

PHRD 5056 - 61366: NUCLEAR MEDICINE
Wednesday 4:00 – 5:50 pm
Bienville 110

I. Contact Information

Catherine Whipple, RPh, BCNP
Bienville 131; 318-342-3169 or 318-323-5126 (pharmacy)
Email: whipple@ulm.edu or catherine.whipple@cardinalhealth.com
Office Hours: Wednesday prior to class or by appointment

II. Course Prerequisites/Co-requisites

None.

III. Course Description

Nuclear Medicine Elective. 2cr. This course will introduce the basic concepts of radioactive material including fundamental decay, biological effects, protection from exposure, handling and storage of radioisotopes and their application to pharmacy. The official radiopharmaceuticals and non-official radiopharmaceuticals of merit employed in diagnostics and therapy will be considered.

IV. Curricular Objectives and Outcomes

Upon completion of the course, the student should be able to meet the following Accreditation Council for Pharmacy Education (ACPE) outcomes.

Standard 1: Foundational Knowledge

- 1.1. Foundational knowledge – The graduate is able to develop, integrate, and apply knowledge from the foundational sciences (i.e., biomedical, 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.

Standard 3: Approach to Practice and Care

- 3.1. Problem solving – The graduate is able to identify problems; explore and prioritize potential strategies; and design, implement, and evaluate a viable solution.
- 3.2. Education – The graduate is able to educate all audiences by determining the

ACPE Appendix 1

Pharmaceutical Sciences

Extemporaneous Compounding
Pharmaceutical Calculations
Pharmaceutics/Biopharmaceutics
Pharmacology

Clinical Sciences

Medication Dispensing, Distribution and Administration
Pharmacotherapy

V. Course Specific Objectives and Outcomes

Students who successfully complete the course requirements should achieve the following course objectives and outcomes:

- Demonstrate proficiency in knowledge of radiation physics and instrumentation.
- Demonstrate proficiency in the ability to perform mathematical calculations relative to radioactive decay.
- Understand the concept of radiation biology and its effects on human systems.
- Understand the basic principles of radiation protection.
- Demonstrate proficiency in knowledge of radiopharmaceuticals indication and preparation.

- Demonstrate proficiency in knowledge of radiopharmaceuticals usage in diagnostic application to disease states.
- Demonstrate proficiency in knowledge of therapeutic radiopharmaceutical application in disease states.

VI. Course Topics

- Define radiation energy and atomic structure.
- Stable vs. unstable nuclides
- Man-made radionuclides
- Characteristics that identify radionuclides
- Modes of radioactive decay
- Radioactive decay and half-life – The Fundamental Decay Law
- Interaction of ionizing radiation with matter
- Radiation detection methods
- Radiation biology
- Radiation protection – radiation sickness
- Technetium characteristics
- Generator properties and yield calculation
- Radiopharmaceuticals – indication, usage, preparation, normal vs. abnormal images

VII. Instructional Methods and Activities

Instructional methods may include, but are not limited to: traditional lectures, in-class discussion, and small group discussion. Active participation in class is required.

VIII. Evaluation and Grade Assignment

Exams and quizzes will be administered in an appropriate format as determined by the instructor. The final grade in the class will consist of the components below and will be determined from total points earned. In the case of partial points when averaging, 0.5 points and above will be rounded up and 0.4 points and below will be rounded down.

The final grade in the class is expected to consist of the following components:

<u>Activity</u>	<u>Points</u>
Two unit exams	200
Final exam (80% new material, 20% comprehensive)	100
Bonus quizzes (for extra credit only)	
Total	300

GRADING SCALE: A = 89.5-100%; B = 79.5-89.4%; C = 69.5-79.4%; D = 59.5-69.4%; F = Less than 59.5%.

Undergraduate 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.

Any student earning a non-passing grade of "D" or "F" on an exam will be required to participate in mandatory tutoring sessions offered by the course instructor(s) until such a time that they obtain a passing average in the course.

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: No required textbook. Information will be presented in lectures and slide decks posted on Moodle. Information sources are available from instructor.

B. Attendance Policy: The ULM School of Pharmacy follows the University Attendance Policy. http://catalog.ulm.edu/content.php?catoid=23&navoid=2875&hl=attendance&returnto=search#Class_Attendance_Regulations_Excused_Absences

C. Make-up Policy: Examinations missed due to excused absences will be rescheduled at the discretion of the instructor. The make-up exam may be given in an appropriate format as determined by the instructors, including oral. Any presentations and/or examinations that are not completed by the alternative date will be scored as a zero. Students who miss the comprehensive final exam during the scheduled time will receive an "I" for the course in accordance with University and College of Pharmacy policies and procedures.

D. Academic Integrity: Faculty and students must observe the ULM published policy on Academic Dishonesty (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, which may be found at: <http://rxweb.ulm.edu/pharmacy/policies/copcodeofconduct.pdf>

Students are expected to work independently on examinations and assignments unless it is specifically described by the instructor as a group activity. Academic misconduct includes, but is not limited to:

- Any use of resources other than your own recollection and reasoning ability on an examination unless access to the resource is authorized by the instructor in advance.
- The inappropriate use of electronic or wireless technology (including but not limited to cell phones, PDA's, or pagers) during an examination.
- Possessing or using any examination question previously used in this course.
- The attempt to reconstruct an examination after it is taken with the intent to share with other students.
- Sharing information about an examination with students who have not taken the exam.

E. Course Evaluation Policy: At a minimum, students are expected to complete the on-line course evaluation.

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 College's technical standards and policies concerning students with special needs (<http://www.ulm.edu/studentpolicy/studentpolicy.pdf>). Information about 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/>

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 orderly 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 Bienville 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.

H. Early Intervention Policy: Students scoring <70% on any exam and an overall exam average <70% (excludes quizzes, assignments, bonus, etc.) will be required to participate in early intervention until such time as the exam average is 70 or above. The early intervention policy may be found at: <http://www.ulm.edu/pharmacy/documents/ospa/earlyintervention.pdf>

In brief, this requires the student to review each missed exam item with the instructor. Class attendance will be mandatory until the student is no longer part of Early Intervention. Other details are available in the policy. Failure to meet the requirements of the policy will result in the student's ineligibility to remediate. The remediation policy may be found at: <http://www.ulm.edu/pharmacy/documents/ospa/remediationpolicy.pdf>

I. Discipline/Course Specific Policies: Students are to exhibit professional behavior at all times. This includes being prepared for class, being seated and quiet when class is to begin, and participating actively in class. Student integrity is an important part of professionalism. As such, a grade of zero will be assigned to any examination or assignment on which a student is found to have cheated. Failure to adhere to University, College of Pharmacy, and class policies or Academic Integrity will result in disciplinary action in accordance with University policy.

J. Electronic Device Policy: All cell phones should be turned off during class. Students should not use class time to check email or to text message. Computers may be used during class to view the slides and take notes; however, use of the Internet will not be allowed unless required for a class activity.

If a student has a need to be notified during an emergency situation while attending class, he/she should leave the telephone number of the Office of Student and Professional Affairs, 318-342-3800, with the person who may need to contact them. The use of cell phones is not allowed during examinations or quizzes. Students using cell phones during an examination or quiz will be considered to have committed an act of academic dishonesty and will be charged and brought before the committee on ethical and professional conduct.

X. Tentative Course Schedule

Schedule: *The instructor reserves the right to adjust the schedule as needed.*

- 1/17 (Wed.) Syllabus/Overview/Radiation Energy/Atomic Structure/Stable vs. Unstable
- 1/24 (Wed.) Characteristics of Radionuclides/ Modes of Radioactive Decay
- 1/31 (Wed.) Radioactive Decay and Half-life/ Interaction of Ionizing Radiation with Matter
- 2/7 (Wed.) Radiation Detection Methods / End of Material for Test I
- 2/14 (Wed.) Radiation Biology / Review for Test I
- 2/21 (Wed.) Test 1 (100 pts.)
- 2/28 (Wed.) Radiation Biology and begin Radiation Protection
- 3/6 (Wed.) Radiation Protection/Tc99m Ideal Radionuclide
- 3/13 (Wed.) Tc99m Generator Properties/QC of elution/Generator Yield and Tc99m Chemistry
- 3/20 (Wed.) Test 2 (100 pts.)
- 3/27 (Wed.) Intro to Radiopharmaceuticals, CNS, Lung

4/3 (Wed.) *Spring Break*
4/10 (Wed.) **Liver, Hepatobiliary, Spleen, Bone**
4/17 (Wed.) **Heart, Kidney, Endocrine**
4/24 (Wed.) **Labeling Formed Elements/Miscellaneous procedures/
Therapeutic Radiopharmaceuticals**
5/1 (Wed.) **Dead Day**
TBA **Final Exam (100 pts.)**