Tox Calculations</td>
<td>BP</td>
<td>SDL, SQ, TQ, IA, WE</td>
</tr>
<tr>
<td>3</td>
<td>ADME Intro</td>
<td>BP</td>
<td>SDL, SQ, TQ, GA, WE</td>
</tr>
<tr>
<td>4</td>
<td>ADME + Physicochemical properties</td>
<td>BP</td>
<td>SDL, SQ, TQ, IA, WE</td>
</tr>
<tr>
<td>5</td>
<td>Midterm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Intro Key Targets/Pathways</td>
<td>TAs</td>
<td>SDL, SQ, TQ, GA, WE</td>
</tr>
<tr>
<td>7</td>
<td>Key Targets/Pathways</td>
<td>TAs</td>
<td>SDL, SQ, TQ, IA, WE</td>
</tr>
<tr>
<td>8</td>
<td>Case presentation</td>
<td>BP</td>
<td>SDL, SQ, TQ, IA, WE</td>
</tr>
<tr>
<td>9</td>
<td>Group Presentations</td>
<td>BP, TAs</td>
<td>GP, WE</td>
</tr>
<tr>
<td>10</td>
<td>Group Presentations</td>
<td>BP, TAs</td>
<td>GP, WE</td>
</tr>
<tr>
<td>11</td>
<td>Final</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations:

SDL = self-directed learning (includes videos and reading)
SQ = study quiz
TQ = timed, graded quiz
IA = individual assignment
GA = group assignment
PA = piazza activity
WE = webinar
GP = group project with presentation
Part 4: Grading Policy

Graded Course Activities [may change slightly]

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Number of Assessments</th>
<th>% of total grade</th>
<th>Total % of Grade per category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (practice quizzes; self-assessment)</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Quizzes (timed, mandatory quizzes within 24 hours of webinar completion)</td>
<td>7</td>
<td>2%</td>
<td>14%</td>
</tr>
<tr>
<td>Webinar attendance and participation</td>
<td>10</td>
<td>0.3%</td>
<td>3%</td>
</tr>
<tr>
<td>Assignments (includes participation in discussions; individual and group-based activities)</td>
<td>7</td>
<td>4%</td>
<td>28%</td>
</tr>
<tr>
<td>Midterm</td>
<td>1</td>
<td>15%</td>
<td>15%</td>
</tr>
<tr>
<td>Final exam</td>
<td>1</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Group Project</td>
<td>1</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

Assessment Details

1. Practice Quizzes: via the “quizzes” function of the LMS. Not graded. These quizzes are informal self-assessments to gauge your comprehension of course material. You can use them to practice the material prior to a formal assessment, e.g., self-tests.
2. Weekly timed, graded quizzes: taken online (LMS) within 24 hours of conclusion of the weekly webinar.
3. Assignments: Instructions provided via the LMS. Due before the weekly webinar. Individual and group-based assignments. All students in a group get the same grade.
4. Midterm: The midterm will be proctored following COCI policies for proctoring, and will cover all topics prior to the exam date.
5. Final Exam: The final exam is cumulative and will be proctored following COCI policies for proctoring.
6. End of Quarter Student Group Project: The Student Group Project is developed through the quarter as students engage in collaborative activities and assignments. Near the beginning of the course, each Student Group will choose a current and relevant question/topic in pharmacology and toxicology (from a list of provided options). In weeks 9 and 10 of the course each group will present their topics, findings and ideas; each group will present their findings in a format such as a power point, video, or other online media. All students in a given group will receive the same grade.
Late Work Policy

Be sure to pay close attention to deadlines—there will be no make up assignments or quizzes, or late work accepted without a serious and compelling reason and instructor approval.

Viewing Grades in LMS

Points you receive for graded activities will be posted to the LMS Grade Book. We will update the online grades each time a grading session has been completed—typically 3 to 5 days following the completion of an activity.

Letter Grade Assignment

Final grades assigned for this course will be based on the percentage of total points earned.

Your grade will be based on the following scale:

A  = 93 -100%  
A-  = 90 – 92%  
B+  = 87 – 89%  
B   = 83 - 86%  
B-  = 80 – 82%  
C+  = 77 - 79%  
C   = 73 – 76%  
C-  = 70 - 72%  
D+  = 67 - 69%  
D   = 63 – 66%  
D-  = 60 – 62%  
F   = Below 60
Part 5: Course Policies

Participation/Attendance

Webinar attendance and participation is mandatory. Students are expected to participate in all online activities that are part of any assignment.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the course so that we can help you find a solution.

Study Guides

Many students have come to expect study guides to help them prepare for exams. We do not create a list of what to study for you. Here is why not:

1. Learning how to organize, synthesize, and prioritize information is an important part of a college education, and preparation for a professional career.

2. Study guides are personal. Create your own or create a group study guide that provides you with the information you need.

3. This is course that incorporates student-initiated activities. Creating study guides is one of the activities that must be driven by the individual student.

4. Students in this class are expected to learn and be tested on all material presented in chapters, online, and in class.

Complete Assignments

All assignments for this course will be submitted electronically through LMS unless otherwise instructed. Assignments must be submitted by the given deadline or special permission must be requested from instructor before the due date. Late or missing discussion assignments may affect the student’s grade.
Inform Your Instructor of Any Accommodations Needed

If you have a documented disability and verification from the Student Disability Center (http://sdc.ucdavis.edu/) and wish to discuss academic accommodations, please contact your instructor as soon as possible. It is the student’s responsibility to provide documentation of disability to SDC and meet with a SDC counselor to request special accommodation before classes start.

Honor Code

Academic dishonesty will not be tolerated. As a student in this course (and at this university) you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and also integrity in your behavior in and out of the classroom. Make sure to review the Code of Conduct document: http://sja.ucdavis.edu/cac.html

Important Note: Any form of academic dishonesty, including cheating and plagiarism, may be reported to the office of student affairs.

Course policies are subject to change. It is the student’s responsibility to check LMS for corrections or updates to the syllabus. Every effort will be made to post any changes in LMS.