

Fundamentals of Pharmacology, PHPY N5021

Fall 2024 Syllabus and Lecture Schedule

Mondays 6PM-9PM

COURSE DESCRIPTION:

This course provides information on the principles of pharmacology using scientific and evidenced-based approaches. The fundamental concepts of dose-response relationships, pharmacokinetic models, drug-receptor interaction, absorption, distribution, biotransformation and elimination are covered and will provide the students with the necessary background for understanding how drugs affect living tissues. In addition, the course covers four classes of drugs: drugs acting on G-protein coupled receptors, drugs acting on ion channels, and biologic drugs. Moreover, drug design, discovery and approval processes will be discussed. The course will enable students to critically evaluate new developments in the field and understand the variability of drug responses seen in individuals. The course focuses upon the principles of pharmacology and not on specific pharmacotherapeutics, although several drugs are used to illustrate general principles. The structure of the course is lecture-based.

COURSE OBJECTIVES:

The overall goal of the course is to understand the basic principles of pharmacokinetics and pharmacodynamics and to apply these principles to understanding pharmacological activity and dosing in normal individuals and in special populations. With an appreciation of these principals, students will be able to understand and resolve controversies in drug development and therapeutics.

1. Apply knowledge of human physiology, biochemistry and anatomy to explain dose-response relationships and the time course of drug concentrations.
2. Explain the mechanism of action, adverse drug reactions, and organ effects of some major drug categories used to treat illnesses within the framework of the principles presented in the course.
3. Apply the principles of pharmacokinetics and pharmacodynamics to dosing issues.
4. Identify the basic principles behind rational drug design and the process by which drugs are approved for clinical use.
5. Explain the concept of risk versus benefit in pharmacotherapeutics and how this influences drug prescription and drug development.
6. Identify perspectives on the pharmacotherapeutic effects on health risks related to age, gender, culture, and lifestyle.

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COURSE FORMAT:

Lectures will be pre-recorded and available through the Canvas course website and the NJMS Education Portal. Students are expected to review the pre-recorded lectures and lecture slides prior to the live session on Mondays.

Mondays 6:00-8:00 PM Live session with the module lecturer. Students can attend these sessions in-person (MSB Room B552) or remotely via Zoom. The module lecturer will address students' questions, provide clarifications on the lecture material, and/or give problem-solving exercises during the session. These sessions will be recorded and posted to the Canvas course website.

Recitation session. (TBD) A Teaching Assistant will hold a weekly recitation session to answer questions about the lecture material. Recitation sessions will be held via Zoom at a time and date to be determined. Recitation sessions will be recorded and posted to the Canvas course website.

FACULTY AND STAFF:

FACULTY	DEPARTMENT	OFFICE	EXTENSION	E-MAIL ADDRESS
Dr. Joshua R. Berlin	Pharmacology, Physiology & Neuroscience	MSB, I621	2-1618	josh.berlin@rutgers.edu
Dr. Eldo Kuzhikandathil	Pharmacology, Physiology & Neuroscience	SPH Bldg., Room 161	2-1157	kuzhikey@ca.rutgers.edu
Dr. Larry Gaspers	Pharmacology, Physiology & Neuroscience	MSB, H651	2-5379	larry.gaspers@rutgers.edu
Angela Custodio	Teaching Assistant (TA)	N/A	N/A	ac1456@gsbs.rutgers.edu
Gunjan Patel	Teaching Assistant (TA)	N/A	N/A	gp560@gsbs.rutgers.edu

COURSE TEXTBOOKS:

Texts are 'recommended' only.

Reading assignments are supplemental and help clarify points made in the lecture. Electronic copies of the textbooks can be accessed through the Canvas course website via the "Reading list" tab or through the Rutgers library (<https://www.libraries.rutgers.edu/health-sciences>). Physical copies of the textbooks are also on reserve in the Smith library.

1. Brenners' Pharmacology.

Brenner, G.M. and Stevens, G.W. (2022) *Brenner and Stevens' Pharmacology*. (6th ed.) Philadelphia, PA: Elsevier, Inc.

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2. "Levine's" Pharmacology.

Walsh, C.T and Schwartz-Bloom, R.D. (2005) *Levine's Pharmacology Drug Actions and Reactions*. (7th ed) Boca Raton, FL: Taylor & Francis.

3. "Pandit"

Pandit, N.K. and Soltis, R. (2012) *Introduction to the pharmaceutical sciences: an integrated approach*. (2nd ed.) Philadelphia : Wolters Kluwer Health/Lippincott Williams & Wilkins.

EVALUATION METHODS & COURSE GRADING

Assessment/Evaluation:

Quizzes: At the discretion of the module lecturer, there may be a 5-minute open book/ open note quiz on the prior weeks' lecture material. A review the quiz answers will be held after the assessment is completed.

Quizzes will be based on the material covered in the lectures. The final quiz grade will be the average of your top three quiz scores. There will be six quizzes given during the course. Your lowest 3 quiz scores will not count, so if you miss 1 or 2 quizzes there is no penalty. However, if you only take 2 (or 1 or 0) quizzes, the missed quiz(zes) will be counted as zero towards your average.

Mid-term and Final Exams These are multiple-choice examinations based on the material presented in the lectures and textbook readings. **Note:** the final exam is not cumulative and only covers materials presented in the second half of the course.

Examinations and Quizzes will be administrated through Examssoft/Examplify software. Students have the option to take their examinations on campus (MSB room: B552) or remotely.

Estimation of Weighted Course Average

Please provide the weighted breakdown for the course

Exam/Quizzes	Weight (%)
Quizzes	10
Mid-term	45
Final	45
Total	100%

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Course Grading:

Final grades are assigned based on the student's course average where:

A grade of **A** will be assigned for a course average > 90%.

A grade of **B+** will be assigned for a course average > 80%.

A grade of **B** will be assigned for a course average >70%.

A grade of **C+** will be assigned for a course average > 65%.

A grade of **C** will be assigned for a course average > 60%.

Any student, whose course average falls below the C grade level, will receive a grade of F in the course.

EDUCATION PORTAL AND CANVAS COURSE ACCESS:

The CANVAS course website is an essential part of the Fundamentals of Pharmacology Course. CANVAS can be accessed using the Educational Portal website at <https://ep.njms.rutgers.edu> . The Education Portal provides single sign-on and "one stop shopping" site for various academic systems such as CANVAS, Education Management System, Digital Media Portal, Virtual Microscopy, SOCRATES, etc.

If the Education Portal is unavailable, direct links for CANVAS, NJMS Video, Virtual Microscopy etc., are provided below:

CANVAS: To access all course information log onto CANVAS at: <https://canvas.rutgers.edu/>

WIRELESS ACCESS FOR ELECTRONIC EXAMS (ON CAMPUS EXAMS)

RU Health Sciences is the primary wireless network for SGS however you can use either RU Health Sciences or RU Wireless Secure for electronic exams. Please make sure you can connect to both prior to an exam. See <https://ruwireless.rutgers.edu/ruwireless-secure> for more information. **DO NOT USE RU Wireless.**

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EXAMSOFT SYSTEM REQUIREMENTS:

Note: These requirements will be updated by the SGS Office of Student Affairs and Admissions. The requirements below are from the 2019-2020 Academic year:

EXAMSOFT SYSTEM REQUIREMENTS:

The following laptop requirements are necessary for the School of Graduate Studies

REQUIREMENTS	
Windows	Mac OS
<ul style="list-style-type: none"> English 64-bit OS versions of Windows 10 (20H2, 21H1, 21H2) and 11 (21H2) Windows RT, Windows 10 and 11S, are NOT supported at this time. 1GHz Intel (non-ARM) processors or higher RAM: 4 GB or higher HD (needs at least 1 GB of free space) 13" screen or larger (Laptops) Minimum screen resolution of 1280x768 Virtual machines & applications are not allowed Surface Pro is allowed (running W10 or W11 * NOT in S mode * and non-pro Surface devices are not allowed) Tablets are not allowed; nor Chromebooks, netbooks, etc. For on-site support, a working USB port is required (newer devices may require an adaptor) 	<ul style="list-style-type: none"> v10.15 (Catalina), v11 (Big Sur), v12 (Monterey), v13 (Ventura) Any server version of Mac OS is NOT supported CPU: Intel or M1 processor. RAM: 4 GB or higher HD (needs at least 1 GB of free space) 13" screen or larger (Laptops) Minimum screen resolution of 1280x768 Virtual machines & applications are not allowed For on-site support, a working USB port is required (newer devices may require an adaptor)
<ul style="list-style-type: none"> Microsoft Edge Chrome Firefox Do not use beta versions. Other browsers are not supported. 	<ul style="list-style-type: none"> Safari Chrome Firefox Do not use beta versions. Other browsers are not supported.
Browser Settings <ul style="list-style-type: none"> - JavaScript Enabled - Cookies Enabled - CSS Enabled - Disable pop-up blockers 	Browser Settings <ul style="list-style-type: none"> - JavaScript Enabled - Cookies Enabled - CSS Enabled - Disable pop-up blockers
Must have Administrator level account permissions.	

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Disable Toolbars, Adware or Spyware programs. They may adversely affect the computer's performance and cause delays in loading testing questions.

If you are using McAfee, you need to turn off Real-Time Scanning.

Turn off Windows updates or virus scanner updates to avoid interruptions during testing.

*****The following requirements apply for exams with ExamID or ExamMonitor enabled**

- Exemplify version 3.4 or greater
- Hard Drive: 2GB or higher available space
- RAM: 8GB or higher recommended; 4GB required
- Webcam
- Microphone (no headphones!)
- Internet: 2Mbps upload speed

EXAMSOFT EXAMPLIFY LINKS:

Follow the link below for the current Minimum System Requirements.

<https://examsoft.com/resources/exemplify-minimum-system-requirements/>

Follow the link below for the current PC or Mac installers.

<https://support.examsoft.com/hc/en-us/articles/11146797283469-Exemplify-Download-the-Installers-for-Windows-Mac>

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ABSENCE FROM COURSE QUIZZES AND EXAMS:

SGS has issued a **MISSED EXAM POLICY** for students enrolled in their programs. Below are the valid excuses for missing a quiz or exam in this course (verbatim from the SGS Exam Policy):

- 1) Significant illness, with official note by doctor, which must include a valid reason for missing the exam. The doctor's note cannot result from a remote (online) diagnosis.
NOTE: Illness prior to the exam ("didn't have time to study") does not constitute a valid excuse, although exceptions can be given by the SGS Associate Dean of Student Affairs if the prior illness has been severe or lengthy.
- 2) Death in the immediate family (parents, siblings, children, grandparents, aunts/uncles, niece or nephew, sister-in-law or brother-in-law, parents-in-law, first-cousins).
Verification, with dates, is required, but this can be a newspaper announcement, event (e.g. wake) announcement, etc.
- 3) Medical/dental school interview, in which the interview or unavoidable travel overlaps with the exam. Copy of the invitation letter.
- 4) Presentation at a meeting. Proof of attendance required.
- 5) More than two final exams on the same day. (NOTE: An exam should not be rescheduled for an individual with two exams on the same day). If a student has more than two exams on the same day, they will need to contact the SGS Associate Dean of Student Affairs, who will contact the course directors about allowing the student to take one of the exams on a different day. The vast majority of schools across the country, including Rutgers New Brunswick, allow up to two final exam in the same day.
- 6) Permission of SGS Associate Dean of Students Affairs, with consultation of course-director. This will be rare, but is meant to account for valid, but unforeseen circumstances.

Each of these reasons will require some form of documentation to be submitted to verify the absence. For the full policy, please follow this link:

http://njms.rutgers.edu/sgs/current_students/docs/new/ExamPolicy.pdf

CODE OF PROFESSIONAL CONDUCT (COURSE EXAMINATIONS):

All students have a fundamental responsibility for maintaining academic integrity and intellectual honesty in their academic and professional endeavors. They are expected to observe generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, to acknowledge the published work of others in an appropriate manner, and to refrain from receiving or giving aid during examinations or other work requiring independent effort. When submitting written material, students take full

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responsibility for the originality of all work not otherwise identified by appropriate acknowledgments and imply that both the ideas and words used are their own. All students are expected to respect the property of faculty and other students, and not use research equipment or laboratory supplies of others without permission.

Specific examples of appropriate behavior in examinations exams are given below:

Examinations: The purpose of an examination is to assess a student's knowledge of a topic defined within a course or courses. **Unless given explicit written instructions to the contrary, a student must work without assistance on an examination.**

- **Classroom examination:** Each student will provide answers to questions as directed. Unless otherwise stated, no material (books, calculators, computers, communication devices) of any kind can be used during an examination.
- **Take-home examination:** Each student will provide answers as directed. Unless otherwise stated, research and writing must be done individually without assistance or exchange of information with others. The ability to use source material in the research of answers will be defined for each examination. But, unless stated otherwise, all source material should be cited appropriately as outlined below.

NOTE: THESE POLICIES ALSO HOLD TRUE FOR ALL EXAMS ADMINISTERED REMOTELY.

To view the full policy for the Code of Professional Conduct in the School of Graduate studies regarding examinations, research and oral presentations follow this link:

http://njms.rutgers.edu/sgs/current_students/ac_integ.php

ACADEMIC WARNING POLICY:

http://njms.rutgers.edu/sgs/documents/policys/SGS_Academic_Warning_Policy.pdf

Each program shall clearly inform students of the criteria for satisfactory academic performance. Academic standing will be reviewed each semester by the Program's Academic Standing Committee. Students who receive less than an average grade of "B" in the designated Core course(s) or have a GPA less than 3.0 will receive an academic warning notice. Students performing below satisfactory levels of proficiency as outlined by the program may also receive a written warning notice. The written warning states the problem(s), outlines those measures needed for improvement and sets a deadline for compliance. Letters informing students of an academic warning will be sent within 30 calendar days of the end of the semester. A request will be made to students receiving academic warning letters to meet with the Program Director and/or the Academic Standing Committee.

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COURSE ADD/DROP POLICY:

Policy for the Addition of a Course:

Students may add courses with the approval of the instructor (when required) and the program director. A student wishing to add a course after the general registration period has closed, must complete the "Add/Drop/Withdraw" form and have appropriate approval of the course instructor (when required) and program director prior to the start of the course. Registration will not be permitted beyond the first week of a course. Credit will not be given for courses in which the student was not registered.

Add Course Form Link:

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=96fcae95-bc67-45fb-8da3-11300ded2e99>

Policy for Dropping a Course:

Students may drop courses with approval of the instructor (when required) and the program director. Students submitting a completed "Add/Drop/withdraw" form to the SGS Registrar's office within 10 academic days of the start of the course will receive a full tuition refund and the course will not appear on their official transcript. The drop period of 1-10 *academic days, is distinguishable from the withdrawal period in that the drop period is without penalty. A completed and approved Add/Drop/Withdraw" form(s) must be received by the Registrar's office within the time periods set forth above in order for a course(s) to be "dropped".

Drop Course Form Link:

<https://na2.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c45635ca-6a1e-4936-b436-337b211b8433>

***An academic day is defined as a day that the SGS campus at which the student is enrolled is open for business.**

REASONABLE ACCOMMODATIONS AT RUTGERS SCHOOL OF GRADUATE STUDIES:

Rutgers School of Graduate Studies is committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). To ensure access to this please contact Student Affairs, to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom setting. Students are encouraged to register with the Office

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of Student Affairs as soon as they begin their program. Accommodations are not provided retroactively. Rutgers School of Graduate Studies encourages students to access all resources available through the School for consistent support and access to their program.

More information can be found online at

http://njms.rutgers.edu/education/student_affairs/student_support/disability_services.cfm.

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must complete the ODS registration form: <https://webapps.rutgers.edu/student-ods/forms/registration> and contact the RBHS Office of Disability Services at 973-972-5396 or cindy.poorepariseau@rutgers.edu to make an appointment for an intake interview. You will also be asked to provide documentation of your disability:

<https://ods.rutgers.edu/students/documentation-guidelines>.

If the documentation supports your request for reasonable accommodations, the Office of Disability Services will provide you with a Letter of Accommodations. This Letter will be used to notify appropriate school personnel about the accommodations you are qualified to receive. To begin this process, please complete the Registration form on the ODS web site at:

<https://webapps.rutgers.edu/student-ods/forms/registration>.

TEACHER-LEARNER POLICY RUTGERS SCHOOL OF GRADUATE STUDIES:

The Rutgers SGS Newark Health Science Campus strongly believes that teaching and learning should take place in a climate of mutual respect where students and faculty are equally responsible for maintaining a professional and collegial environment. An environment where students are evaluated based upon accomplishment, professionalism and academic performance. We are committed to maintaining a positive learning environment and the highest standards of behavior in the teacher-student relationship.

To view the full Teacher-Learner policy for the School of Graduate studies, please follow this link: https://njms.rutgers.edu/sgs/current_students/docs/Teacher%20Learner%20Policy.pdf

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Date and Location	Topic	Lecturer
2Sept2024	No Class	Labor Day Holiday
Lecture 1: 9Sept2024	Course Introduction (Dr. Gaspers) Introduction: Basic Concepts in Pharmacology	Dr. Josh Berlin (In-person and remote)
Lecture 2: 16Sept2024	Drug-Receptor Interactions	Dr. Eldo Kuzhikandathil (In-person and remote)
Lecture 3: 23Sept2024	Pharmacodynamics	Dr. Josh Berlin (In-person and remote)
Lecture 4: 30Sept2024	Pharmacokinetics - I. Absorption and Distribution	Dr. Josh Berlin (In-person and remote)
Lecture 5: 7Oct2024	Pharmacokinetics - II. Biotransformation and Termination	Dr. Josh Berlin (In-person and remote)
Lecture 6: 14Oct2024	Pharmacokinetics - III. Clinical Pharmacokinetics	Dr. Josh Berlin (In-person and remote)
21Oct2024	Midterm Examination	(In-person and remote)

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Date and Location	Topic	Lecturer
Lecture 7: 28Oct2024	G-Protein Coupled Receptors	Dr. Eldo Kuzhikandathil (In-person and remote)
Lecture 8: 4Nov2024	Ion Channels	Dr. Larry Gaspers (In-person and remote)
Lecture 9: 11Nov2024	Biologics	Dr. Eldo Kuzhikandathil (In-person and remote)
Lecture 10: 18Nov2024	Drug Design	Dr. Eldo Kuzhikandathil (In-person and remote)
Lecture 11: 25Nov2024	Drug Toxicity	Dr. Eldo Kuzhikandathil (In-person and remote)
Lecture 12: 2Dec2024	Variability in drug response	Dr. Larry Gaspers (In-person and remote)
9Dec2024	Final Exam	(In-person and remote)