

Therapeutics IV (Renal/Urology Module)
PHRD 4093
CRN# 64347

I. Contact Information**Course Coordinators (* indicates preferred method of contact)**

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II. Course Prerequisites/Corequisites

PHRD 4064

III. Course Description

2 credit hours. Principles of pathophysiology, pharmacology, medicinal chemistry, clinical pharmacokinetics and pharmacotherapy (including both prescription and non-prescription medications) as they apply to renal and urology drug therapy management.

IV. Curricular Objectives and Outcomes

1.1. Learner (Learner) - Develop, integrate, and apply knowledge from the foundational sciences (i.e., pharmaceutical, social/behavioral/administrative, and clinical sciences) to evaluate the scientific literature, explain drug action, solve therapeutic problems, and advance population health and patient-centered care.

2.1. Patient-centered care (Caregiver) - Provide patient-centered care as the medication expert (collect and interpret evidence, prioritize, formulate assessments and recommendations, implement, monitor and adjust plans, and document activities).

2.2.2. Describe the role of the pharmacist in impacting the safety and efficacy of each component of a typical medication use system (i.e., procurement, storage, prescribing, transcription, dispensing, administration, monitoring, and documentation).

2.2.3. Utilize technology to optimize the medication use system.

2.2.4. Identify and utilize human, financial, and physical resources to optimize the medication use system.

3.1. Problem Solving (Problem Solver) – Identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution.

3.3.2. Assist patients in navigating the complex healthcare system.

ACPE Appendix 1 Required Elements:

Biomedical Sciences

- Biochemistry - Structure, properties, biological functions, applicable kinetics, and metabolic fate of macromolecules essential to life (proteins, lipids, carbohydrates, and nucleic acids). Application of these concepts to identify endogenous targets for drug therapy and rational drug design strategies.
- Human Anatomy - Structure of major human body systems at the cellular, tissue, organ, and system level.

Pharmaceutical Sciences

- Clinical Chemistry - Application of clinical laboratory data to disease state management, including screening, diagnosis, progression, and treatment evaluation.

- Medicinal Chemistry - Chemical basis of drug action and behavior in vivo and in vitro, with an emphasis on pharmacophore recognition and the application of physicochemical properties, structure-activity relationships, intermolecular drug-receptor interactions and metabolism to therapeutic decision-making.
- Pharmaceutics/Biopharmaceutics - Physicochemical properties of drugs, excipients, and dosage forms important to the rational design and manufacture of sterile and non-sterile products. Application of physical chemistry and dosage form science to drug stability, delivery, release, disposition, pharmacokinetics, therapeutic effectiveness, and the development of quality standards for drug products.
- Pharmacogenomics/genetics - Genetic basis for disease and individual differences in metabolizing enzymes, transporters, and other biochemicals impacting drug disposition and action that underpin the practice of personalized medicine.
- Pharmacokinetics - Mathematical determination of the rate of drug movement from one therapeutic or physiologic compartment to another. Application of physicochemical and kinetic principles and parameters to therapeutically important issues, such as drug delivery, disposition, therapeutic effectiveness, and beneficial or adverse interactions in general and specific populations.
- Pharmacology - Pharmacodynamics, mechanisms of therapeutic and adverse drug actions and interactions, lifespan-dependent variations in physiology or biochemistry that impact drug action and effectiveness, and application of these principles to therapeutic decisionmaking.
- Toxicology - Pharmacodynamics, mechanisms, prevention, and treatment of the toxic effects of drugs and poisons, including poisons associated with bioterrorism.

Clinical Sciences

- Clinical Pharmacokinetics - Application of basic pharmacokinetic principles and mathematical models to calculate safe and effective doses of drugs for individual patients, and adjust therapy as appropriate through the monitoring of drug concentration in biological fluids.
- Health Information Retrieval and Evaluation - Critical analysis and application of relevant health sciences literature and other information resources to answer specific patient-care and/or drug-related questions and provide evidence-based therapeutic recommendations to healthcare providers or, when appropriate, the public.
- Medication Dispensing, Distribution and Administration - Preparation, dispensing and administration of prescriptions, identification and prevention of medication errors and interactions, maintaining and using patient profile systems and prescription processing technology and/or equipment, and ensuring patient safety. Educating about appropriate medication use and administration.
- Patient Assessment - Evaluation of patient function and dysfunction through the performance of tests and assessments leading to objective (e.g., physical assessment, health screening, and lab data interpretation) and subjective (patient interview) data important to the provision of care.
- Patient Safety - Analysis of the systems- and human-associated causes of medication errors, exploration of strategies designed to reduce/eliminate them, and evaluation of available and evolving error-reporting mechanisms.
- Pharmacotherapy - Evidence-based clinical decision making, therapeutic treatment planning, and medication therapy management strategy development for patients with specific diseases and conditions that complicate care and/or put patients at high risk for adverse events. Emphasis on patient safety, clinical efficacy, pharmacogenomic and pharmacoeconomic considerations, and treatment of patients across the lifespan.

V. Course Specific Objectives and Outcomes

At the conclusion of this course, students should be able to:

- Understand the pharmacology of drugs used in the treatment of chronic kidney disease, metabolism of calcium and phosphorus in renal failure, major stages of renal failure, pharmacology of drugs used in kidney transplant.
- Understand the pathophysiology of overactive bladder and the pharmacology of drugs used in the treatment of overactive bladder.
- Identify structures of drug molecules, knowledge of receptors and possible binding site.
- Understand the structure-pharmacological activity and identify the functional groups responsible for activity and solubility.
- Understand the possible biotransformations, metabolic products and their implications in activity and toxicity.

- Identify the structures of tracer, imaging agents and their physico-chemical properties and intended uses.
- Define primary acid-base disturbances within the human body.
- Apply simple formulas to determine the etiology of simple acid-base disturbances.
- Integrate the supplemental concepts of the anion gap and the excess gap to help assess complex acid-base disturbances.
- Discuss the most common causes of each primary acid-base irregularity.
- Determine the appropriate management for patients with acid-base disorders.
- Estimate renal clearance using common equations.
- Estimate drug removal by hemodialysis.
- Describe interventions to prevent drug-induced renal disease.
- Recognize risk factors and clinical presentation for the main types of urinary incontinence.
- Identify medications that can cause or worsen urinary incontinence.
- Describe pharmacologic and non-pharmacologic treatment options for the main types of urinary incontinence.
- Develop an appropriate treatment and monitoring plan and provide patient counseling information based on patient-specific information for a patient with urinary incontinence.
- Identify common laboratory tests used when interpreting renal function.
- Discuss laboratory evidence indicating renal dysfunction and associated diseases.
- Recognize risk factors for CKD.
- Identify stages of CKD.
- Recall management strategies used to slow progression of CKD.
- Interpret causes and identify treatments of CKD complications.
- Recognize renal replacement therapy strategies.
- List complications of RRT and recall treatment strategies for those complications.
- Discuss the definitions of AKI.
- Interpret RIFLE and AKIN criteria.
- Differentiate the 3 types of AKI using clinical picture and lab values.
- Identify signs and symptoms of electrolyte abnormalities including sodium, potassium, magnesium, calcium and phosphorus.
- Recognize clinical manifestations of electrolyte disorders.

VI. Course Topics

Topics include: Nephrology Lab Interpretation, Fluid and electrolytes, Acid/Base Balance, Acute Kidney Injury, Chronic Kidney Disease, Dialysis and Renal Dosing, Drug-Induced Renal Failure, BPH, Erectile Dysfunction, Urinary Incontinence.

VII. Instructional Methods and Activities

Instructional methods may include: traditional lectures, internet-based lectures with in-class discussion, distance learning, in-class discussion of patient cases, small group discussion, problem-based learning, case-based learning, and individual projects. Quizzes or other graded in-class exercises may also be administered.

VIII. Evaluation and Grade Assignment

- There will be three examinations, each encompassing new material and may include comprehensive material as necessary.
- Quizzes will be given, announced or unannounced, as deemed necessary by each faculty member.
- Exam dates are scheduled in the course syllabus and will only be changed in the event of University closure.
- Exams may be multiple choice, fill in the blank, short-answer, case or scenario based discussion, essay, or any other format deemed necessary by the lecturers and course coordinator.
- Exam and assignment turnaround time will be determined by individual instructors and/or course coordinators.
- Information acquired from previous lectures in the course and from other courses in the professional pharmacy curriculum may be needed in preparing for these examinations.
- Exams will cover material (readings, outside assignments) not covered in class.

- During exams, cell phones should be turned off and left with your belongings in the front of the room. Students will not be allowed to leave the room to go to the restroom during the exam, unless accompanied by a faculty member of the same sex, provided there is another proctor to remain in the room.
- The use of programmable calculators and electronic devices capable of storing, receiving or transmitting data are prohibited during an exam or quiz unless expressly authorized by the course instructor. Such devices must be turned off and left with your belongings in the front of the room.
- Exams will NOT be returned to the student. All instructors will have copies of the exam and students' results, and students may view their exam results (inc. right/wrong) in instructors' offices, at times convenient for all involved. At this time, they may also discuss exam questions with the instructors who wrote them; however, any official "challenges" of questions must be done in writing. (See below)
- Exams will be issued using ExamSoft; all students are required to download the exams prior to the date of the scheduled exam. If a student cannot take the exam on the scheduled date, the student must reverse download the exam to ExamSoft. Under no circumstances should a student open an examination, except during the scheduled time and at the scheduled location. Scratch paper will be issued on the day of the exam and all students are required to sign the scratch paper and return it to the exam proctor prior to leaving the room. No other paper items will be allowed during the exam unless supplied by the faculty administering the exam. All exams must be uploaded before leaving the classroom; in the event of a power outage or loss of Wi-Fi connection all students are required to upload the exam at the earliest possible reconnection time, however proof of exam closeout will be required prior to leaving the classroom.
- Students wishing to review their exams with the course coordinators or with a specific faculty member must do so within 2 weeks of when the exam scores are posted, or within 1 week of the time that the score for the final exam is posted.
- In the event that there is an issue with a particular test question, adjustments to scores will be made based on discussions between the test question writer and the course coordinator.
- Problems or issues with question(s) should be first directed, via e-mail, to the faculty member who presented the material. The course coordinator should be copied on this communication. In the event that the faculty member and the student cannot arrive at an acceptable conclusion, the course coordinator should be contacted regarding the issue. Students wishing to challenge a question on the test must provide the course coordinator with a **written (email preferred)** statement that identifies which question(s) is/are being challenged, why the student feels his or her answer(s) is/are correct, and references from recent (published within the last 1-2 years) primary or tertiary literature to support the claim. Any challenges that are submitted via a class representative must contain the name of the original student challenging the question. Discussion of a dispute will occur only after a written query is submitted. The challenge will be reviewed by the faculty member, and his or her decision will be shared with the course coordinator(s). Challenges of test questions will only be considered within 2 weeks of regular exams and within one week of the final exam.
- The decision to award full or partial credit for late assignment submission will be at the discretion of the instructor.
- Individual test grades for the course will be based strictly upon these percentages.

<u>Assessment:</u>	<u>Points</u>
Exam #1	80
Exam #2	80
Exam #3 (Final)	80
In-Class Assignment	<u>5</u>
Total class points:	245

Grading Scale (based upon total number of points for semester):

89.5 – 100%	A
79.5 – 89.49%	B
69.5 – 79.49%	C
59.5 – 69.49%	D
≤59.49%	F

- Mid-term grades will be posted on-line for students to view via Banner. Mid-term grades indicate a student's status at mid-semester only and do not indicate the final performance outcome of a student.

Student Success Policy: <http://www.ulm.edu/pharmacy/documents/ospa/earlyintervention.pdf>

Remediation Policy: <http://www.ulm.edu/pharmacy/documents/ospa/remediationpolicy.pdf>

IX. Class Policies and Procedures

At a minimum, all policies stated in the current ULM *Student Policy Manual & Organizational Handbook* should be followed (see <http://www.ulm.edu/studentpolicy/>). Additional class policies include:

A. Textbook(s) and Materials

- a. Required
 - i. Chisolm-Burns MG, Wells BG, Schwinghammer TL. *Pharmacotherapy Principles and Practice*. 4th ed. New York: McGraw-Hill, Inc; 2016. ISBN 9780071835022.
 - ii. Brunton LL, Lazo JS, Parker KL, eds. *Goodman and Gilman's: The Pharmacological Basis of Therapeutics*. 12th ed. New York: McGraw-Hill, Inc; 2011. ISBN 9780071624428.
 - iii. Beale JM, Block JH, eds. *Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry*. 12th ed. Wolters Kluwer/Lippincott Williams & Wilkins; 2010. ISBN 9780781779296.
- b. Recommended
 - i. Lemke TL, Williams DA, Roche VF, Zito SW, eds. *Foye's Principles of Medicinal Chemistry*. 7th ed. Wolters Kluwer/Lippincott Williams & Wilkins; 2013. ISBN 9781609133450.
- c. Additional reading materials may be posted by course faculty.

B. Attendance Policy

Class attendance is regarded as an obligation as well as a privilege, and students are expected to know attendance regulations and to attend regularly and punctually at classes in which they are enrolled. Failure to do so may: (1) prevent access to the classroom during regularly scheduled times; (2) jeopardize a student's scholastic standing; and (3) lead to suspension from the College or University. Students must submit excuses for class absences to course coordinators within three class days after returning to classes.

Professors shall accept an official University excuse. With the following exceptions, professors are to determine whether absences are excused or unexcused: 1) Absences arising from authorized trips away from the University or from special duties at the University shall be excused. 2) Absences arising from a student's confinement in a hospital or other in-patient facility or doctor's excused absences shall be excused. Students are responsible for verifying providing documentation to the faculty, which will be verified. 3) Absences arising from a death in the immediate family shall be excused. The immediate family is defined as spouse, child, step-child, mother, father, sister, brother, grandmother, grandfather, step-mother, step-father, step-brother, step-sister, aunt, uncle, mother-in-law or father-in-law.

C. Make-up Policy

Each student is expected to attend each exam at the date and time specified. If a student cannot attend an exam due to valid University excuse, he/she must speak directly with the course coordinator, as soon as possible. The course coordinator must be notified **prior** to an examination if a student misses an exam. The ULM SOP Excused Absence Policy must be followed. Please refer to the official document for details. In case of emergency, the course coordinator must be notified within 48 hours of the emergency. Failure to do so will result in a zero (0) grade for that exam. Make-up exams will be prepared at the same or higher level than the original exam. The format of the make-up exam may be written or oral. Failure to attend a scheduled make-up exam will result in a zero (0) grade for that exam. *Students missing an exam due to a University approved excuse will take the make-up exam during the week of finals, or as determined by the course coordinator.*

<http://www.ulm.edu/pharmacy/documents/ospa/excusedabsence.pdf>

D. Academic Integrity

Faculty and students must observe the ULM published policy on Academic Dishonesty (see Page 4 of the ULM *Student Policy Manual* - <http://www.ulm.edu/studentpolicy/>). All professional students will adhere to the standards

set forth in the College of Pharmacy's Code of Conduct (<http://www.ulm.edu/pharmacy/documents/ospa/codeofconductv82011.pdf>).

Censures (Penalties)

Academic dishonesty will result in a referral to the Committee on Ethical and Professional Standards with a recommendation for a grade of "F" for the course and expulsion from the College of Pharmacy. Academic dishonesty includes, but is not limited to, the use of information taken from others' work or ideas, the provision of help to others on non-collaborative evaluations (tests, quizzes, etc.), collaboration on take home exams, or the use of unapproved information or electronic devices to assist in obtaining an answer to the question.

E. Course Evaluation Policy

At a minimum, students are expected to complete the on-line course evaluation. It is requested that they also complete the College of Pharmacy course and instructor evaluations, including providing comments. In addition, individual feedback is encouraged throughout the course.

F. Student Services

Information concerning student services in the College of Pharmacy can be found in the College of Pharmacy Student Handbook. In particular, students should pay special attention to the University's technical standards and policies concerning students with special needs (<http://www.ulm.edu/studentpolicy/studentpolicy.pdf>). ULM student services, such as the Student Success Center (<http://ulm.edu/cass/>), Counseling Center (<http://ulm.edu/counselingcenter/>), and Student Health Services, is available at the following Student Services web site <http://ulm.edu/studentaffairs/>. Students with special needs requiring accommodations MUST follow the process described at <http://rxweb.ulm.edu/pharmacy/student/specialneeds.pdf>.

Mental Wellness on the ULM Campus

If you are having problems with emotional, social, and/or behavioral issues please call any of the mental health clinics on the ULM campus to make an appointment. All services are free to ULM students, staff, and faculty, and are strictly confidential.

- COP Office of Student and Professional Affairs: 342-3800
- ULM Counseling Center: 342-5220
- Marriage and Family Therapy Clinic: 342-5678
- Community Counseling Center: 342-1263
- ULM HELPS (Helping Educators and Learners Prevent Suicide) Project Office: 342-1335

The University of Louisiana at Monroe strives to serve students with special needs through compliance with Sections 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. These laws mandate that postsecondary institutions provide equal access to programs and services for students with disabilities without creating changes to the essential elements of the curriculum. While students with special needs are expected to meet our institution's academic standards, they are given the opportunity to fulfill learner outcomes in alternative ways. Examples of accommodations may include, but are not limited to, testing accommodations (oral testing, extended time for exams), interpreters, relocation of inaccessible classrooms, permission to audiotape lectures, note-taking assistance, and course substitutions.

Title IX of the Education Amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds, including federal loans and grants. Furthermore, Title IX prohibits sex discrimination to include sexual misconduct, sexual violence, sexual harassment and retaliation. If you encounter unlawful sexual harassment or gender-based discrimination, please contact Student Services at 318-342-5230 or to file a complaint, visit www.ulm.edu/titleix.

G. Emergency Procedures

Please review the emergency escape plan in the classrooms and hallways of the Bienville building. Move quickly and in an orderly manner to the appropriate stairwell and exit the building. The meeting place for this class will be the far end of the north parking lot between the Bienville building and Broadmoor Blvd. Under no circumstances is the elevator to be used for emergency evacuation. Any student needing assistance should notify the professor immediately. For emergencies, to contact University Police, call 1-911 from landlines and 342-5350 from cell

phones. **The course coordinators reserve the right to adjust the syllabus or schedule, in accordance with University and College policies and procedures.**

H. Federal Regulations require determination and verification of every students' physical location while enrolled in classes (where they are physically located while taking classes), regardless of the delivery method (on campus, online). At the beginning of every semester and whenever physical location changes, students must update or verify their current location through banner https://ssb-prod.ec.ulm.edu/PROD/bwgkogad.P_SelectAtypUpdate. Students should do this by the end of the first week of classes.

I. This course is a major requirement for the PharmD degree (e.g., B.S.) in Pharmacy (e.g., Radiologic Technology). Completion of degree requirements leads to eligibility for professional licensure and/or certification in Louisiana upon graduation. Federal Regulations require universities to provide information to students about the alignment between Louisiana's requirements and those of other states. ULM has created a web page with discipline-specific information containing hyperlinks to Licensure Boards in the United States <https://www.ulm.edu/professional-licensure-disclosures/index.html>. Program Directors and/or faculty will discuss this information with you during advising or other program meetings but is also available to answer questions and address any concerns you might have. It is also important to note that licensure or certification requirements are subject to change. Although ULM Program Directors annually review and update licensure information for every state, the faculty recommends that before enrolling in a program and throughout enrollment, students communicate with the applicable state board to confirm understanding and whether upon completion of ULM's program, they will meet requirements.

J. Discipline/Course Specific Policies

Students are responsible for all course information on Moodle and/or instructor websites. They are expected to check these sources regularly to access class materials, required readings, assignments, and other information necessary to excel in this course.

X. Course Schedule

Course schedule is subject to change at the discretion of the Course Coordinators

Class will meet in Bienville 202, **Tuesdays from 10:00-11:50 AM**

LECTURE	DATE	TOPIC	FACULTY	EXAM POINTS
1	1/16/2024	Medicinal Chemistry	El Sayed	20 pts
2	1/23/2024	Pharmacology	Jackson	20 pts
3	1/30/2024	Nephrology Labs/Acute Kidney Injury	Miller	20 pts
4	2/6/2024	Drug-induced Renal Failure	Miller	20 pts
	2/13/2024	No Class – Mardi Gras Holiday		
	2/20/2024	EXAM 1 (Lectures 1-4)		Faculty: Please submit questions by <u>2/13/24</u> El Sayed: 20 pts Jackson: 20 pts Miller: 40 pts
5	2/27/2024	Chronic Kidney Disease	Miller	20 pts
6	3/5/2024	Chronic Kidney Disease	Miller	20 pts
7	3/12/2024	Fluid and Electrolytes	Miller	20 pts
8	3/19/2024	Fluid and Electrolytes	Miller	20 pts
	3/26/2024	EXAM 2 (Lectures 5-8)		Faculty: Please submit questions by <u>3/19/24</u> Miller: 80 pts
	4/2/2024	No Class – Spring Break Holiday		
9	4/9/2024	Dialysis and Renal Dosing	Brady	20 pts
10	4/16/2024	Urinary Incontinence	Brady	20 pts
11	4/23/2024	Acid/Base Balance	Manor	20 pts
12	4/30/2024	BPH and Erectile Dysfunction	Donald	5 pts (In-Class Activity) 20 pts
	5/7/2024	EXAM 3 - FINAL (Lectures 9-12)		Faculty: Please submit questions by <u>5/1/24</u> Brady: 40 pts Manor: 20 pts Donald: 20 pts