

**Course:     Fundamentals of Pharmacology, PHPY N5021**

***July 11, 2019***

**Department:** Department of Pharmacology, Physiology, and Neuroscience

**Description:** This course provides information on the principles of pharmacology using a scientific and evidenced-based approach. 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. Drug design and the drug discovery and approval process will be discussed. In addition, the course covers three classes of drugs: drugs acting on G-protein coupled receptors, drugs acting on ion channels, and drugs of abuse. The course will enable students to critically evaluate new developments in the field and understand the variability of responses seen in individuals. The course focuses upon the principles of pharmacology and not on specific pharmacotherapeutics, although a number of drugs are used to illustrate general principles. The structure of the course is lecture-based. Suggested readings listed under *Assignment* in the schedule are recommended to further enhance student comprehension of the material.

**Course Schedule:** Mondays 6-9 PM, Room MSB B-552.

**Instructor:   Martha C. Nowycky, Ph.D**

<b>Date/Instructor</b>	<b>Content Module</b>	<b>Assignment</b>
Week 1 9/9 Martha C Nowycky, Ph.D.	Introduction: Basic Concepts in Pharmacology	<b>Read:</b> Levine Ch. 2-3, & Ch 4-pgs 61-69 <b>Pandit:</b> Ch 1; Ch 3 <b>Review:</b> Handout for Week 1
Week 2 9/16 Eldo Kuzhikandathil, Ph.D.	Drug-Receptor Interactions	<b>Read:</b> Levine, Ch 9 <b>Pandit:</b> Ch 2, Ch 13, Ch 14 <b>Review:</b> Handouts for Week 2
Week 3 9/23 Joshua Berlin, Ph.D.	Pharmacodynamics	<b>Read:</b> Levine, Ch 3, Ch 9 <b>Pandit:</b> Ch 1, Ch 2 <b>Review:</b> Handouts for Week 3
Week 4 9/30	NO CLASS	NO CLASS
Week 5 10/7 Joshua Berlin, Ph.D..	Pharmacokinetics I. Absorption and Distribution	<b>Read:</b> Levine, Ch 4-6 <b>Pandit:</b> Ch 5, Ch 6, Ch 7, Ch 8 <b>Review:</b> Handouts for Week 4
Week 6 10/14 Joshua Berlin, Ph.D..	Pharmacokinetics II. Biotransformation and Termination	<b>Read:</b> Levine, Ch 7, Ch 8 <b>Pandit:</b> Ch 9, Ch 10, Ch 11 <b>Review:</b> Handouts for Week 5
Week 7 10/21 Joshua Berlin, Ph.D.	Pharmacokinetics III. Clinical Pharmacokinetics	<b>Read:</b> Levine, Ch 10 <b>Review:</b> Handouts for Week 6
Week 8 10/28	<b>IN-CLASS MIDTERM</b>	
Week 9 11/4 Eldo Kuzhikandathil, Ph.D	G-Protein Coupled Receptors	<b>Read:</b> Pandit: Ch 12 <b>Review:</b> Handout for Week 8
Week 10 11/11 Martha C. Nowycky, Ph.D.	Ligand-Gated Ion Channels	<b>Read:</b> Pandit: Ch 13 <b>Review:</b> Handouts for Week 9

Week 11 11/18 Eldo Kuzhikandathil, Ph.D.	Drug Design	<b>Read:</b> Pandit: Ch 3, Ch 4; Ch 5, Ch 7 <b>Review:</b> Handouts for Week 10
Week 12 11/25 Eldo Kuzhikandathil, Ph.D.	Drug Toxicity	<b>Read:</b> Levine, Ch 13 Pandit: Ch 16 <b>Review:</b> Handouts for Week 11
Week 13 12/2 Martha C. Nowycky, Ph.D	Drugs of Abuse	<b>Read:</b> Levine, Ch 15 <b>Review:</b> Handouts for Week 12
Week 14 12/9 Martha C. Nowycky, Ph.D.	Variability of Drug Response	<b>Read:</b> Levine, Ch 11, Ch 12 Pandit: Ch 15, Ch 16 <b>Review:</b> Handouts for Week 13
Week 15 12/16	<b>IN-CLASS FINAL</b>	

## **Course Goal**

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. Students will also try to resolve controversies in drug treatment by the application of these principles.

## **Objectives:**

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.

## **Method of Instruction**

This course consists of lectures, readings, links to informational sites on the internet and lecture handouts. Lecture handouts are available from the Moodle homepage and will assist the student in extracting the most pertinent information from the lectures and readings.

## **Attendance**

Students are expected to attend every class. Although attendance is not taken, we will give surprise quizzes (see Evaluation).

## **Evaluation**

The mid-term and final exams will each contribute 45% to the final grade. The final exam is not cumulative and will cover material in Weeks 9-14. The remaining 10% of the final grade will come from surprise quizzes. The quiz grade is the average of your top 3 quiz scores. There will be at least 5 quizzes. Your lowest 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 the average.

## **Professional Behavior**

All students are expected to observe and support high standards of honesty, integrity and professional conduct in all aspects of education and research. Professional behaviors include arriving on-time for class, respecting the opinions of classmates and professors, appropriately referencing work produced by another person, following through on commitments and using

positive verbal and non-verbal communication. While it is occasionally appropriate to challenge a grade assignment, students are expected to conduct themselves in a reasonable manner and recognize that the professor has the authority to lower a grade as well as to raise a grade following further evaluation. Please refer to the GSBS student handbook on academic integrity.

### **Recommended Textbooks:**

**Texts are ‘recommended’ only: no text is required.**

Reading assignments are supplemental and help clarify points made in the lecture. Both texts are on reserve in the library.

#### 1. “Levine’s” Pharmacology.

Walsh CT, Schwartz-Bloom RD. Levine’s Pharmacology Drug Actions and Reactions. 7<sup>th</sup> edition. Boca Raton, FL: Taylor & Francis; 2005.

This text is very comprehensive. The book is available both in printed format as well as in several e-book formats. The printed format is expensive and prices vary wildly even from one seller like Amazon. However, rentals are available or you may want to get a used copy. The 5<sup>th</sup> and 6<sup>th</sup> Editions are very similar to Edition 7 and a reasonable choice. E-books are often (although not always) cheaper. Be sure you are getting a version that is compatible with your reading device as ebooks are generally device-specific.

#### 2. “Pandit”

Pandit, NK and Soltis, R. Introduction to the Pharmaceutical Sciences. Lippincott, Williams & Wilkins. Second Edition, 2011.

This book is written at a more introductory level. It does not cover all topics. However, you may find it helpful if you are having trouble with basic principles such as acid-base balance or dose-response curves. It’s cheaper than Levine’s text and also has very helpful study questions. The syllabus refers to the Second edition. If you buy Pandit, be sure to get the Second ed. The Second addition is very different from the first: it has *fewer* chapters than the First edition and the book is completely reorganized so chapter numbers do not apply to the First edition.

**CONTACT INFORMATION****Course Instructor****Martha Nowycky, Ph.D**

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Payal Shah

**How to contact the course staff:**

You may contact us by the course e-mail or voice mail. Messages will be returned as promptly as possible. If a problem develops and a student wishes to speak to an instructor directly, an office or a phone visit can be arranged.