Washtenaw Community College Comprehensive Report

MRI 162 MRI Pulsed Sequence, Imaging Options, and Parameters
Effective Term: Fall 2022

Course Cover

College: Health Sciences
Division: Health Sciences
Department: Allied Health
Discipline: Magnetic Resonance Imaging
Course Number: 162
Org Number: 15600
Full Course Title: MRI Pulsed Sequence, Imaging Options, and Parameters
Transcript Title: MRI Pulse Sequence
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: Inactivation
Change Information:
Consultation with all departments affected by this course is required.
Rationale: The program is being reduced, and this course is being inactivated and removed from the program. The content in this course will be incorporated into an existing course.
Proposed Start Semester: Fall 2022
Course Description: In this course, students learn the parameters and imaging options necessary to create quality magnetic resonance (MR) images. Topics include magnetic resonance (MR) pulse sequences, image formation, and image contrast. The pulse sequences covered are spin echo, fast spin echo, gradient echo, inversion recovery, echo planar, parallel imaging, and spectroscopy. Tissue characteristics, contrast agents, and post-processing techniques are also covered.

Course Credit Hours

Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
Lab: Instructor: 0 **Student:** 0
Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 30 **Student:** 30
Repeatable for Credit: NO
Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Requisites

Enrollment Restrictions
Admission to Magnetic Resonance Imaging (MRI) program

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Identify the pulse sequences commonly used in Magnetic Resonance Imaging (MRI).
   Assessment 1
   Assessment Tool: Departmental final exam
   Assessment Date: Spring/Summer 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: answer key
   Standard of success to be used for this assessment: 80% of the students will score 70% or higher on each related outcome question.
   Who will score and analyze the data: Departmental Faculty

2. Recognize the Magnetic Resonance Imaging (MRI) parameters involved in MR image formation.
   Assessment 1
   Assessment Tool: Departmental final exam
   Assessment Date: Spring/Summer 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: answer key
   Standard of success to be used for this assessment: 80% of the students will score 70% or higher on each related outcome question.
   Who will score and analyze the data: Departmental Faculty

3. Identify imaging options used to obtain diagnostic magnetic resonance (MR) images.
   Assessment 1
   Assessment Tool: Departmental final exam
   Assessment Date: Spring/Summer 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
   How the assessment will be scored: answer key
   Standard of success to be used for this assessment: 80% of the students will score 70% or higher on each related outcome question.
   Who will score and analyze the data: Departmental Faculty

Course Objectives

1. List and explain the design and application of Magnetic Resonance Imaging (MRI) pulse sequences.
2. List and describe the use of contrast agents in Magnetic Resonance Imaging (MRI).
3. Analyze the effects imaging parameters have on magnetic resonance (MR) signal and contrast.
4. Explain what is meant by a weighted magnetic resonance (MR) image.
5. Describe image contrast appearance according to image weighting.
6. Name the basic tissue magnetic characteristics that are the sources of contrast in magnetic resonance images.
7. Recognize image artifacts, their cause and how to avoid them.
8. Differentiate between spin echo and inversion recovery.
9. Explain how the EPI sequence differs from other sequences.
10. Discuss rapid imaging techniques.

11. List imaging parameters and explain how they influence the appearance of the magnetic resonance (MR) image.
12. List parameters related to tissue characteristics that affect image contrast.
13. Explain how repetition time, echo time, inversion time and flip angle affect image production.
14. Describe how imaging parameters determine spatial resolution on magnetic resonance (MR) images.
15. Discuss the basic physical principles of Magnetic Resonance Spectroscopy (MRS).
16. Identify the major imaging issues that must be considered when selecting or adjusting an imaging protocol for a specific clinical procedure.
17. Explain and illustrate how to change TR (repetition time).
18. Explain and illustrate how to change TE (echo time).
19. Explain the use of gradient and radiofrequency (RF) pulses in acquiring MR images.
20. Explain the operation of inversion recovery and gradient echo pulse sequences.

New Resources for Course

No new resources are required for this course.

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Level III classroom
Other: OE 121 Radiography Lab

Reviewer	Action	Date
Faculty Preparer:		
Catherine Blaesing	*Faculty Preparer*	*Nov 04, 2021*
Department Chair/Area Director:		
Kristina Sprague	*Recommend Approval*	*Nov 05, 2021*
Dean:		
Shari Lambert	*Recommend Approval*	*Nov 12, 2021*
Curriculum Committee Chair:		
Randy Van Wagnen	*Reviewed*	*Feb 07, 2022*
Assessment Committee Chair:		
Vice President for Instruction:		
Kimberly Hurns	*Approve*	*Feb 11, 2022*

Washtenaw Community College Comprehensive Report

MRI 162 MRI Pulsed Sequence, Imaging Options, and Parameters
Effective Term: Fall 2015

Course Cover

Division: Math, Science and Health
Department: Allied Health
Discipline: Magnetic Resonance Imaging
Course Number: 162
Org Number: 15600
Full Course Title: MRI Pulsed Sequence, Imaging Options, and Parameters
Transcript Title: MRI Pulse Sequence
Is Consultation with other department(s) required: No
Publish in the Following: College Catalog , Time Schedule , Web Page
Reason for Submission: New Course
Change Information:
Rationale: This is a required course for the Magnetic Resonance Imaging (MRI) Program
Proposed Start Semester: Spring/Summer 2016
Course Description: In this course, students learn the parameters and imaging options necessary to create quality magnetic resonance (MR) images. Topics include magnetic resonance (MR) pulse sequences, image formation, and image contrast. The pulse sequences covered are spin echo, fast spin echo, gradient echo, inversion recovery, echo planar, parallel imaging, and spectroscopy. Tissue characteristics, contrast agents, and post-processing techniques are also covered.

Course Credit Hours

Variable hours: No
Credits: 2
Lecture Hours: Instructor: 30 **Student:** 30
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Grading Methods: Letter Grades
Audit
Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Requisites

Enrollment Restrictions
Admission to the Magnetic Resonance Imaging (MRI) program

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Identify the pulse sequences commonly used in Magnetic Resonance Imaging (MRI).
   Assessment 1
   Assessment Tool: Departmental final exam
   Assessment Date: Spring/Summer 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
   Number students to be assessed: All students
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   Assessment Tool: Departmental final exam
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3. Identify imaging options used to obtain diagnostic magnetic resonance (MR) images.
   Assessment 1
   Assessment Tool: Departmental final exam
   Assessment Date: Spring/Summer 2019
   Assessment Cycle: Every Three Years
   Course section(s)/other population: All sections
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Course Objectives

1. List and explain the design and application of Magnetic Resonance Imaging (MRI) pulse sequences.
   Matched Outcomes
2. List and describe the use of contrast agents in Magnetic Resonance Imaging (MRI).
   Matched Outcomes
3. Analyze the effects imaging parameters have on magnetic resonance (MR) signal and contrast.
   Matched Outcomes
4. Explain what is meant by a weighted magnetic resonance (MR) image.
   Matched Outcomes
5. Describe image contrast appearance according to image weighting.
   Matched Outcomes
6. Name the basic tissue magnetic characteristics that are the sources of contrast in magnetic resonance images.
   Matched Outcomes
7. Recognize image artifacts, their cause and how to avoid them.
   Matched Outcomes
8. Differentiate between spin echo and inversion recovery.
   Matched Outcomes

9. Explain how the EPI sequence differs from other sequences.
   Matched Outcomes
10. Discuss rapid imaging techniques.
   Matched Outcomes
11. List imaging parameters and explain how they influence the appearance of the magnetic resonance (MR) image.
   Matched Outcomes
12. List parameters related to tissue characteristics that affect image contrast.
   Matched Outcomes
13. Explain how repetition time, echo time, inversion time and flip angle affect image production.
   Matched Outcomes
14. Describe how imaging parameters determine spatial resolution on magnetic resonance (MR) images.
   Matched Outcomes
15. Discuss the basic physical principles of Magnetic Resonance Spectroscopy (MRS).
   Matched Outcomes
16. Identify the major imaging issues that must be considered when selecting or adjusting an imaging protocol for a specific clinical procedure.
   Matched Outcomes
17. Explain and illustrate how to change TR (repetition time).
   Matched Outcomes
18. Explain and illustrate how to change TE (echo time).
   Matched Outcomes
19. Explain the use of gradient and radiofrequency (RF) pulses in acquiring MR images.
   Matched Outcomes
20. Explain the operation of inversion recovery and gradient echo pulse sequences.
   Matched Outcomes

New Resources for Course

No new resources are required for this course.

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

Level III classroom
Other: OE 121 Radiography Lab

Reviewer	Action	Date
Faculty Preparer:		
Connie Foster	*Faculty Preparer*	*Nov 18, 2014*
Department Chair/Area Director:		
Connie Foster	*Recommend Approval*	*Nov 18, 2014*
Dean:		
Kristin Brandemuehl	*Recommend Approval*	*Nov 19, 2014*
Vice President for Instruction:		
Bill Abernethy	*Approve*	*Jan 05, 2015*