

Course Specification

RARD 635: Advanced Imaging for Radiation Therapy

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 635
Course name: Advanced Imaging for Radiation Therapy

2. Credits: 1(1-0-2)

3. Curriculum and type of course

3.1 Curriculum: Advanced Imaging for Radiation Therapy
3.2 Type of course: Elective course

4. Instructors

4.1 Course Coordinator: Lect.Dr.Puangpen Tangboonduangjit
4.2 Instructors
Lect.Dr.Puangpen Tangboonduangjit

5. Semester/Year: 1stSemester, Academic Year 2020, 2ndyear students

6. Pre-requisite: RARD 524 Physics of Radiation Therapy
RARD 628 Advanced techniques for Radiotherapy

7. Co-requisite: None

8. Classroom: To be announced

9. Revision Date: Nov 2019 **By:** Committee

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

Section 2: Purpose and objective

1. Course Learning Outcomes

Understand, perform and evaluate the accuracy of advanced images for contouring, registration, treatment planning, and delivery for multimodalities i.e., CT, PET-CT, MRI, CBCT, and MVCT

Section 3: Course details

1. Course description

Physics of CT-simulator, 4D-CT, PET-CT, and MRI-simulator images; image-guided radiotherapy using CBCT or MVCT; imaging applications for contouring, registration, treatment planning, and delivery

2. *Hours per semester:* Lecture 15 hours

3. *Assignment feedback:* Within 2 weeks

Section 4: Course Learning Outcomes

Course level learning outcomes	Programme level learning outcomes	Methods	Assessment
Understand, perform and evaluate the accuracy of advanced images for contouring, registration, treatment planning, and delivery for multimodalities i.e., CT, PET-CT, MRI, CBCT, and MVCT	ELO 2, 6	-Lecture -Demonstration -Hands on	- Paper Examination - Assignment

Section 5: Lesson plan and assessment

1. Lesson plan

Time	Topics	Instructors	Method	Assessment
2	Physics of CT-simulator, 4D-CT, and PET-CT images	Lect.Dr.PuangpenTangboongjit	Lecture/ Demonstration	Paper exam
2	Physics of MRI-simulator images	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
2	Image-guided radiotherapy using CBCT or MVCT	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
3	Imaging applications for contouring, registration, treatment planning, and delivery I	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	Assignment
3	Imaging applications for contouring, registration, treatment planning, and delivery II	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
3	Imaging applications for contouring, registration, treatment planning, and delivery III	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	

2. Measurement and Evaluation of Student Achievement

2.1	Theory (short answer questions)	40%
2.2	Assignment	60%

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. Seeram E. Computed tomography : Physical principles, clinical application and quality control. Philadelphia : Saunders; 2001.
3. Bushberg JT. The essential physics of medical imaging. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2011.
4. Cherry, S.R., Sorenson, J.A. and Phelps, M.E., 2012. Physics in Nuclear Medicine E-Book. Elsevier Health Sciences.
5. John L. Meyer. IMRT IGRT SBRT advances in the treatment planning and delivery of radiotherapy. Karger 2007.
6. Kristy K. Brock. Image processing in radiation therapy. 1st ed. CRC Press Taylor&Francis Group, 2013.
7. Arnold Paulino. PET-CT in radiotherapy treatment. 1st ed. Saunders, 2008.