

Course Specification

RARD636 : Monte Carlo in 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.PuangpenTangboonduangjit
4.2 Instructors
Lect.Dr.PuangpenTangboonduangjit

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 and perform the Monte Carlo code and apply the simulation to the radiation machine and radioactive source

Section 3: Course details

1. Course description

Physics of CT-simulator, 4D-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 and perform the Monte Carlo code and apply the simulation to the radiation machine and radioactive source	ELO 2, 6	-Lecture -Demonstration -Hands on	- Paper Examination - Assignment

Section 5: Lesson plan and assessment

1. Lesson plan

Time	Topics	Instructors	Method	Assessment
3	Basic principles of the Monte Carlo method in medical radiation physics and the simulation efficiency of Monte Carlo	Lect.Dr.PuangpenTangboonduangjit	Lecture/ Demonstration	Paper exam
2	Monte Carlo code I	Lect.Dr.PuangpenTangboonduangjit	Lecture/Hands on	

Time	Topics	Instructors	Method	Assessment
2	Monte Carlo code II	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
2	The simulation of linear accelerator machine	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	Assignment
2	The simulation of charged particle machine	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
2	The estimation of the dose distribution in the patient	Lect.Dr.PuangpenTangboongjit	Lecture/Hands on	
2	The simulation of radioactive sources	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. Joao Seco and Frank Verhaegen. Monte Carlo techniques in radiation therapy. CRC Press, Taylor & Francis Group 2013.

