

HPS 703 Radiation Interactions and Transport

Instructor: Bing Ma, PhD,
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Office Hours: Monday 11:30-12:30 PM or by appointment

Prerequisite: HPS 701 or consent of instructor

Description: Radiation safety regulations; Radioactive material transportation regulations; Structural shielding design for medical facilities; Radiation transport; Monte Carlo techniques

Textbooks:

McGinley, P, Shielding Techniques for Radiation Oncology Facilities, 2nd Edition, 2002 ISBN-13: 978-1930524071

National Council on Radiation Protection, Report Number 151, Structural Shielding Design and Evaluation for X- and Gamma-Ray Radiotherapy Facilities, 2005 ISBN 0-929600-87-8

National Council on Radiation Protection, Report Number 147, Structural Shielding Design for Medical X-Ray Imaging Facilities, 2004 ISBN 0-929600-83-5

AAPM Task Group 108: PET and PET/CT Shielding requirements. Med. Phys. 33(1), Jan2006

Objectives:

Students will become proficient of practical radiation safety objectives and regulatory requirements in clinical practice including those for patients, members of the general public and staff. Students will learn the principles for designing and installing structural shielding in clinical facilities that satisfies both regulatory requirements and clinical needs. Students will learn to use Monte Carlo techniques for radiation transport calculations.

Tentative Outline of Instruction

Week	Contents
January 20	Radiation protection regulations
January 25	Conventional shield design for X- and Gamma-ray radiotherapy facilities
February 1	Conventional shield design for X- and Gamma-ray radiotherapy facilities
February 8	conventional Maze design for X- and Gamma-ray radiotherapy facilities
February 15	Washington's Birthday Recess
February 22	Mazes and doors for high-energy rooms
February 29	Mazes and doors for high-energy rooms
March 7	Shielding design for medical X-ray imaging facilities
March 14	Exam 1
March 21	Spring break

March 28	Shielding design for medical X-ray imaging facilities
April 4	Methodologies for shielding PET and PET/CT facilities
April 11	Monte Carlo technique for radiation transport
April 18	Monte Carlo technique for radiation transport
April 25	Monte Carlo technique for radiation transport
May 2	Study week
May 9	Exam 2 (3:15-5:15PM)

Homework: Homework assignments are due at **the start of the class period**. **Late homework will be penalized 5% off the total possible points if turned in within the first 24-hour period after the specified due date and time, and 5% per 24-hour period (or fraction of a day) (including weekends) after that time, up to a week after the due date. Late assignments will be accepted with penalty up to one week after the due date. Assignments submitted at any later time without an approved excuse will not be accepted.**

Exams: Two exams will be given. You are expected to know the material well. Reasonable effort is expected from each student. If you need assistance in understanding the material, please ask for it. Students must take each examination at the scheduled time. If a student is unable to take an examination at the scheduled time, the student must contact the course instructor in writing, in advance, to inform her they will need to take the examination early. Failure to take the exam will result in a zero for the exam. Students must take the final exam at the scheduled time without exception.

Grade Distributions:

Homework	20%
Exam 1	40%
Exam 2	40%

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

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 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 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 me during office hours so that we 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 me 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, **January 31**, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternate time would impose an undue hardship on the instructor or the university that could not have reasonably been avoided. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=4&navoid=164>.

Incomplete Grades - The grade of I – Incomplete – can be granted when a student has satisfactorily completed all course work up to the withdrawal date of 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. A student who receives an I is responsible for making up whatever work was lacking at the end of the 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.

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 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.

Final Examinations – The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

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/

Any other class specific information - (e.g., absences, make-up exams, extra credit policies, plagiarism/cheating consequences, policy on electronic devices, specialized department or college tutoring programs, bringing children to class, policy on recording classroom lectures, etc.).