

M219: Introduction to Magnetic Resonance Imaging (MRI)

Winter 2022

Lectures: Mon/Wed 2pm – 3:50pm

BH-173, CHS, Bauer Auditorium

Instructors:

Kyung Sung: 310-267-6842, ksung@mednet.ucla.edu

Holden Wu (Guest Lecturer)

Albert Thomas (Guest Lecturer)

Ben Ellingson (Guest Lecturer)

Learning Objectives:

To introduce the students to the fundamental principles of magnetic resonance imaging.

To demonstrate basic applications of MRI.

Grading Structure:

There will be 3 homework assignments and a final exam.

- Homework: 60%
- Class Participation: 10%
- Final Exam: 30%

Course Schedule:

Lecture	Date	Topic
#1	Jan 3, 2022	Introduction
#2	Jan 5, 2022	MRI Systems I: B0
Homework #1 out		
#3	Jan 10, 2022	Bulk Magnetization and Nuclear Precession
#4	Jan 12, 2022	MRI Systems II: B1
#5	Jan 17, 2022	MLK Holiday
#6	Jan 19, 2022	Bloch Equations and Relaxation / MRI Signal Detection
#7	Jan 24, 2022	MRI Systems III: Gradients
Homework #1 due, Homework #2 out		
#8	Jan 26, 2022	Fundamental Math of MRI
#9	Jan 31, 2022	Spatial Localization I
#10	Feb 2, 2022	Spatial Localization II
#11	Feb 7, 2022	MRI Signal Equation and Basic Image Reconstruction (by Holden Wu)
#12	Feb 9, 2022	Fast Imaging and Advanced Image Reconstruction (by Holden Wu)
Homework #2 due, Homework #3 out		
#13	Feb 14, 2022	Basics of MR Spectroscopy (by Dr. Albert Thomas)
#14	Feb 16, 2022	Fast MR Spectroscopic Imaging (by Dr. Albert Thomas)
#15	Feb 21, 2022	Presidents' Day Holiday
#16	Feb 23, 2022	Basic Pulse Sequences I: Saturation Recovery and Inversion Recovery (by Dr. Ben Ellingson)
#17	Feb 28, 2022	Basic Pulse Sequences II: Gradient Echoes (by Dr. Ben Ellingson)
#18	Mar 2, 2022	Basic Pulse Sequences III: Spin Echoes
Homework #3 due		
#19	Mar 7, 2022	Imperfections and Artifacts (by Dr. Holden Wu)
#20	Mar 9, 2022	MRI Safety (by Dr. Albert Thomas)
Mar 14-18		Final Exam