

PHAR 6732: Medicinal Chemistry and Pharmacology of Cardiovascular Agents

Course Syllabus Fall 2019
2.3 Credits



This course adheres to the items listed in the College of Pharmacy Central Syllabus:

https://docs.google.com/a/umn.edu/document/d/1artQ5e1rbzxe8IEtWo7BE8k8snZAEgMMz_QcW8yJ-II/edit?pli=1

Course Web Site: <http://CANVAS.umn.edu>

Term: Fall PD2

Meeting Times & Locations

Day	Time	Duluth Room	Twin Cities Room	Dates
Tuesday	9:05-11:00	Lib 410	WDH 7-135	August 27 – October 1
Thursday	10:10-12:05	Lib 410	WDH 7-135	August 29– October 3
Monday	8:00-9:55	LSci 165	Moos 1-451	October 7 –December 9
Thursday	8:00-9:55	LSci 165	Moos 1-451	October 10 – December 13

PLEASE NOTE THAT FIRST DAY OF CLASS IS MONDAY AUGUST 26th at 8:00 AM location TC 1-451 : DU – LifSci 165

Help, Duluth: 218-726-8847 itsshelp@d.umn.edu

Technology Help, Twin Cities: 612-301-4357 help@umn.edu

Course Instructional Team

All faculty have an open door policy for students to meet and discuss the course material. Students should feel free to drop by or call their offices any time, or contact the faculty member to schedule an appointment.

Name	Office Location	Phone	Email
Venkatram Mereddy, PhD (Course Director: Duluth)	Chemistry 136	218-726-6766	vmereddy@d.umn.edu
L'Aurelle Johnson, PhD (Course Director: Twin Cities)	WDH 7-115C	612-624-5430	joh02745@umn.edu
Rory Rimmel, PhD	WDH 8-170	612-624-0472	remme001@umn.edu
Ling Li, PhD	MTRF 4-208	612-626-2359	lil@umn.edu
Anne Schullo-Feulner, PharmD	WDH 7-103	612-626-4858	amsf@umn.edu
Scott Chapman, PharmD	WDH 7-115E	612-624-7143	chapm004@umn.edu
Beshay Zordoky, PhD	WDH 3-120	612-625-6499	zordo001@umn.edu

Teaching Assistants: See course CANVAS site for roster and contact information

Overview of the course

Course content

Medicinal Chemistry and Pharmacology of Cardiovascular Agents builds upon the foundational concepts learned in Phar 6722: Principles of Medicinal Chemistry and Phar 6726: Principles of Pharmacology, and applies them to drug classes primarily used for the treatment of cardiovascular diseases. The content of this course is presented in two units: (1) Antihypertensive agents and (2) Agents for other cardiovascular diseases.

This course fully integrates medicinal chemistry and pharmacology, and aligns strategically with similar concurrent content in Phar 6734: Cellular Metabolism and Nutrition and Phar 6736: Cardiovascular Pharmacotherapy. The overall objective of this course is to provide a solid scientific foundation that will facilitate understanding of the clinical pharmacotherapy of these agents.

Course Description

Medicinal Chemistry and Pharmacology of Cardiovascular Agents is an integrated course taught in Pharmacology and medicinal chemistry for each topic will be presented separately in class, however, content will be integrated on exams. The primary method of instruction is lecture-based with the use of video podcast and/or literature or textbook readings as support for class notes and discussions. Basic comprehension of the material is reinforced by an in-class, low-level, low-stakes quizzes at the discretion of the instructor. Review sessions will be a blend of active learning-based discussion designed to build upon lecture material and foster higher-level content integration. A total of 3 non-cumulative exams will be given during the semester.

Prerequisites

Phar 6722: Principles of Medicinal Chemistry and Phar 6726: Principles of Pharmacology

Course Materials

Required:

- Handouts and lecture slides, available through the course [CANVAS site](#)
- eReserve packet of readings
- eTextbook: Foye's Principles of Medicinal Chemistry, 7th Edition, T. L. Lemke and D. A. Williams, Eds., 2013
- eTextbook: Rang and Dale's Pharmacology, 7th Edition, Rang et al., 2012
- eTextbook: Goodman & Gilman's The Pharmacological Basis of Therapeutics, 12th Edition, Brunton et al., 2011

Recommended/Optional:

- Basic and Clinical Pharmacology, 12th Edition, Katzung et al., 2012
- Pharmacology, 4th Edition, Brenner and Stevens, 2012

We expect students to actively take notes during class. The course handouts are a framework for the classes, and are not meant to be a complete, authoritative text. For a discussion about course handouts, note taking, and active learning, see: Brazeau, G. A. Handouts in the Classroom: Is Note Taking a Lost Skill? *Am. J. Pharm. Ed.* **2006**, *70*, Article 38.

Class sessions will be recorded and made available to students for download or streaming by the College of Pharmacy.

Computer/Technology Requirements

The University of Minnesota computer requirements are listed here:

- CANVAS: This course will use CANVAS to distribute resources and host course activities (quizzes, resources). See CANVAS setup requirements at <http://www1.umn.edu/CANVAS/start/technical.html>.
- E-Textbooks: Some textbooks will be provided as E-Texts. You will access these through the course CANVAS site.
- E-Mail: Course instructors will communicate through email about course administrative issues. We suggest that you check your U of M email daily.
- Clickers: You will need your Turning Point Response Card keypads ("clickers") to participate in lectures and some quizzes.
- Internet-enabled device capable of accessing CANVAS (computer, tablet, etc.)

Course Goals and Learning Objectives

Course goals and objectives are based on ACPE Accreditation standards and the expertise of our faculty body, who have identified specific learning Domains and Scientific Objectives, which are available by clicking the links below:

Domains: https://docs.google.com/a/d.umn.edu/document/d/1n1lqsiUBzlr_ZCzXJ5UW7N6FrsgdskgYfzn6K98kkPU/edit

Scientific Foundations: <https://docs.google.com/a/d.umn.edu/document/d/1Zyf4QpHakxB1yubUImbOAL-18uNqzeifurx3tv1F38I/edit>

Course goal 1

Recognize molecular and cellular processes that underlie the pharmacological mechanisms of action for endogenous mediators and cardiovascular-renal drugs, and relate this information to how these drugs are used in the treatment of cardiovascular diseases.

Objective 1: Identify endogenous signaling molecules that modulate cardiac, renal, vascular, clotting, and atherogenic functions, and recognize and describe how biological processes that alter the impact of these mediators represent potential drug targets.

Objective 2: Identify agents that act as diuretics, vasodilators, hypolipidemics, antiplatelet and anticoagulant agents, antiarrhythmics, and cardiotonics.

Objective 3: For each of the drug classes listed above (objective 1.2), analyze and describe the: (a) Mechanisms of action of prototype drugs in the class, (b) ADME properties of the drug, (c) Effects resulting from drugs, including therapeutic, adverse, and off-target effects, and (d) Effects and uses of drugs that can be affected by coadministration with other drugs.

Course goal 2

Describe the relationship between chemical structure and biological activity for cardiovascular drugs.

Objective 1: Identify pharmacophores and structure-activity relationships in relation to drug-target interactions.

Objective 2: Explain how physico-chemical properties of drugs affect their ADME properties and therapeutic uses.

Objective 3: Describe chemical pathways of drug metabolism, and how these are affected by genetic polymorphisms and co-administration of other drugs.

Objective 4: Apply the above objectives to the process of making drug therapy decisions.

Course goal 3

Foster development of critical thinking, analytical skills, and the ability to work with a team to enable the analysis and utilization of medicinal chemistry and pharmacology in a clinical context.

Objective 1: Practice written and oral presentation skills to develop effective communication skills with patients and other health professionals.

Objective 2: Solve clinical questions and problems using critical thinking skills and pharmacology and medicinal chemistry knowledge.

Assessments and Grading

Course Score: Details about the structure and format of all graded assessments are described below. The course score will be determined by applying the following percentage (weight) to each assessed activity:

Exam 1	150 pts (15%)
Exam 2	250 pts (25%)
Cumulative Exam 3	300 pts (30%)
2 quizzes	100 pts total (10%) 50 pts each quiz
3 problem sets	150 pts total (15%) 50 pts each
1 Student Group Activity	50 pts total (5%)
Total	1000 pts (100%)

A letter grade will assigned using the course score according to the following grading scale:

Grade	A	A-	B+	B	B-	C+	C	C-	D	F
%	100-93	92- 90	89-87	86-83	82-80	79-77	76-73	72-70	69-60	59-0

Course total grade percentages will be rounded prior to final grade submission. (E.g. if you have a 92.5%, this will round up to a 93%, thereby changing the letter grade from a A- to an A.

Online Canvas Quizzes:

Two online quizzes will be given via Canvas. Each online quiz will assess material covered from the class periods indicated next to the Canvas Quiz as designated in the course schedule. The number of questions and time allotted to complete the Canvas Quiz will also be noted next to each of the Canvas Quiz. The length of the quiz (number of questions AND time allotted to complete the exam) will be based on the number of lecture hours covered. There will be no more than 10 questions for each quiz with a total time limit to complete the quiz not to exceed 20 mins*(accommodations will be recognized based on DRC accommodation letters). You will be able to take the quiz anytime within that 24 hour period; however, once the online quiz is opened you will have the indicated allotted time to complete it. The standard make-up policy will apply to all quizzes. Although the online quizzes are open-resource, they are not group projects. Thorough study of the material for each online Canvas Quiz is strongly encouraged as it will prepare you for the closed resource unit exam and the comprehensive final exam. Each student is expected to take the online quiz independently and submit their own work. Each student is responsible for ensuring that they are appropriately logged into the course website when taking assigned exams. The Canvas quizzes worth 10% of the total course grade (see assessment point value breakdown for each online Moodle Exam for more details).

Exams: Exams are, incremental high-stakes assessments that require the application of course content to new problems or situations, and questions will be multiple choice and/or short answer. All exams should be completed in black or blue ink, and no materials are allowed to be used during exams. Post-exam review will occur ~2 weeks after the exam date. During the in class post-exam review students will have the opportunity to review exams and submit regrade requests via a google form. Within the form you must indicate the question of concern and the regrade rationale. Students may not keep exam materials outside of the post-exam review period.

Technical Support for Online quiz:

If you require assistance please take the following steps: Step 1 : Visit the technical support website <http://umn.edu/canvas> to troubleshoot your problem through self-help pages. Step 2: If your problem cannot be solved with self-help, call the One Help desk at 218-726-8847 in Duluth or 612-301-4357 in TC. Following these steps will ensure that you get the assistance that you need in a timely manner. Please do not hesitate to contact Tech Support. They are there to help! If you have technical difficulties during an online quiz, or if you are uncertain about your quiz was submitted properly, email the course director immediately, including your chosen answers for the quiz questions.

MAKE-UP POLICY FOR EXAMINATIONS QUIZZES, etc.:

Please note MAKE-UP EXAMINATIONS/QUIZZES WILL NOT BE OFFERED EXCEPT UNDER THE FOLLOWING CIRCUMSTANCES: illness, verified by a licensed professional; a family emergency, verified by the professional in attendance; or a University-sponsored event, verified by the sponsoring organization. Additional circumstances will be considered at the discretion of the instructor, but are not likely to be granted. If a student is unable to attend the scheduled exam, the relevant instructor must be notified (by email AND phone) at least 24 hours in advance of the exam time (where possible) . If you do not receive a reply to your request prior to the exam time, please do NOT assume that your request has been granted; contact us again to confirm that your request was received and processed. If an acceptable circumstance or adequate documentation is not provided, a grade of zero on the exam will be assigned. Unless there are extenuating circumstances, students must contact the relevant instructor within 24 hours of the missed exam in order to be considered for a make-up. Depending on the circumstances, the make-up exam date will not be more than one week after the original exam date and will if possible occur before the original exam date.

Problem sets: During each unit there will be a series of complex integrated questions posted on the CANVAS site. Student must answer these questions prior to the review session. These problem sets will be worth 15% of total grade. There will be a in class pre-exam review that will focus on application of concepts, and build upon the current didactic knowledge and reinforce mastery of course content. In addition to covering the material on the problem sets. A key to the problem set will be provided once problem set submission has closed.

University and College of Pharmacy Policies

For information about College-wide policies, see:

[University of Minnesota and College of Pharmacy Policy Reference \(Centralized Syllabus\)](#)

[includes all required UMN and CoP policies, e.g., Attendance; Academic Freedom; Copyright; Course Evaluations; Disability Accommodations; FERPA, etc.]

Week-by-week schedule

Date	Topic/In-Class Activities Assessed activities are in bold .	Assignments Generally, these are to be completed before class	Instructor
August 26 (M)	Course Introduction	Problem set 1 (Due September 12 on CANVAS site)11:59PM	Johnson L/Mereddy
August 26 (M)	Med Chem and Autonomic Pharmacology Review		Rommel /Zordoky
August 29(Th)	Anti-hypertensive Agents (2 Hrs)		Rommel
September 3 (T)	Pharmacology Diuretics	Class will start 10:10 to 11am	Zordoky
September 5 (Th)	Pharmacology Diuretics (1 Hrs)		Zordoky
	Med Chem Diuretics (1Hrs)		Rommel
September 10 (T)	Pharm Renin-Angiotensin- (2Hrs) Aldosterone System I /II	Quiz 1 (August 27-September 10) online 24hrs	Zordoky
September 12 (Th)	Med Chem Renin-Angiotensin -Aldosterone System (1Hrs)		Rommel
	In class pre-exam review		Zordoky and Rommel
September 17 (T)	Exam 1 (August 27-September 12) (1hr)		Johnson/Mereddy
Date	Topic/In-Class Activities Assessed activities are in bold .	Assignments Generally, these are to be completed before class	Instructor
September 19 (Th)	Pharmacology and Med Chem Phosphodiesterase Inhibitors (Hr)	Problem set 2 (Due Oct 20 CANVAS site) 11:59PM	Rommel
	Med Chem Vasodilators (1Hr)		Rommel
September 24 (T)	Pharm Vasodilators (2 Hrs)		Rommel
September 26 (Th)	In class post-exam review (1hr)	CLASS STARTS AT 11	Johnson/Mereddy

October 1 (T)	Pharm and Med Chem of Calcium Channel Blockers (2Hrs)	Quiz 2 (September 19-October 1) online 24hr (opens at 3pm)	Rommel
October 3 (Th)	Pharm Hypolipidemics (2Hrs)		Li
October 7 (M)	Med Chem Hypolipidemics (2Hrs)	<i>CLASS TIME AND SCHEDULE CHANGE!!!!</i>	Rommel
October 10 (Th)	Pharm Anticoagulants/Anti-Platelets I	Pharm Purine Receptors (30mins) Video Please review prior to class	Schullo-Feulner/ L. Johnson
October 14 (M)	Med Chem Anticoagulants/Anti-Platelets I (1.5Hrs)		Rommel
October 17 (Th)	NO CLASS	FALL BREAK	
October 21 (M)	NO CLASS	NO CLASS	
October 24 (Th)	Pre-Exam Review	CLASS STARTS AT 9AM	Li/Johnson/Rommel/ Schullo Feulner
October 28 (M)	Exam 2 (September 19-October 14) (90mins)		Li/Johnson/Rommel/ Schullo Feulner
October 31 (Th)	Pharm Antiarrhythmics (Heart Physiology) Pharm Antiarrhythmic	Problem set 3 (Due November 17 Canvas Site) 11:59PM	Chapman Johnson
November 4 (M)	Med Chem Antiarrhythmic (1-2hrs)		Mereddy
November 7 (Th)	In class post exam 2 review (1hr)	CLASS STARTS AT 9:00AM	
November 11 (M)	Pharmacology of Agents Used for Heart Failure (2 Hrs)		Zordoky
November 14 (Th)	Med Chem Cardiac Glycosides (1hr) Study Group Activity - "Heart Failure" (1hr)		Mereddy Zordoky
November 18 (M)	Pre-Exam Review	CLASS STARTS AT 9:00AM	Rommel/Zordoky, Johnson, Chapman, Schullo- Feulner/Mereddy
November 21 (Th)	Exam 3 (August 26-November 11) 2 Hours		
November 25 (M)	NO CLASS		
November 28 (Th)	NO CLASS	University Holiday- NO CLASS	

December 2 (M)	NO CLASS		
December 5 (Th)	In class Exam 3 post exam review	CLASS STARTS AT 9:00AM	
December 9 (M)	NO CLASS		

Dates to Remember	
Quiz 1	September 10, 2019
Problem Set 1	September 12, 2019
Exam 1	September 17, 2019
Quiz 2	October 1, 2019
Problem Set 2	October 20, 2019
Exam 2	October 28, 2019
Problem Set 3	November 17, 2019
Exam 3	November 21, 2019