

PHARMACOLOGY & THERAPEUTICS COURSE INTRODUCTION

I. PHARMACOLOGY & THERAPEUTICS: COURSE GOALS AND OBJECTIVES

Course Goals:

The central goals of the Pharmacology and Therapeutics course are:

1. To provide students with a solid grounding in the basic concepts and scientific underpinnings of the pharmacological sciences
2. To provide students with a comprehensive introduction to the fundamental Pharmacology and uses of the major classes of clinically important drugs currently used in medical practice.

Specific key concepts and learning objectives will be provided for each individual lecture topic. However, the general course goals are as follows:

Course Learning Objectives:

At the end of the course students will be able to:

MEDICAL KNOWLEDGE

1. Explain how the fundamental pharmacological properties of pharmacokinetics and pharmacodynamics influence routes of administration; drug distribution and drug levels in the body; drug efficacy and potency; potential for drug-drug interactions; drug toxicity; and the appropriate choice of drug for pharmacotherapy in a given patient.
2. Explain how to use drug-specific and patient-specific pharmacokinetic parameters to calculate the physiochemical properties that influence rates of drug disposition and clearance in the body, and how these parameters can be used to monitor, design and modify appropriate dosing regimens of drugs in specific patient populations.
3. Describe the process by which new drugs are discovered, developed, tested and finally approved by the Federal Drug Administration for use in the clinic.
4. Discuss the fundamental principles of pharmacogenomics including how specific patient genotypes can influence the pharmacokinetic and pharmacodynamics properties of a drug, thereby affecting the clinical response to particular classes of medications.

5. Describe how pharmacogenomics approaches can be used to influence the drug discovery process and the choice of drugs in the treatment of specific diseases.
6. List the major drugs and drug classes currently used in medical practice and describe their pharmacology including their indications, contraindications, clinical use, mechanisms of action, physiological effects, pharmacokinetic properties, major adverse effects and clinically significant drug interactions.
7. Apply knowledge of the pharmacology of the major drugs and drug classes currently used in medical practice, together with both disease-specific and patient-specific factors to select the most appropriate medication(s) for the effective pharmacotherapy of a given disease or condition in a specific patient.
8. Demonstrate an understanding of the molecular, cellular and physiological mechanisms underlying the pathophysiological changes that occur in the etiology of the most common disease states and describe how targeting these mechanisms with the appropriate choice of drug(s) can act to effectively treat, cure, or mitigate the underlying disease causes and/or symptoms.
9. Discuss the theoretical considerations and principles that underlie the successful pharmacotherapy of the major diseases and conditions.
10. Recognize and explain the rationales behind the use of widely used, national organization-approved treatment algorithms for the management and treatment of common diseases and conditions, including identifying the currently accepted diagnostic criteria required to initiate drug therapy and the anticipated therapeutic goals likely to be achieved by therapeutic intervention.
11. Identify any clinical testing requirements for monitoring the effectiveness and potential toxicity of specific drugs used in the treatment of common diseases and conditions.
12. Explain the physiological, pharmacological, and psychological effects of acute and chronic exposure of individuals to drugs with abuse potential, and the consequences of sudden withdrawal of such a drug from a drug-dependent individual.
13. Describe the effective use of non-pharmacological therapeutic interventions in the treatment of specific diseases, conditions and symptoms.
14. Discuss the basic principles of toxicology; the mechanisms by which excess exposure to certain drugs, toxins, chemicals, heavy metals and poisons can lead to adverse toxicological effects; and the basic principles of clinically managing the poisoned patient.

15. Evaluate the relative advantages and disadvantages in the use of dietary supplements and herbal medications in the treatment of certain specific conditions or diseases, including their efficacy, potential for causing adverse effects and drug interactions.
16. Compare and contrast the major differences in the laws and regulations governing the approval, safety, efficacy and marketing of dietary supplements and herbal medications compared to conventional FDA-approved drugs.
17. Demonstrate an understanding of the design and conduct of basic scientific and clinical research and explain how these findings can be applied to both develop new therapeutic modalities and influence patient care.

INTERPERSONAL AND COMMUNICATION SKILLS

18. Demonstrate the ability to effectively communicate and work collaboratively together with peers in the small group setting to successfully address problems of pharmacological significance.
19. Contribute to the education of peers by actively engaging in small group sessions and other required group work within the course.

PRACTICE-BASED LEARNING AND IMPROVEMENT

20. Critically evaluate one's performance in the course to identify strengths and personal limitations in either pharmacological knowledge or study methods; develop learning goals to address any deficiencies and actively seek out assistance from appropriate sources to successfully remediate these deficiencies.
21. Demonstrate an ability to use online resources to objectively identify and evaluate the primary basic scientific and clinical literature relevant to pre-clinical drug discovery and drug development.

PROFESSIONALISM

22. Demonstrate professional behavior by completing all course requirements, including course evaluations, in a timely manner
23. Demonstrate professionalism by behaving in a professional, courteous and respectful manner when engaged in course activities or interacting with course faculty and staff.

24. Demonstrate responsibility and accountability by attending and being punctual at all required course activities such as small groups, team-based learning exercises and exams.
25. Demonstrate professional behavior by requesting any excused absence from required course activities well ahead of the scheduled date.
26. Demonstrate professional behavior by responding to direct communication from the Course Director in a timely fashion, particularly in circumstances when a face-to face meeting is requested to discuss issues related to academic performance
27. Demonstrate professional and ethical behavior by honestly completing course examinations without attempting to seek an advantage by unfair means; and by reporting any unethical behavior of peers to the course administration.

II. ORGANIZATION OF THE COURSE.

A. Syllabus

The Pharmacology & Therapeutics course is year-long and is divided into two semesters.

Semester III (PharmI); August 3rd, 2020 – December 14th, 2020
Semester IV (PharmII); January 12th – April 26th, 2021

You will receive an **individual** grade for **each** semester.

Semester III:

There are five major areas of emphasis in Semester III:

(i) Basic Principles –in this series of lectures you will be introduced to the fundamental concepts of Pharmacology including pharmacokinetics, pharmacodynamics, pharmacogenomics, drug metabolism, drug interactions, drug transporters and drug discovery

(ii) Autonomic Pharmacology/ NSAID medications- this section of the course will introduce you to the pharmacology of the autonomic nervous system and the NSAID class of drugs.

(iii) Antimicrobial agents –this section of the semester will provide an introduction to the pharmacology and clinical use of antibiotic drugs used in the treatment of infectious diseases.

(iv) Cardiovascular Pharmacology – in this series of lectures you will be introduced to the major drug classes that are used to treat diseases of the cardiovascular system. These drug classes include those involved in the regulation of blood coagulation, as well as drugs used to control hyperlipidemia, hypertension, angina, cardiac arrhythmias and congestive heart failure.

(v) Miscellaneous Pharmacology Topics- this final section will deal with a number of topics including, pharmacotherapy of anemia, immunomodulation therapy, treatment of allergies and pharmacotherapy of mycobacterial and fungal infections

There will be a total of **SIX** exams in Semester III on the following dates:

August 17th; August 28th; September 19th; October 2nd; October 30th; December 14th.

Semester IV

There are four major areas of emphasis in Semester IV:

(i) Neuropharmacology – this series of lectures this semester will provide an introduction to the pharmacology and clinical use of the analgesics ; the anesthetics, antiepileptics and drugs used to treat neurodegenerative diseases

(ii) Psychopharmacology – this series of lectures will provide an introduction to the pharmacology of drugs used in the treatment of common psychiatric illnesses, including the antidepressants, mood stabilizers, anxiolytics, and anti-psychotics. There will also be lectures on sedative hypnotic drugs and drugs used to treat drug abuse.

(iii) The endocrine system – this section of the course will discuss the pharmacology of drugs used to treat disorders of the endocrine system. Topics included are hypothalamic and pituitary hormones ; estrogens, progesterones and androgens ; Adrenocorticosteroids ; drugs used to treat thyroid disorders ; drugs to treat osteoporosis, and drugs to treat diabetes.

(iv) Chemotherapy – the final section of the semester will focus on the pharmacology of drugs used in chemotherapy and the treatment of cancer. Other topics will include drugs to treat HIV and other viral infections, and the pharmacology of common botanical medications and alternative medicine supplements.

(iv) Other topics- Other lecture topics that will be introduced throughout the semester include drugs to treat drugs to treat Rheumatoid Arthritis ;

drugs used in the management of GI disorders ; and Herbal Medications and Drug Supplements.

There will be **FIVE** exams in Semester IV on the following dates:

January 22nd; February 15th; March 5th; April 5th; April 26th.

B. Integration with other courses

The Pharmacology and Therapeutics course will run concurrently with Mechanisms of Human Disease. You will find that the lecture topics in these have been integrated so that related topics are coordinated and will be taught in a contemporaneous fashion. This will ensure that you will first hear about the underlying scientific basis of a disease process, its associated pathologies, and symptoms, prior to being introduced to the Pharmacology of the drugs used to treat that specific disease process. The topic areas are further integrated in small group sessions within both the Mechanisms and Pharmacology courses that aim to dovetail knowledge gained from both courses into addressing specific clinical scenarios. It is hoped that by integrating the course material in this way, it will aid the overall educational experience and will greatly facilitate the learning process.

C. Lectures

All Pharmacology lectures during the COVID-19 affected portion of the course will be pre-recorded using the Panopto software platform and delivered asynchronously. When circumstances allow a return to face-to-face teaching, lecture will be presented in SSOM Rm. 390. However, it is possible that due to public health guidelines, attendance at live lectures may be restricted to a limited number of participants for safety reasons. In this case, pre-recorded lectures will also be made available. Irrespective of the mode of delivery, a PDF printout and PPS file of the powerpoint presentation of each lecture will be made available prior to each lecture.

D. Learning objectives and Handouts

A handout that can be used as a study guide for each lecture topic will accompany each lecture and will be posted on the web, where it can be accessed through the calendar for each specific date.

These will include:

- a) A list of suggested reading assignments.
- b) A list of key concepts and learning objectives for each lecture topic.
- c) A list of the important drugs that will be covered during the lecture.

- d) A detailed overview of the material that will be covered in the lecture.
- e) Charts illustrating key Pharmacological features of each drug covered in the lecture, and/or a brief review of key points made in the lecture.

E. Small Group Case Studies

In addition to lectures the course also includes a variety of small group case studies. These small group case analyses will typically last 90 min and will take virtually using the Zoom platform. They will use various clinical case vignettes to illustrate important pharmacological concepts and will attempt to facilitate learning of critical pharmacological information covered in the related lectures. In the first semester the small group cases will be focused on basic pharmacological concepts such as pharmacokinetics, pharmacodynamics drug dosing, drug metabolism, and drug interactions. The case vignettes and associated study questions will be made available online. Individual small group assignments, room numbers, and the names of the group facilitators will be posted, both on the course web page and on Lumen. Note that in many cases, Pharmacological topics and the use of drugs in the treatment of specific diseases will be discussed in small group cases delivered within the Mechanisms of Human Disease course.

In addition to the small group cases there will also be a pharmacology demonstration that will use clinical simulators and standardized patients to illustrate important aspects in the use of autonomic drugs. This demonstration will take virtually using the Zoom platform. You will be expected to have reviewed the cases prior to the class and to come to these sessions ready to fully participate in the discussions.

In line with current school policy attendance at Small Groups is Mandatory- you will be expected to sign into each small group using the SSO feature in zoom. Failure to attend and participate in small groups will result in an evaluation of NOT MEETING EXPECTATIONS in your Professional competency component of the course. If, for whatever reason you find that you have a legitimate reason for being unable to attend a particular small group session you should seek advance permission from the Office of Student Affairs.

Please note that small group discussions WILL NOT be recorded. In order to facilitate discussion and encourage engagement, it is expected that during the virtual small group discussion utilizing the zoom platform, you will keep your video link on and display your full name (no nicknames please). Failure to comply with this etiquette will result in a professionalism

report being submitted to the Academic Review and Intervention Committee (ARIC).

III. BENCH-TO-BEDSIDE PROJECT

Bench-to-Bedside: The Bench-to-Bedside project is a small group exercise in which you and your group will engage with the primary biomedical literature in order to both develop important lifelong learning skills and gain an understanding of the ways in which basic and clinical research are performed, evaluated, and explained to patients.

The project is divided into two distinct assignments. For the **first assignment**, you and your group will discuss a recent basic science research paper addressing a significant problem of pharmacological or pathophysiological interest and prepare a group presentation on the topic to be presented to the other three small groups present in your assigned SDL. In addition, you will be required to write a brief report (no more than 400 words) describing the principal findings and clinical significance of the study that could be used to describe the study to a typical patient. Note: this report should be written in a style that would be understood by a typical patient with no prior scientific or medical knowledge.

For the **second assignment**, you and your group will be provided with the name of a drug that is either currently undergoing clinical trials, or that has been recently approved. You will then have to work collaboratively together to search the literature in order to identify the relevant papers describing the drugs indications, mechanism of action, relevant pre-clinical data supporting the development of the drug, pharmacokinetic properties, and the details of the clinical trial studies demonstrating safety and efficacy, which you will then need to summarize in the form of a group presentation that will be delivered to the other three small groups in your assigned SDL. You will also be required to write a brief summary (no more than 400 words) of your findings that again could be used to explain the clinical use and significance of the drug to a typical patient (i.e. someone with no prior scientific or medical knowledge).

This project is designed to achieve five major goals: (1) gain an understanding of the ways in which basic and clinical research are performed and evaluated; (2) develop and hone lifelong learning skills including identifying, critiquing and assessing the credibility of relevant biomedical research; (3) working collaboratively and effectively as a team; (4) developing and honing communication and presentation skills; and (5) developing the skills of communicating complex biomedical and clinical concepts to peers, and ultimately patients. **These are all skills and**

behaviors identified by the medical school accrediting body – the Liaison Committee on Medical Education (LCME)- as being essential for every medical students to develop, and as a result are enshrined within the standards to which every medical school is held accountable.

Assignment 1:

1. Students will be provided with a copy of the relevant biomedical paper for discussion approximately one week prior to the initial small group session.

2. Students should initially read the paper to familiarize themselves with the topic and to identify any areas and concepts that they do not understand that will need to be further explored as part of the group.

3. At the first **Bench-to-Bedside I** meeting, students will meet as part of the first small group session and will discuss the paper amongst themselves, identifying the underlying background and rationale behind the study, the experimental approaches utilized in the study, the principal results of the study and their potential significance. These small group discussions will be moderated by a faculty facilitator who will help guide the discussion and provide feedback, but that is not expected to lecture or provide detailed answers.

4. At the **Bench-to-Bedside II** meeting, students will meet as part of the second small group session to present their findings in the form of an informal presentation to the other small groups present in the SDL. These presentations should be in the form of a powerpoint presentation and should involve each member of the group. Each group should be prepared to answer questions from both the faculty and other students.

5. At the completion of the assignment, each student should write a brief report (no more than 400 words) describing the principal findings and clinical significance of the study that could be used to describe the study to a typical patient. The premise of this assignment is that you have been asked a question about a study that a patient has heard about on the news and you are describing the principal results and clinical significance of the study to the patient in words and terms that they should be able to readily understand (e.g. imagine describing the study to your grandparents). These reports should be submitted no later than **Friday September 18th**. Details on how reports will be submitted electronically will be provided at a later date.

Assignment 2:

1. For the second assignment, each group will be provided with the name of drug that is either currently undergoing clinical trials or has recently been approved by the FDA.
2. During the initial **Bench-to-Bedside III** small group session each group should work together to search the biomedical literature in order to identify the relevant papers that help address the following points:
 - a) Background on the disease that the drug is intended to treat and the rationale for developing the drug for this indication
 - b) Description of the drug and its mechanism of action and physiological effects
 - c) Review of clinical trial data including study design and protocol, results of clinical efficacy data and outcomes, and any significant safety issues.
 - d) Pharmacological significance and future prospects for patient care

During the small group a faculty facilitator will be present to help guide any discussion, answer any questions and provide feedback, but is not expected to lecture or provide detailed answers on the topic.

3. At the **Bench-to-Bedside IV** session, students will present their findings in the form of an informal presentation to the other small groups present in the SDL. These presentations should be in the form of a powerpoint presentation and should involve each member of the group. Each group should be prepared to answer questions from both the faculty and other students.

4. At the completion of the assignment, each student should write a brief report (no more than 400 words) to explain the clinical use and significance of the drug to a typical patient (e.g. your grandmother/grandfather) who has asked you a question about the drug based on a piece they had read in a newspaper (i.e. what disease the drug is used to treat, how it works, how well does it work, and what, if any are its expected side effects). As part of this report, the student should also include the relevant references (including authors names, title, journal name and page numbers) for the manuscripts describing the drugs mechanism of action and clinical trial results. These reports should be submitted no later than **Monday October 5th**. Details on how reports will be submitted electronically will be provided at a later date.

Grading and Assessment

The combined Bench-to-Bedside projects will be worth a total of **4%** of your final course grade for Semester III. The grade will be based upon two independent assessments:

- A. Faculty assessment of the quality of the group presentations (20%)
- group scores will be applied to each member of the group
- B. Assessment of the written reports (80%)

Satisfactory completion of the Bench-to-Bedside projects will be taken into consideration when completing the outcomes for the **Practice-based learning and improvement; Interpersonal and communication skills;** and **Professionalism** competencies. Failure to adequately meet the expectations of any of these competencies will result in either a “Meets with concerns or Does Not Meet” designation and will require subsequent remediation, which, depending on the particular circumstances could include performing a “make up” assignment and delivering a presentation to the Course Directors.

Attendance and participation in these projects is **expected**. Any unexcused absence will result in the loss of any points associated with the particular assignment and will be appropriately reflected in the competency assessments.

IV. TIPS ON STUDYING FOR PHARM

As indicated above, the first section of semester III will introduce you to the basic scientific principles of Pharmacology. By its very nature this section of the course is very conceptual and deals with very basic fundamental aspects of Pharmacology. However, the remainder of the course will quickly become very specific and is organized in a stepwise fashion to introduce you to the different classes of currently available drugs that are used to treat specific diseases and clinical conditions. This will expose you to a very large amount of information. In order to facilitate your learning and understanding of this material it is helpful to consider the following specific pieces of information for each drug or class of drugs that is covered.

For each drug/drug class you should know the following:

- a) **INDICATIONS***** - under what circumstances is the drug used.
- b) **DRUG ACTION***** - what clinical effect does the drug have.
- c) **MECHANISM OF ACTION***** - how does the drug work at the biochemical level.

- d) ADVERSE EFFECTS***** - are there any major clinically relevant side effects of the drug.
- e) CONTRAINDICATIONS***** - are there circumstances in which the drug should not be administered to certain patient populations e.g. the elderly, those with renal insufficiency, pregnant women etc.
- f) PHARMACOKINETICS** - are there any factors such as absorption, metabolism, excretion or half-life that might significantly affect the drug action.
- g) DRUG INTERACTIONS** - are there any interactions with other potentially concomitantly administered drugs that might significantly affect the clinical efficacy, bioavailability or toxicity of either drug.

***- indicates most relevant HIGH YIELD information that is essential to master in order to perform well on the USMLE Step 1 exam.

This information will be discussed for each drug and/or drug class discussed throughout the course. In many cases, the information will be summarized in the charts that will accompany your lecture handouts. By learning this information for each drug/drug class, you will gain a greater appreciation for both the uses and limitations of these drugs in the effective treatment of specific patient populations. Knowing, understanding and being able to apply this information will also be critical for performing well in examinations both in the Pharmacology course and in the USLME-step 1 exam.

V. EXAM FORMAT & GRADING POLICY.

- A. There will be a total of **ELEVEN** exams throughout the year that contain Pharmacology and Therapeutics questions.
- B. The total number of questions containing Pharmacology material will vary from exam to exam and will depend on the total number of Pharmacology lectures given during that period of the course.

- C. The exams are **NOT** cumulative. Each exam will consist of **three questions per lecture and one questions per small group session that were delivered during the corresponding section of the course.** All questions will all be multi choice format in the style of the United States Medical Licensing Exam (USMLE-Step 1). Total time allowed for each exam will vary depending on the number of exam question- the average time allotted to answer each question will be 1 min 20 sec.
- D. Your **final** semester grade will be based on the **total percent correct** of your answers from all of the questions answered in each exam throughout the entire semester.

Grading will be on a Pass/Fail basis

Pass: an aggregate percentage score greater than or equal to **70%**

Fail: an aggregate percentage score of less than **70%**.

- G. In order to pass the entire course and progress to taking step 1 you will need to score a PASS in BOTH PharmI and PharmII

VI. PREPARATION FOR EXAMINATIONS.

- A. As part of the handouts for each lecture you should also receive a chart(s) illustrating the major features of the drugs discussed during that lecture (i.e. indications, mechanism of action, adverse effects, contraindications, drug interactions). Alternatively, some lectures may supply you with a list of key review points for the lecture. In either case, these materials should be invaluable resources in your preparations for each exam.
- B. USMLE type questions with explanations can be found at the end of each chapter in Katzung and Trevor's *Examination and Board Review (9th Edition)*.
- C. An online student Resource Center accompanies the 12th edition of Katzung "*Basic & Clinical Pharmacology*". This includes chapter questions and answers with detailed rationales.
- D. The following represent Pharmacology-related exam questions that are available online:

URL <http://www.pharmacology2000.com/learning2.htm>

URL http://www.medtrng.com/pharmacology_quizzes.htm

URL <http://www.med-ed.virginia.edu/courseSites/subjects.cfm?CID=1>

URL http://tmedweb.tulane.edu/pharmwiki/doku.php/all_pharmwiki_quizzes

VII. MISSED EXAM POLICY.

If circumstances arise that may prevent you from taking a scheduled examination (e.g. serious illness) you should immediately contact **BOTH** the course directors **AND** the Office of Student Affairs, so that a timely adjudication can be made. Students who are forced to miss exams for **legitimate** reasons, as ascertained by the Assistant/Associate Dean of Student Affairs, will be given the opportunity to take a make-up exam on an individual basis.

VIII. REMEDIATION POLICY

Students who fail to achieve the minimum score required for a passing grade in the course may be allowed the opportunity to take a make-up remediation exam. The purpose of the remediation exam is for the student to demonstrate competence of the material presented in the course. The composition of the exam will be decided by the course director and will consist of representative questions reflecting material that was presented throughout the semester. The make-up exam will be a rigorous, yet fair assessment to ensure that the student has achieved sufficient mastery of the course content to be allowed to continue to the next academic level. Remediation exams will be administered at the end of the academic year and will be scheduled by the Office of Student Affairs and the Academic Center for Excellence in consultation with the Course Director. All students requiring remediation should meet with the Course Director well in advance of the scheduled date of the exam to discuss both the exact format of the exam and their proposed study approach. Those students achieving a score of **greater or equal to 75%** on the remediation exam will have their F grade converted to a P*. Students who fail to successfully achieve the minimum passing score will be required either to repeat the course in its entirety, or alternatively, may be subject to automatic administrative action by the School, as outlined in the academic policy manual.

Please note that students with a final cumulative course score of <60% may be denied the opportunity to remediate their failure by an end-of-year exam, and may instead be required to repeat the course. The decision to allow such students the opportunity to take a remediation exam will be made by the Student Promotions Committee following a recommendation provided by the Course Director.

IX. PROFESSIONALISM.

Personal responsibility and professionalism are two key areas in the development of a physician. Professionalism is a separate category on the required

evaluations for the American College of Graduate Medical Education. It is expected that professionalism will be extended in all aspects of your conduct in this course. This includes appropriate and professional interactions with the course directors, lecturers, educational specialists and other students. Any serious lack in professional conduct will be reported to the Dean.

It is further expected that all students will maintain personal integrity and honesty during the examination process, especially in the current circumstances where exams will be administered remotely.

Specifically, we do not expect you to participate in and/or enable any of the following:

- the unauthorized use of any materials, notes, sources of information, study aids or tools during the exam
- the assistance of any individual to help answer a question
- the viewing or sharing of another student's answers
- the use of any internet enabled device to search for answers during the exam
- participation in any unauthorized online or telephone communication during the exam
- participation in any online chat or crowdsourcing efforts aimed at gaining an unfair advantage during the exam
- helping another student commit an act of academic dishonesty

In addition, we do not expect you to reproduce the exam by any method including screenshots, photographs, video recording, or transcription either directly or from memory.

Any student that attempts to gain an unfair advantage over other students in an examination by any of these unauthorized means will be guilty of academic misconduct and will be promptly reported to the Dean.

You are training to be physicians and both we and society expect you to hold yourself to the highest professional and ethical standards.

X. TEXTBOOKS

Recommended:

Katzung, B. G., Masters, S.B. and Trevor, A.J. Basic and Clinical Pharmacology 14th Edition. McGraw Hill: Norwalk, CT. 2017.

- Available in the Inking Format for iPad
- Also available through Access Medicine

This is a textbook that is used by many Pharmacology courses at other Medical Schools around the country- it is the companion textbook to the Board Review book listed below. It offers an in-depth detailed discussion of each topic and can be used as a primary resource textbook. It contains excellent summary charts of points at the end of each chapter.

XI. ADDITIONAL TEXTBOOKS AND E-RESOURCES

A. Textbooks.

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics 13th Edition. McGraw Hill: NY 2017.

This voluminous textbook provides a very comprehensive and in depth discussion of all areas of modern clinical pharmacology. It is considered as the “gold standard” of Pharmacology textbooks. However, it would probably be overkill for the course for all but the most interested students.

- available in the Inking format for iPad
- also available through Access Medicine

2. Goodman & Gilman's Manual of Pharmacology and Therapeutics 2nd Edition. McGraw Hill Professional NY 2013.

This is a condensed readily portable paperback version of the main Goodman & Gilman Reference textbook highlighted above. Highly recommended for those students that want a comprehensive user-friendly Pharmacology resource that can easily be carried in either a pocket or backpack.

3. Howland & Mycek. Lippincott's Illustrated Reviews, Pharmacology 5th Edition., Lippincott Williams &Wilkins, 2011.

6th Edition expected September 22nd 2014

A “user friendly” textbook that provides a basic outline of each topic. Provides just about the right amount of detail for easy review of any given topic. Includes many excellent tables, charts and illustrations for easy review of the material.

B. Review Books

4. Katzung, B.G. and Trevor, A.J. Pharmacology: Examination and Board Review 10th Edition. McGraw Hill: Norwalk, CT., 2012.

This Board Review book has previously been recommended by past students of the course. It offers a user-friendly brief synopsis of most pharmacological topics with plenty of diagrams, figures and tables. It also includes a list of practice exam questions complete with annotated answers at the end of each section. However, you should be aware that this book provides only a brief review of each topic, not a comprehensive in-depth coverage.

5. Pazdernik & Kerecsen Rapid Review: Pharmacology, 3rd Edition Elsevier, 2010.

An excellent review book that provides essential facts and information for each of the major drug classes in a succinct user-friendly format- includes many excellent charts and figures. Highly recommended as a board review study aid to complement the lecture handouts provided in the course.

5. Gleason, DejaReview Pharamacology, 2nd Edition, McGraw Hill, 2010.

An excellent resource for exam preparation. Essentially Pharm flash cards in a book format. Provides numerous active recall questions on each of the key topics that allows the student to gauge their study progress.

C. E-Resources

1. **Scientific American Medicine**

URL <https://www-deckerip-com.archer.luhs.org/decker/scientific-american-medicine/>

This Online Textbook is available through the library e-books collection. It contains a series of excellent up-to-date chapters on a variety of disease process, detailing the underlying biology and pathology of each disease. Most importantly, each chapter ends with a discussion of the available therapeutic approaches to treat each disease, as well as a succinct review of the most important pharmacological aspects of each of the highlighted medications.

2. **Up-to-Date**

URL <http://www.utdol.com/application/search.asp>

This website is available through computers on campus and can be accessed via the library web site (under quick links). It provides access to an extensive searchable and clickable database of excellent articles and monographs on specific disease conditions and the medications used to treat them. Provides excellent discussion on all aspects of specific medications including indications, mechanism of action, side effects and drug interactions. An excellent resource of current up-to-date pharmacological information that is widely used on the clinical floors.

3. Medical Pharmacology- Online Pharmacology content & Practice questions

URL <http://www.pharmacology2000.com/learning2.htm>

This is a privately run web site that provides concise review notes on a comprehensive list of Pharmacological topics and specific medications. In addition, it offers the chance to take a number of different online practice exams for each topic. Although I cannot attest to the complete accuracy of the material, it seems that this site would be a good resource for exam preparation.

XII. KEY CONTACTS

COURSE DIRECTOR

Name: Neil A. Clipstone, Ph.D.
Associate Professor of Pharmacology
Associate Dean of Biomedical and Translational Sciences
Location: SSOM Rm 319

Email – nclipstone@luc.edu

ASSISTANT COURSE DIRECTOR

Name: Debra Hoppensteadt, Ph.D.
Professor of Pathology and Pharmacology

Email – dhoppen@luc.edu

MEDICAL EDUCATION COORDINATOR

Name: Kelly Larkin

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REMEMBER TO CHECK YOUR E-MAIL ON A REGULAR BASIS. UPDATES AND CHANGES WILL BE ONLY POSTED THROUGH E-MAIL. ALSO CHECK THE WEEKLY COURSE SCHEDULE FOR ANY CHANGES.