Physics 122&123

Physics of Medical Imaging: Magnetic Resonance

Spring Semester 2022

2-credit students: Register for PHY 122 only
3-credit students: Register for PHY 122 AND PHY 123

SYLLABUS (Please read carefully)

PHY 122&123 emphasizes ideas and concepts of modern physics that are used in the particular medical imaging technique of Magnetic Resonance Imaging (MRI). The main physical effect behind MRI is Nuclear Magnetic Resonance (NMR). The physical principles of NMR are a little more complex to study than those of other imaging techniques; however, NMR is so widely used in medicine and research, for imaging as well as for spectroscopy, that it is worth the effort.

Learning Outcomes

This course assumes that students have already had introductory physics courses covering classical mechanics, electromagnetism, and some introductory quantum mechanics. After this course, students will acquire deeper knowledge in atomic and nuclear physics, as well as electromagnetism and quantum mechanics.

Instructor

Prof. Paola M. Cereghetti
pmc5@lehigh.edu
Office: LL 410
Office hours: I will be available after each class. Please e-mail me if you need to meet at another time.

Class Meetings

Monday and Wednesday: From 4:25pm to 5:40pm in room LL511.

While 3-credit students will take all classes, 2-credit students will take classes during week 1 through 8 of the semester; week 13 will be off for everybody to prepare the final presentation, and week 14 is back on for everybody to carry out end of semester presentations.

Textbook and Class Notes

No textbook is required, I will be teaching from a variety of sources, and I will provide the material. Two interesting books are: 1. *Physics of Medical Imaging (3rd. edition)* by Jerrold T. Bushberg *et al*., and 2. *Introduction to Physics in Modern Medicine (2nd. edition)* by Suzanne Amador Kane *et al*. The second book is more introductory, but excellent in its simplicity and clarity.

Homework

Homework will be assigned every week and will be due the following one. The homework will be in the form of reading assignments and/or problems pertinent to the imaging technique we are learning. Reading and problem solving are designed to help the students clarify the material.

Attendance

Attendance is mandatory and will count towards your course grade. Should you miss a class for a valid reason or other extenuating circumstances, please: 1. Let me know, possibly in advance, an e-mail is enough; 2. Talk with me to discuss your absence and to make sure you understand the material you missed.

Semester Project (NO Exams)

You will be assigned a topic of your choice, and you will have to complete a couple of assignments revolving around that topic. At the end of the semester, you will merge those assignments into your semester/final report and that will also be the topic of your presentation to the class during Week 14 of the semester (8 mins presentation for 2-credit students, 12 mins presentation for 3-credit students).

Grading:

Your grade in the course will be determined based on class participation, attendance, homework, the quality of your semester project and presentation. There are no exams in this course.

Accommodations for Students with Disabilities:

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at https://studentaffairs.lehigh.edu/disabilities .

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community [http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf]. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Student Senate Statement on Academic Integrity

We, the Lehigh University Student Senate, as the standing representative body of all undergraduates, reaffirm the duty and obligation of students to meet and uphold the highest principles and values of personal, moral and ethical conduct. As partners in our educational community, both students and faculty share the responsibility for promoting and helping to ensure an environment of academic integrity. As such, each student is expected to complete all academic course work in accordance to the standards set forth by the faculty and in compliance with the University's Code of Conduct.