BROWARD COLLEGE
COURSE OUTLINE

LAST REVIEW: **2009-2010** *(i.e. 2003-2004)* **NEXT REVIEW:** **2014-2015** *(i.e. 2008-2009)* **STATUS:** **A** *(A, I, D)*

COURSE TITLE: Introduction to Magnetic Resonance Imaging

COMMON COURSE NUMBER: RTE2575

CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN *(per 16 week term)*

CLOCK HOURS: *(Voc. Course ONLY)*

Lecture: **48** Lab:

Clinic: Other:

PREREQUISITE(S): Graduation from an Accreditated Health Science Program

COREQUISITE(S): **NONE**

PRE/COREQUISITE(S): **NONE**

COURSE DESCRIPTION *(750 characters, maximum)*:

A study of the clinical applications and principles of magnetic resonance imaging, Basic MR physics, history, hardware, safety, and important aspects of the MR exam are among the topics covered to introduce the student to the MR imaging technology profession.

UNIT TITLES

1. Introduction to Magnetic Resonance Imaging
2. Physical Principles of MRI
3. MR Hardware
4. Spatial Encoding
5. MR Anatomy
6. Artifacts
7. Safety
8. Site Planning

Common Course Number: RTE2575

UNITS

Unit 1 Introduction to MR Imaging

General Outcome:

1.0 **The student shall:** Be able to demonstrate an understanding of the care required by those undergoing an MR exam. Understand contraindications to an MR exam. Develop an ability to manipulate MR parameters in order to obtain the best examination of the area of interest. Develop an understanding of the basic physics of MR imaging.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

1.1 Identify who Felix Bloch was

1.2 Define “pixel”

1.3 Define “voxel”

1.4 Describe what constitutes an NMR signal

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Unit 2 Physical Principles of MRI

General Outcome:

2.0 The student shall:

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

2.1 Describe dipole

2.2 Describe magnetic induction

2.3 Identify where MR radio frequency fits in the electromagnetic spectrum

2.4 Explain how net magnetization is utilized to generate NMR signal

2.5 Discuss the factors that affect processional frequency

2.6 Explain how a 90 percent RF pulse is generated and how it affects MZ

2.7 Discuss free induction decay

2.8 Discuss how Fourier transportation affects NRM Signal

2.9 Discuss how proton density affects signal intensity

2.10 Define T1 relaxation time

2.11 Define T2 relaxation time

2.12 Describe phase coherence

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Unit 3 Magnetic Resonance Hardware

General Outcome:

3.0 The student shall:

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

3.1 Discuss the differences between permanent, resistive and super-conducting magnets

3.2 Define cryogen, cryostat, dewar, transfill

3.3 Describe the operation of the table and gentry

3.4 Discuss the types of receiving coils and their use

3.5 Describe how shimming affects homogeneity

3.6 Describe hard-copy production

3.7 Discuss image storage hardware

3.8 Describe the operator console

3.9 Discuss the MR IP, AP and computer

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Unit 4 Spatial Encoding and Pulse Sequences

General Outcome:

4.0 The student shall:

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

4.1 Discuss Slice selection and its relation to Larmoor frequency

4.2 Discuss phase and phase encoding

4.3 Discuss frequency encoding

4.4 Describe how a voxel is located in a slice volume by spatial encoding

4.5 Define: TR, TE, TI, matrix signal-averaging, spin-echo and inversion recovery

4.6 Describe the effect parameter manipulation has on signal intensity

4.7 Interpret a simple pulse-sequence diagram

4.8 Discuss the sequence of events needed to produce partial saturation, spin-echo and inversion-recovery images