

Course Specification

RARD 513: Physics of Diagnostic Imaging

Institution Name: Mahidol University

Campus/Faculty/Department: Faculty of Medicine, Ramathibodi Hospital, Department of Diagnostic and Therapeutic Radiology

Section 1: General information

1. Course number and name

Course number: RARD 513

Course name: Physics of Diagnostic Imaging

2. Credits: 2(2-0-2)

3. Curriculum and type of course

3.1 Curriculum: Physics of Diagnostic Imaging

3.2 Type of course: core course

4. Instructors

4.1 Course Coordinator: Asst.Prof. Dr. Sawwanee Asaaphatiboon

4.2 Instructors:

Asst.Prof. Dr. Sawwanee Asaaphatiboon

Asst.Prof. Dr.Napapong Pongnapang

5. Semester/Year: 1stSemester, Academic Year 2019, 1styear students

6. Pre-requisite: Radiation and Nuclear Physics

7. Co – requisites: None

8. Classroom: To be announced

9. Revision Date: 31st July 2019

Note: Revised course learning outcome, course description, and evaluation

Section 2: Purpose and objective

1. Course Learning Outcomes

- 1.1 Student can identify physical concepts of diagnostic radiology
- 1.2 Student can explain physics, evolution and safety of each modality in diagnostic radiology
- 1.3 Student can identify the components, the difference of diagnostic equipment and detectors and application of diagnostic radiology
- 1.4 Student can understand concept of image quality and quality control of each modality
- 1.5 Student can understand and apply TRS 457 to perform dosimetry in diagnostic equipment

Section 3: Course details

1. Course Description

Principle of physics; application and quality control of diagnostic imaging systems including conventional radiography, mammography, fluoroscopy, computed tomography (CT), ultrasound, electronic imaging, magnetic resonance imaging (MRI) systems including Technical report series 457 (TRS 457): dosimetry in diagnostic radiology an international code of practice.

2. Hours per semester:

Lecture 30 hours

Self-study 30 hours

3. Assignments feedback: Within 2-4 weeks

Section 4: Course Learning Outcomes

Course level learning outcomes	Programme level learning outcomes	Methods	Assessment
1. Student can identify physical concepts of diagnostic radiology	ELO 2	- Lecture - Class discussion - Assigned readings	- Examination
2. Student can explain physics, evolution and safety of each modality in diagnostic radiology	ELO 2	- Lecture - Class discussion - Assigned readings	- Examination
3. Student can identify the components, the difference of diagnostic equipment and detectors and application of diagnostic radiology	ELO 2	- Lecture - Class discussion - Assigned readings	- Examination
4. Student can understand concept of image quality and quality control of each modality	ELO 1,2	- Lecture - Class discussion - Assigned readings	- Examination
5. Student can understand and apply TRS 457 to perform dosimetry in diagnostic equipment	ELO 1, 2,4,5	- Lecture - Class discussion - Assigned readings	- Examination
6. Student can value the professional conduct of diagnostic radiology	ELO 4,5	- Assigned readings	- Rubric writing assessment

Section 5: Lesson plan and assessment

1. Lesson plan

Time(hr)	Topics	Instructors	Method	Assessment
15 min	Subject introduction	Lect.Dr.Sawwanee		
2	Physical concepts of diagnostic radiology I	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Physical concepts of diagnostic radiology II	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Screen-film radiography	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Computed Radiography and Digital Radiography	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Mammography	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Fluoroscopy	Lect.Dr.Sawwanee	- Lecture - Class discussion	Examination
2	Ultrasonography I and II	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Ultrasonography I and II	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Electronic Imaging	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Computed Tomography I	Lect.Dr.Sawwanee	- Lecture - Class discussion	Examination

Time(hr)	Topics	Instructors	Method	Assessment
2	Computed Tomography II	Lect.Dr.Sawwane	- Lecture - Class discussion	Examination
2	Magnetic Resonance Imaging I	Lect.Dr.Sawwane	- Lecture - Class discussion	Examination
2	Magnetic Resonance Imaging II	Lect.Dr.Sawwane	- Lecture - Class discussion	Examination
2	Basic imaging concepts and their relationships I	Lect.Dr.Napapong	- Lecture - Class discussion	Examination
2	Basic imaging concepts and their relationships II	Lect.Dr.Napapong	- Lecture - Class discussion	Examination

2. Measurement and Evaluation of Student Achievement

2.1 Theory Examination (short, long answer questions) 80%

2.2 Class discussion 20%

Section 6: Assessment and improvement of the course operation

1. Strategies to assess the effectiveness of the courses by the students

Assessment of instructor's teaching by student

2. Strategy to assess the instruction

Assessment of students' learning records

Assessment of instructor's teaching by student

3. Improvement of Instruction

Consider the students' learning records

Consider the students' assessment of instructor's teaching

Consider the program committee's comment

4. Verification of student achievement in the subject

By program committee and faculty-level academic committee

5. Review and action plan to improve the effectiveness of the course

Using the results from 1 - 4 as inputs to the instruction improvement

Learning Resources

1. William E. Brant, Clyde A. Helms. Fundamentals of Diagnostic Radiology, Fourth Edition. Lippincott Williams & Wilkins. 2006.
2. <http://www.sprawls.org/resources/>
3. <https://www.imaios.com/en/e-Courses/e-MR>
4. Stark DD. Magnetic resonance imaging. 3rd ed. St. Louis : Mosby; 1991.
5. Mitchell DG. MRI principles. Philadelphia : Saunders; 1991.
6. Seeram E. Computed tomography : Physical principles, clinical application and quality control. Philadelphia : Saunders; 2001.
7. Bushberg JT. The essential physics of medical imaging. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2011.