

University of Nevada, Las Vegas
School of Allied Health Sciences
Department of Health Physics and Diagnostic Sciences

- Course Number:** CMI 330
- Course Title:** Principles of Magnetic Resonance Imaging
- Instructors:** Dr. Steen Madsen (Rm. 347, 702-895-1805)
steen.madsen@unlv.edu
Office hours: by appointment
- Prerequisite:** PHYS 151 and RAD 100, or consent of instructor.
- Credit Hours:** 3
- Description:** The Physics and general principles of magnetic resonance imaging (MRI) are emphasized. Instrumentation and image acquisition are also discussed.
- Objectives:** To provide the student with an understanding of the fundamental principles of MRI. Of Clinical relevance, the student will be able to explain how images are acquired and how to optimize image quality.
- Schedule:** One 2.5-hour class period. Monday 4:00 – 6:45, WRI-C225

Instructional Methodology:

1. Teaching Methods
 - a. Lectures
 - b. In-class problem sets
2. Teaching Aids
 - a. Whiteboard
 - b. Overheads
 - c. PowerPoint
 - d. Handouts
3. Students will be responsible for
 - a. All lecture material
 - b. All problem sets

Student Evaluation:

The grades are distributed as follows:

- Exam #1 – 20%
- Exam #2 – 20%
- Problem sets – 20%
- Presentation – 10%
- Final Exam – 30%

Students unable to take exams #1 and #2 at the designated time will be given the opportunity to take them within one week of the regularly scheduled exam. If a student fails to take the exam within the one week grace period, he/she will fail the exam. Students must take the final exam at the scheduled time without exception. The final exam is comprehensive and therefore covers all materials taken during the semester. In addition to the exams and problem sets, students will be responsible for a 10-minute presentation on any topic related to MR physics and instrumentation.

Grading:

<i>Grade Points</i>	<i>Letter Grade</i>
94+	A
90-93	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+
73-76	C
70-72	C-
60-69	D
<60	F

Required Texts* and Supplemental Reading:

*Stewart C. Bushong and Geoffrey Clarke, *Magnetic Resonance Imaging: Physical and Biological Principles* (4th ed., 2015).

Catherine Westbrook, Carolyn K. Roth and John Talbot, *MRI in Practice* (3rd ed., 2005).

Outline of Instruction (Tentative):

Date	Topic
Aug. 24	Introduction, electricity and magnetism
31	Electricity and magnetism
Sept. 7	Labor Day Recess
14	Nuclear magnetism
21	RF pulse sequences; MR imaging signals; MR imaging parameters
28	Exam #1
Oct. 5	Measurement of relaxation times
12	Fourier transforms in MR, Common MR artifacts
19	Signal encoding; Spin echo and gradient echo techniques
26	Motion, flow, MRA and contrast agents
Nov. 2	Exam #2
9	Perfusion/diffusion imaging,
16	MR imaging hardware
23	Presentations
30	Biological effects of MRI
Dec. 7	Final Exam

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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.

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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).

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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/