

Biology 3AA3 Fundamentals of Pharmacology

Course Outline Winter Term 2016

Lectures: 12:30-1:20 PM, Tues, Wed, Fri HSC 1A4

Tutorials:

Biology 3AA3 2016 Tutorials	
Days and Times	Room
T01 Tu 8:30AM-11:20AM	BSB 122
T02 We 8:30AM-11:20AM	BSB 122
T03 Mo 8:30AM-11:20AM	BSB 122
T04 Tu 8:30AM-11:20AM	BSB 238A
T05 Mo 8:30AM-11:20AM	BSB 238A
T06 Mo 2:30PM-5:20PM	BSB 238A

Instructor:

Dr. Joanna Wilson
Life Science Building; LSB528, x20075
Email: joanna.wilson@mcmaster.ca

Office Hours will be held on Tuesdays, 130-230 PM in LSB528

Instructional Assistant: Thelma Leech (leecht@mcmaster.ca)
LS 118, Ex. 24629

TAs: Contact information will be provided in tutorial

Lana Shaya
Shamaila Fraz
Adam Kuleza

Important Note: This course uses Avenue to Learn to post the course outline, lectures, tutorial assignments and other resources.

Course Description: This course examines the fundamentals of pharmacology as a science. Special topics will include the drug discovery/development process, environmental issues in human drugs, and the use of herbal medications as pharmaceutical products. The course will be organized in weekly lectures and tutorials.

Course Objectives

Students will learn the fundamentals of:

1. pharmacokinetics (drug absorption, distribution, metabolism, elimination),
2. pharmacodynamics (drug targets, drug receptor targets and second messengers, efficacy, potency, drug response relationships)
3. toxicology (adverse drug responses, therapeutic window)
4. drug development (drug discovery, pre-clinical studies, clinical studies, post-marketing surveillance)
5. environmental issues in human pharmaceuticals (human drugs in the environment, effects of human drugs on non-target species, antibiotic resistance)
6. herbal drugs (herbal medication, herb-drug interactions)
7. over the counter medication (safety margins for over the counter medications)

Students will be able to describe the major mechanisms that control pharmacokinetics and pharmacodynamics. Students will be expected to interpret pharmacological data and perform data analyses of pharmacological experiments. Students will be able to describe the drug discovery process and identify the major barriers to new drugs on the market. Students will read and interpret scientific publications in pharmacology.

Optional Textbook:

The optional textbook for this course is ***Pharmacology: Principles and Practice*** by Miles Hacker, Kenneth Bachmann and William Messer. This is available in the campus bookstore.

Students are welcome to use other textbooks to support their learning in the course. The McMaster University libraries (especially Health Sciences Library) has a number of good quality text books on pharmacology (e.g. Katzung, Kalant, Goodman and Gillman, Rang and Dale etc) that will support the learning in this course. However, many of these texts provide the material using an organ based system (e.g. drugs for cardio vasculature, drugs for renal function...) and the course is not taught by organ system. Students will need to use a variety of texts to support their learning in this course as not all topics are in every textbook.

Lectures:

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|--------|---|
| Week 1 | Jan 5, 6, 8 – Introduction, Pharmacokinetics 1, 2
No Tutorial This Week |
| Week 2 | Jan 12, 13, 15 - Pharmacokinetics 3, 4, 5
Tutorial 1: Routes of drug administration (Assignment) |
| Week 3 | Jan 19, 20, 22 – Pharmacokinetics 6, 7, 8
Tutorial 2: Drug interactions (Paper and discussion, Quiz)
Huang, S.M., and L.J. Lesko. "Drug-Drug, Drug-Dietary Supplement, and Drug-Citrus Fruit and Other Food Interactions: What Have We Learned?" <i>The Journal of Clinical Pharmacology</i> 2004; 44: 559-569. |
| Week 4 | Jan 26, 27, 29 – Pharmacodynamics 1, 2, 3
Tutorial 3: Drug absorption, pKa and pH (Assignment) |

- Week 5 Feb 2 – Pharmacodynamics 4
Feb 3 – MID TERM TEST 1 (Pharmacokinetics, 15% of grade)
Feb 5 – Pharmacodynamics 5
Tutorial 4: Cytochrome P450 mediated drug metabolism (Assignment)
BRING COMPUTERS OR TABLET TO TUTORIAL FOR ONLINE RESEARCH
- Week 6 Feb 9, 10, 12 – Pharmacodynamics 6, Toxicology 1, 2
Tutorial 5: Dose response curves: efficacy, potency (Assignment).
BRING SEMI LOG GRAPH PAPER TO TUTORIAL
- Week 7 Feb 15-19 Reading week
- Week 8 Feb 23, 24, 26 – Toxicology 3, Drug Development 1, 2
Tutorial 6: Agonists and antagonists (Assignment)
BRING SEMI LOG GRAPH PAPER TO TUTORIAL;
Assign presentations, group contracts
- Week 9 March 1 – Drug Development 3
March 2 - Drug Development 4 (Guest Lecture on Rationale Drug Design, Sara da Silva)
March 4 - MID TERM TEST 2 (Pharmacodynamics, Toxicology, 15% of grade)
Tutorial 7: Therapeutic index, drug safety (Assignment); Presentation tips
- Week 10 March 8, 9, 11 – Pharmaceuticals in the Environment 1, 2, 3
Tutorial 8: Drug shortages and recalls (Paper and discussion, Quiz);
Annotated bibliographies
Ventola, C. Lee. "The Drug Shortage Crisis in the United States" *P&T* 2011; 36: 740-757.
- Week 11 March 15, 16 - Herbal Medication, Over the counter medications
Tutorial 9: Drugs in the environment (Paper and discussion, Quiz)
Kidd, K.A. et al. "Collapse of a Fish Population after Exposure to a Synthetic Estrogen." *PNAS* 2007; 104: 8897- 8901.

Group Presentations: Start in Week 11 Lecture slots

March 18- Atropine

March 22, 23 – Carbamazepine, Halothane

March 25 – NO CLASSES

March 29, 30, April 1 – Losartan, Lovenox, Metronidazole

April 5, 6, 8 – Oxycodone, Rifampicin, Venlafaxine

Group Presentations: 15% (12% presentation, 3% annotated bibliography)

To be completed in groups of 2-3 students. There will be 3 presentations per class and one drug per day.

Students will provide a presentation in class on the pharmacokinetics, pharmacodynamics OR toxicology of a drug. Presentations will be no more than 12 minutes long, with 3 minutes for

class discussion and questions. Students will prepare a powerpoint file to support their presentation. Students will upload the powerpoint presentation to Avenue to Learn the Friday before their presentation so that the presentations can be easily uploaded at the beginning of class.

Students will form groups within their tutorial section. Students will select a drug and topic (pharmacokinetics, pharmacodynamics, toxicology) from a list provided during week 8 tutorials.

Students will hand in an annotated bibliography on the day of their presentation that documents their sources and what they used these sources for.

Students will be given a group grade on the presentation and annotated bibliography. Students will complete a Group Partner Evaluation Form and marks may be adjusted based on these evaluation forms and TA discretion, for individual group members, if the group work is not shared by all group members. Group member contracts are provided for those groups who wish to use them. At minimum, groups need to specify tasks assigned to each group member and document this distribution to their TA.

In-class discussion is a vital portion of these presentations. Student participation will be noted ***and students may receive up to a 5% bonus to their presentation grade for participation in the discussion.*** Participation will be graded by the TAs, based on both the quantity and quality of the questions and discussion.

The content of the group presentations may be tested on the final exam. Students are expected to attend the lecture slots where students are presenting their research.

Tutorials: Start on Week 2, 20% of grade

Students are expected to attend every tutorial and be prepared to complete the tutorial assignments. Tutorials are a combination of review sessions and tutorials and students should expect to complete some work (quiz, discussion, assignment) in each tutorial. Students are expected to complete the tutorial work independently, these are not shared assignments. The content is directly tied to what is discussed in class. Tutorial sheets are made available on Avenue to Learn for students to print off and bring to tutorial session. Semi-log graph paper is also available for some tutorials. Please bring materials to class. You are welcome to bring a calculator with you.

Tutorial Formats:

Format 1 – in class exercise. Students will complete exercise in class and hand in to TA for marking before they leave tutorial. Assignments completed in pencil will not be re-graded; only those completed in pen may be re-graded.

Format 2 – in class discussion. Students will be expected to read the paper prior to coming to class (paper is identified on the tutorial sheet). Students will answer a short quiz on the paper at the beginning of the class and then have a discussion of the paper. Students will be expected to participate and marked by the TA on their participation in these discussions. TAs will ask students to come prepared to lead a discussion during the term.

There are nine tutorial exercises. After that, students will use the tutorial sessions to plan their group presentation and meet with their TAs to discuss their progress.

Exam:

A final exam will be scheduled by the registrar at the end of term. It will be worth 35% of the final grade. The final exam will be cumulative and include the content of the group presentations. McMaster approved calculators may be brought into the exam.

Course Grading

Midterms: 2 @ 15% each:	30%
Exam:	35%
Group Presentation:	15%
Tutorial Assignments:	20%

Avenue To Learn

In this course we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

As a student enrolled in this course you have been granted permission to access an online learning management system, Avenue to Learn. Avenue to Learn course pages are considered an extension of the classroom and usage is provided as a privilege subject to the same code of conduct expected in a lecture hall (see relevant section of the student code of conduct below). This privilege allows participation in course discussion forums and access to supplementary course materials. Please be advised that all areas of Avenue to Learn, including discussion forums, are owned and operated by McMaster University. Any content or communications deemed inappropriate by the course instructor (or designated individual) may be removed at his/her discretion. Per the University Technology Services Code of Conduct, all members of the McMaster community are obligated to use computing resources in ways that are responsible, ethical and professional.

Avenue to Learn Terms of Use are available at <http://avenue.mcmaster.ca>.

Student Code of Conduct - Appendix D

Major Offences include, but are not limited to:

- (h) Engaging in disruptive behaviour. Disruptive behaviour is behaviour in class or out of class which involves substantial disorder and/or disrupts the operation of the University
- (j) Engaging in verbal or non-verbal behaviour or communication toward an individual or group which is considered to be intimidating, harassing and/or discriminatory

Missed Work:

All missed work due to illness or personal circumstance must have appropriate documentation. Students may use a single MSAF form per term for this course to explain missed work. If you are absent from the university for a minor medical reason, lasting fewer than **3 days**, you may

report your absence, once per term, without documentation, using the McMaster Student Absence Form (MSAF). Absences for a longer duration or for other reasons must be reported to the Associate Dean of Science Office, with documentation, and relief from term work may not necessarily be granted. When using the MSAF, report your absence to leecht@mcmaster.ca. You must then contact the Mrs. Leech immediately (normally within 2 working days) by email at leecht@mcmaster.ca to learn what relief may be granted for the work you have missed, and relevant details such as revised deadlines, or time and location of a make-up exam.

Please note that the MSAF may not be used for term work worth 25% or more, for absences more than 3 days nor can it be used for the final examination. Any additional missed work must have appropriate documentation submitted to the Faculty/Program office. It is your responsibility to document missed work and a grade of zero will be assigned in absence of this documentation. Grades for missed midterms will be added to the final exam.

Students who miss tutorial sessions will be provided with a chance to make up the work. A MSAF does NOT exempt students from completing the course tutorial requirements. Assignments may be handed in in the subsequent tutorial to your TA. Those that miss class discussions must submit a brief paper based on the reading for that week to be marked (no more than 2 pages summarizing the hypothesis tested (if there was one), methods/experimental design, results and major findings/implications of the research). Brief papers will be handed in to your TA at the next tutorial for marking.

Academic Integrity

You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behavior can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Academic Accommodation of Students with Disabilities

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be

arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities.

At certain points in the course it may make good sense to modify elements of the course schedule outlined above. The instructor and university reserve the right to modify elements of the course and will notify students accordingly (in class and post any changes to the course website). The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.