



## PH784. CIRCULATORY PHARMACOLOGY

**Course Description:** This course involves a study of normal circulatory mechanisms and functions and how various drugs and toxic substances modify them.

**Credit Hours:** 2 semester hours

**Course Prerequisites:** It is expected that students in the pharmacology program will have already completed basic courses in biochemistry, physiology and pharmacology. Students in other programs should have background in one of these disciplines. Prior approval by either the Graduate Director of the program in which the student is enrolled or the student's faculty advisor is required, as is the approval of the director of this course.

**Course Dates:** Fall Semester

**Course Times:** Specific class times will be arranged

**Course Location:** G301 (unless otherwise arranged)

**Course Director:**

Rob Rockhold, Ph.D.  
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Professor of Pharmacology & Toxicology  
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**Required Text and Other Learning Resources:**

Drugs for the Heart, 6th Edition - *Text with Online Updates*. By Lionel H. Opie, MD, DPhil, DSc, FRCP and Bernard J. Gersh, MB, ChB, DPhil, FACC

<http://www.actionbioscience.org/education/herreid.html> - *The Use of Interrupted Case Method: A cooperative learning strategy that works.*

<http://www.ucsf.edu/career/pff.teachresou.shtml>

<http://cte.udel.edu/TAbook/lecture.html>

[http://cte.umdnj.edu/traditional\\_teaching/traditional\\_lecture.cfm](http://cte.umdnj.edu/traditional_teaching/traditional_lecture.cfm)

<http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/teachtip.htm>

<http://www.reproline.jhu.edu/english/6read/6training/lecture/sp605web.pdf>

### Course Overview:

The course, Cardiovascular Pharmacology, will be presented in a combined lecture and directed reading format. Thirty-eight hours of didactic content from faculty are provided, eight hours are devoted to student presentation, peer-teaching and feedback, and two hours of formal examination total to give 48 total contact hours to the course.

The content will focus on providing a multidisciplinary background in structural features (circulatory histology and gross anatomy), features of neural regulatory influences, and major endocrine systems affecting circulatory performance. Emphasis will be placed on recently introduced and emerging therapeutic agents affecting humoral regulatory systems, including the renin-angiotensin-aldosterone axis. The basis for and action of drugs upon systems regulating vascular flow homeostasis, including endothelin systems, nitric oxide synthases, antithrombotic agents, potassium channel activators will be explored. It is intended to enhance performance in relevant areas of Medical Pharmacology (PH622/722) by deepening student comprehension of systems underlying the function and modifying the action of agents affecting the heart and vasculature.

### Course Objectives:

Upon completion of this doctoral-level course in cardiovascular pharmacology, students can be expected to:

- demonstrate, by performance in the concurrent Medical Pharmacology class (PH622/722), a strong working knowledge of the major classes of drug agents used in contemporary antihypertensive and cardioprotective cardiovascular medicine. Antiarrhythmic and positive inotropic agents will NOT be covered in these presentations.
- recognize emerging trends in development of new cardiovascular therapeutic entities,
- identify, comprehend and succinctly summarize in a written format contemporary primary literature citations in the relevant areas of cardiovascular pharmacology, and
- demonstrate the ability to effectively relay such information to others in a standard lecture format.

These objectives can be mapped to Department of Pharmacology & Toxicology Ph.D. program objectives dealing with preparing graduates:

- to serve as effective teachers of pharmacology (prepared as future faculty),
- with fundamental knowledge of cardiovascular pharmacology,
- to exhibit life-long learning capabilities with respect to the scientific literature, and
- to demonstrate effective oral and written communication skills.

### Grading

The grading in this course will be based on two major elements: The first criterion will be a series of four assignments. Four "student presentation" sessions are identified in the course schedule. For each session, the student is expected to have identified a recent citation (in the 2006-2007 literature) concerning an aspect of cardiovascular pharmacology, and to present a written summary of the major finding(s) of that work and the impact on the field that results from the finding. Proposed citations will be submitted to the course director for approval no later than one week (seven days) prior to each session. Unless a compelling reason is identified otherwise, citations should be drawn from high-impact journals dealing with cardiovascular science. Each written summary should encompass roughly two to five single-spaced pages using standard fonts, font sizes and margins. Inclusion of figures or photos is acceptable, but should not replace a minimum of roughly two pages of printed text. Additional clarification of these criteria will be communicated during class sessions. During

each "student presentation" session, each student will deliver a short (15 minutes duration is the nominal expectation) lecture based on the chosen citation and which effectively relates the background to and summarizes the major contribution(s) to the field from the work in that citation. Students may choose to utilize visual (Powerpoint) presentations and/or another visual medium (white/chalk board, overhead, etc.). Each presentation should:

- Present measurable learning objectives for the "teaching session",
- Deliver a clear, succinct summary of findings,
- Present a single multiple choice style examination question based on the material, with
  - written documentation for correct and incorrect responses to the question, and
  - directly linked to a measurable learning objective.

The purpose for this method of assignment is to provide guidance to students in development of enduring learning skills, to illustrate and nurture effective teaching skills, and to foster familiarity with the pharmacological literature. Feedback will be provided using standard rubrics developed for departmental use.

The performance criteria upon which grading of the student presentations will be based are:

- Clear, concise, compelling writing [20% of final presentation grade].
- Ability to summarize critical data in effective didactic format [20%].
- Ability to integrate structural/functional concepts to actions of drug agents [25%].
- Ability to recover relevant information on CV drugs from primary literature [25%].
- Delivery of effective oral presentation [10%].

Each presentation will be worth 22.5% of the final course grade [total = 90% of final course grade].

The second criterion will be demonstration of recall of discrete knowledge of new/emerging CV drugs on a final multiple choice format examination, which will count for 10% of the final course grade. Each participating faculty member will submit 3 multiple choice examination questions for each hour of lecture contact. A total of 100 questions will be chosen from those submitted for the final examination.

### **Participating Faculty:**

Robin W. Rockhold, Ph.D. Professor, Department of Pharmacology & Toxicology,  
Director

John Naftel, Ph.D., Professor, Department of Anatomy

Jerry Farley, Ph.D., Professor and Interim Chair, Department of Pharmacology & Toxicology

Norman Moore, Ph.D., Professor, Department of Anatomy

Robert Kramer, Ph.D., Professor, Department of Pharmacology & Toxicology

David Dzielak, Ph.D., Associate Vice Chancellor for Strategic Initiatives, Professor of Physiology & Biophysics

Joey Granger, Ph.D., Dean, School of Graduate Studies in the Health Sciences,  
Professor of Physiology & Biophysics

**Course Policies:**

**Attendance:** Attendance at scheduled classes, active participation in discussion, and timely completion of assignments are required.

**Communication:** The primary medium for communication among students, faculty and staff will be via UMMC-supported e-mail. The minimum expectation is that students will check for e-mail notifications prior to scheduled classes. Schedule changes, alterations in assignments and general notices of concern to students will be posted by e-mail.

**University Policies:**

Students with disabilities (ADA) statement Refer to UMC policy

Academic honesty statement Refer to UMC policy

**Course Schedule:**

<b>Session</b>	<b>Session Title</b>	<b>Faculty</b>
Session 1	Circulatory histology	Naftel
Session 2	Smooth muscle contraction	Farley
Session 3	Gross anatomy of the heart	Moore
Session 4	Antihypertensive Drug Overview	Rockhold
<b>Session 5</b>	<b>Student presentations – Structural/Functional Basis for Drug Action</b>	
Session 6	Reflex and central regulation	Rockhold
Session 7	Endocrine regulatory influences	Kramer
Session 8	Angiotensin-1 converting enzyme inhibitors	Kramer
Session 9	Renin inhibitors	Rockhold
<b>Session 10</b>	<b>Student presentations – Reflex/Endocrine Basis for Drug Action</b>	
Session 11	Endothelin receptor antagonists	Rockhold
Session 12	Angiotensin receptor antagonists	Dzielak
Session 13	Vasopeptidase inhibitors	Rockhold
Session 14	Antianginal Drug Overview	Rockhold
Session 15	<b>Student presentations – Renin/Angiotensin Axis Active Agents</b>	
Session 16	Nitric oxide synthases	Granger
Session 17	Maintenance of vascular homeostasis	Kermode
Session 18	Arachidonic acid products	Kermode
Session 19	Anti-thrombotics	Kermode
Session 20	<b>Student presentations – Modification of Vascular Homeostasis</b>	
Session 21	Potassium channel activators	Farley
Session 22	Lipid metabolism and atherosclerosis	Kramer
Session 23	Lipid-lowering agents	Kramer
Session 24	<b>Final Multiple Choice Examination</b>	