New Course Request

Check Appropriate Boxes: Undergraduate credit [✓] Graduate credit [ ] Professional credit [ ]

1. School/Division Radiologic Sciences/School of Medicine
2. Academic Subject Code RADI

3. Course Number RADI-R429 (must be cleared with University Enrollment Services)
4. Instructor Golali Naziripour

5. Course Title Magnetic Resonance Imaging Physics

Recommended Abbreviation (Optional) (Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): Spring 2011

7. Credit Hours: Fixed at _______ or Variable from _______ to _______

8. Is this course to be graded S-F (only)? Yes [✓] No [ ]

9. Is variable title approval being requested? Yes [ ] No [✓]

10. Course description (not to exceed 50 words) for Bulletin publication:
Instruction into the physical principles of Magnetic Resonance Imaging and image formation.

11. Lecture Contact Hours: Fixed at _______ or Variable from _______ to _______.

12. Non-Lecture Contact Hours: Fixed at _______ or Variable from _______ to _______.

13. Estimated enrollment: _______ of which _______ percent are expected to be graduate students.

14. Frequency of scheduling: [ ] Once per year [✓] Will this course be required for majors? yes

15. Justification for new course: The course is currently under the R408 variable title topics course. New course number is to help alleviate confusion.

16. Are the necessary reading materials currently available in the appropriate library? [✓]

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by: ___________________________ Date 11/19/09
Department Chairman/Division Director

Approved by: ___________________________ Date 12/10/09
Dean

Dean of Graduate School (when required) Date _____________

Chancellor/Vice-President Date _______

University Enrollment Services Date _______

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724
Medical Imaging  RADI R429
Magnetic Resonance Imaging Physics
Spring Semester 2009

April 3 to May 8,

One credit hour
Lecturer Al Naziripour, MSc, Ph.D

Lecture:: Friday, 8.0 9.15 am, 9.30-10:50.0 am,

email: :gonaziri@iupui.edu

Phone:: (317) 274-5190

Office: hours: My "official" office hours - IUPUI Radiology 118

Tuesday and Thursday afternoon 11.30 to 12.30 Am

"Unofficial" office hours: almost any time during the week I am here, some Saturdays and Sundays.

Feel free to schedule a time to meet if none of these times fit you - my time is your time!

Please read the entire syllabus carefully; you are responsible for all of the requirements and procedures described here. You are also responsible for all announcements, assignments, changes, etc., whether or not you are in class.

Class Etiquette:
The lecture period is a time for learning. Inappropriate talking, eating, or working on other coursework during the class session is not acceptable. If the instructor notices behavior that is not conducive to the proper functioning of the class, the involved student(s) will be asked to leave. Cell phones must be turned off. Personal pagers must be on vibrate, not audible. Use of laptops with wireless internet connection should be restricted to notetaking or searching for course-related information. Inappropriate use of laptops will result in loss of privilege during class session.
Objective:
Magnetic resonance Review designed for the junior or the senior Advanced Medical Imaging student. This course will provide an exciting opportunity for the participant to become better acquainted with the physics of magnetic resonance and its practical application to medical imaging. Instrumentation will be linked to the magnetic resonance through experiments on the program's MRI Machine. This course was designed with the content outline provided by the American Registry of Diagnostic Medical MRI in Physics. Participants will integrate course material with practical aspects of MRI imaging in their clinical experiences. At the conclusion of this course, the Diagnostic Medical student will be better prepared to enter the advanced level course work and also be better prepared for clinical rotations.

COURSE GOALS
Upon completion of Physics of MRI, the participant will be able to:
1. Discuss the principle magnetic resonance imaging and its application to clinical examination.

2. Discuss Magnetic Resonance Phenomena in the human body.

LEARNING RESOURCES
REQUIRED READING MATERIALS:
Review all lectures notes that are stored on Oncourse

SUGGESTED RESOURCES
MRI made easy, BERLEX LABORATORIES, Shild Hans H.


**ASSESSMENT AND EVALUATION**

Each participant is expected to attend all lectures that are provided and to participate in the demonstrations that are provided.

Each participant is expected to inform the instructor about any accommodations that need to be made in order to fulfill course requirements.

Each participant is expected to inform the instructor about any accommodations that need to be made in regards to testing.

Final Grades will be based on the following percentages:

- Homework: 10%
- Class Participation: 10%
- Miniexams: 30%
- Comprehensive Final Exam: 50%

**Total: 100%**

Grading Scale - letter grades will be awarded on the following scale:

- A: 94 and above
- A-: 93-91
- B+: 90-88
- B: 87-84
- B-: 83-81
- C+: 80-78
- C: 77-74
- C-: 73-71
- D+: 70-68
- D: 67-64
- D-: 63-60
- F: 59-69

**Tentative Schedule**

1. **Elementary Principles:**
   - Fundamentals of imaging technologies in ultrasound, CT, fluoroscopy, MRT and Nuclear medicine
     - Vector
     - Magnetism
     - Magnetism (Dia, Para, ferro)
     - Magnet
       1. Permanent
       2. Electromagnet (regular and superconducting magnet)
     - Magnetic field (units)
     - Laws of Electricity and Magnetism
     - Electromagnetic wave
Principles of waves, longitudinal and transverse wave, Frequency range and their name, Units and parameters of waves, changes of propagation speed with frequency.

II. Magnetic resonance Principle
   a. Precession and the Larmor Equation
   b. Axis Convention
   c. Perturbance of the M Vector
   d. Rotation Frame of Reference
   e. Resonance:

Magnetic resonance

III. Image Production:
Imaging.

IV. Evaluation
Operation

V. Review & Examination

Magnetic Resonance Imaging(MRI) R408-24940
Indiana University
Medical center
Spring Semester 2009

<table>
<thead>
<tr>
<th>Week/date</th>
<th>Lesson</th>
<th>Topics</th>
<th>Section to read</th>
<th>Assignment</th>
<th>Exam</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>Lesson 1</td>
<td>The fundamental of Magnetic resonance</td>
<td>Chapters 1, 2 and 3</td>
<td>No assignment are due</td>
<td>Basic physic Vectors, electricity magnetis and waves</td>
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<td>March 28</td>
<td></td>
<td></td>
<td><em>Hand out</em></td>
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<tr>
<td>Week 2</td>
<td>Lesson 2</td>
<td>Magnetic resonance Instrumentation</td>
<td>Chapter 5 and 8</td>
<td>Homework 1 from lesson 1 is due</td>
<td>Mini Exam 1 From lesson 1</td>
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<td>April 4</td>
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<td><em>Hand out</em></td>
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<td>Week 3</td>
<td>Lesson 3</td>
<td>Image Production and Evaluation</td>
<td>Chapter 6, 7 and 8 Hand out</td>
<td>Homework 2 from lesson 2 is due</td>
<td>Mini Exam II From lesson 2</td>
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<tr>
<td>April 11</td>
<td>Lesson 4</td>
<td>Radiation safety</td>
<td>Hand out</td>
<td>Homework 3</td>
<td>Mini Exam III From lesson 3</td>
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<td>Week 5</td>
<td>Lesson 5</td>
<td>Review and final exam</td>
<td>Read all chapters</td>
<td>Homework 4 From lesson 4</td>
<td>Comprehensive Final exam</td>
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