

HPS/RAD 102 -1002 - Radiation Science
University of Nevada, Las Vegas
Department of Health Physics & Diagnostic Sciences
Spring/2016

Prerequisites: MAT 124 or consent of instructor

Credit hours: 3

Class Time: Monday 4 PM – 6:45 PM

Class location: BHS 132

Faculty: Yu Kuang, Ph.D.

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Teaching Assistant: Kellie Hoiland (Email: hoiland@unlv.nevada.edu)

Office hours: TBD or by appointment

Course Description: Principles of radiation science and safety including interactions of radiation with matter, radiation quantities and protection standards, dosimetry, radioactive decay, and biological effects of radiation.

Objectives: The student is expected to gain an understanding of principles associated with radiation science and safety. The student is expected to gain the ability to perform the activities listed below, which are examples of routine tasks in professional and academic practice of radiation science.

1. Explain the structure of matter with special emphasis on the composition, stability, and energy levels of atomic nuclei.
2. Explain the various modes of radioactive decay.
3. Explain the various interactions with matter, with special emphasis on photoelectric, Compton, charge particles, and pair production interactions.
4. Demonstrate the utilization of basic mathematical operations including logarithms and exponential functions used in radioactive decay kinetics.
5. Explain ICRP/NCRP recommendations and governmental regulations regarding exposure and radioactive material handling and the ALARA (as low as reasonably achievable) concept.
6. Explain the basic principles of radiation detection and dosimetry.
7. Explain chemical and biological effects of radiation.
8. Identify administrative and technical means of reducing unnecessary radiation exposure to the patient, personnel, self, general public, and the environment.
9. Explain posting requirements in designated radioactive area to comply with governmental regulations.

Schedule of Topics – Spring/ 2016

Week 1 (1/25/2016)	Introduction; Atomic and Nuclear Structure; Definition of Radioactivity; Classification of Radionuclides
Week 2 (2/1/2016)	Types and Energies of Radiations Emitted; Modes of Decay
Week 3 (2/8/2016)	Interaction of Radiation and Matter
Week 4 (2/15/2016)	Washington's birthday recess, no class
Week 5 (2/22/2016)	Review for Exam 1
Week 6 (2/29/2016)	Examination 1 (material from weeks (1– 3 Interaction of Radiation and Matter))
Week 7 (3/7/2016)	Radiation Detection
Week 8 (3/14/2016)	Radiation Quantities and Protection Standards
Week 9 (3/21/2016)	Spring Break, no class
Week 10 (3/28/2016)	Review for Exam 2
Week 11 (4/4/2016)	Examination 2 (material from week 7 Radiation Detection through week 10 Radiation Quantities and Protection Standards)
Week 12 (4/11/2016)	Radiation Biology I
Week 13 (4/18/2016)	Radiation Biology II
Week 14 (4/25/2016)	Review for Final
Week 15 (5/2/2016)	Review for Final
Week 16 (5/9/2016)	Final Examination (material from week 1 through 15)

Exam are all closed-book

Teaching Strategies: Lectures, reading assignments (lecture notes), and in-class problem sets.

Evaluation Methods: Students will have the opportunity to demonstrate achievement of course objectives through exams. Examinations 1 and 2 will consist of multiple choice, short answer, and problem questions and will cover the material stated in the schedule. The final examination will also consist of multiple choice, short answer, and problem questions. A portion of the Final Examination may be comprehensive. Students must take each examination at the scheduled time. If a student is unable to take the examination at the scheduled time, he/she must contact the course instructor in writing in advanced and obtain permission to take the examination early. No examinations may be taken after the scheduled time. If a student has not taken an examination by the end of the scheduled time, a grade of zero will be recorded. Students will be provided the opportunity to review their examinations after class the week following the scheduled exam.

Required Texts: None. Lecture notes/power point presentations will be presented and given out at the beginning of each class.

Supplemental Texts (recommended, but not required):

For Radiography (x-ray) students:

Bushong, S. Radiologic Science for Technologists: Physics, Biology, and Protection. Hardcover. 2008. **ISBN-10:** 0323048374 **ISBN-13:** 978-0323048378.

Sherer, M. Visconti, P. Ritenour, R. Radiation Protection in Medical Radiography, 5th ed. Mosby/Elsevier. 2006. **ISBN-10:** 032304476X **ISBN-13:** 978-0323044769

For Nuclear Medicine students:

Cherry, S. Sorenson, J. Phelps, M. Physics in Nuclear Medicine, 3d. ed. Saunders.2003. **ISBN-10:** 072168341X or **ISBN-13:** 978-0721683416.

General Radiation Protection texts:

Forshier, S. Essentials of Radiation Biology and Protection, 1st or 2nd ed. Delmar/Thomson Learning. 2002. 1st ed. **ISBN-10:** 0766813304 or **ISBN-13:** 978-0766813304. 2nd ed. **ISBN-10:** 142831217X or **ISBN-13:** 978-1428312173.

Noz, M. Maguire, G. Radiation Protection in the Health Sciences, 2nd ed. World Scientific. **ISBN-10:** 981270597X or **ISBN-13:** 978-9812705976.

Grading: Grading will be based upon the total points accumulated throughout the semester A final letter grade will be assigned as a percentage of the total points according to the following scale:

Examination 1	- 30pts	
Examination 2	- 30pts	
Final Examination	- 40pts	
Total Pts Possible		100
A = 93-100		C = 74-77
A- = 90-92		C- = 71-73
B+ = 87-89		D+ = 68-70
B = 84-86		D = 65-67
B- = 81-83		D- = 62-64
C+ = 78-80		F = 0-61

Please remember that your continuation in any health physics or medical imaging program depends on your adherence to the following: maintain a minimum of a 2.50 GPA each semester; have no negative grade points; and, receive a “C” or better in program courses (NUC, CMI, HPS, and RAD).

UNIVERSITY POLICIES:

Academic Misconduct – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <http://studentconduct.unlv.edu/misconduct/policy.html>.

Copyright – The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.

Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) – The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor before or after class to discuss your accommodation needs.

Religious Holidays Policy – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, **September 22, 2015** of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Incomplete Grades - The grade of I – Incomplete – can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade. Please note – Students cannot enroll in other nursing courses if they have an incomplete (I) in a course that is designated as a prerequisite to that course. (Per School of Nursing Policy C-12).

Tutoring – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by calling 702- 895-3177 or visiting the tutoring web site at: <http://academicsuccess.unlv.edu/tutoring/>.

UNLV Writing Center – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

Rebelmail – By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. Emailing within WebCampus is acceptable.

Library Resources –Students may consult with a librarian (www.library.unlv.edu/ consultation) about research needs. For this class, the subject librarian is Xan Goodman. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at www.library.unlv.edu/