Course Specification

RARD 630: Commissioning and quality assurance for radiotherapy instrumentation

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 630

   Course name: Commissioning and quality assurance for radiotherapy instrumentation

2. ***Credits: 1(0-3-2)***

3. ***Curriculum and type of course***

   3.1 Curriculum: Commissioning and quality assurance for radiotherapy instrumentation

   3.2 Type of course: Major course for Radiation Therapy field

4. ***Instructors***

   4.1 Course Coordinator: Lect.Dr.PuangpenTangboonduangjit

   4.2 Instructors

Lect.Dr. Puangpen	Tangboonduangjit
Lect.Dr. Nauljun	Stansook
Lect.Dr. Suphalak	Khachonkham
Lect. Pimolpun	Changkaew
Lect. Daranee	Piriyasang
Lect. Supaporn	Srisuwan
Lect. Sukanya	Rutchantuek
Lect. Supakiet	Piasantia
Lect. Sithiphong	Suphaphong
Lect.Pongsakorn	Klongpad

5. ***Semester/Year:*** 1st Semester, Academic Year 2020, 2nd year students
6. ***Pre-requisite:*** RARD 524: Physics of Radiation Therapy
7. ***Co-requisite:*** RARD 628: Advanced Techniques for Radiotherapy
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

Be able to perform and evaluate the functioning (acceptance, commissioning, QA) for the components of linear accelerator (mechanic, dosimetric, MLC, image guided), CT-simulator, treatment planning of external beam calculation and brachytherapy system and patient specific QA.

Section 3: Course details

1. Course description

Acceptance test and QA for Linac (mechanic, dosimetric, MLC, image guided), CT-simulator, and brachytherapy system; commissioning for treatment planning system in conventional (beam parameters for manual calculation and 3DCRT) and advanced techniques (IMRT and VMAT); setting up routine patient specific QA.

2. ***Hours per semester:*** Practice 30 hours

3. ***Assignment feedback:*** Within 2 weeks

Section 4: Course Learning Outcomes

Course level learning outcomes	Programme level learning outcomes	Methods	Assessment
Be able to perform and evaluate the functioning (acceptance, commissioning, QA) for the components of linear accelerator (mechanic, dosimetric, MLC, image guided), CT-simulator, treatment planning of external beam calculation and brachytherapy system and patient specific QA.	ELO 2, 4, 6	- Lecture - Demonstration - Experimentation	- Oral/Practical Examination - Rubric experiment report - Rubric participation (performance) assessment

Section 5: Lesson plan and assessment

1. ***Lesson plan***

Time	Topics	Instructors	Method	Assessment
3	LabCQA 1: Acceptance and QA Linac (Mechanic)	A.Pongsakorn/ Dr.Puanpen	- Lecture - Demonstration - Experimentation	- Oral/Practical Examination - Rubric experiment report - Rubric participation (performance) assessment
3	LabCQA 2: Acceptance and QA Linac (IGRT)	K.Pongsakorn/ A.Pimolpun		
3	LabCQA 3: Acceptance and QA Linac (Dosimetry)	Dr.Puanpen/ A. Sittipong		
3	LabCQA 4: Acceptance and QA CT-Simulator	A.Prapa/ A.Pimolpun		
3	LabCQA 5: Commissioning Linac (Beam parameters for manual calculation)	Dr.Nauljun/ A.Supakiet		

3	LabCQA 6: Beam Configuration and TPS commissioning (3DCRT: TRS430/TECDOC 1583)	A.Sukanya/ A.Suphalak		
3	LabCQA 7: Commissioning and QA of MLC	Dr.Puanpen/ A. Sittipong		
3	LabCQA 8: TPS commissioning (IMRT/VMAT: TG119)	A.Sukanya/ Dr.Nauljun		
3	LabCQA 9: Routine patient specific QA	A.Pimolpun/ A.Suphalak		
3	LabCQA 10: Acceptance, commissioning, and QA brachytherapy	A.Daranee/ A.Supakiet		

2. Measurement and Evaluation of Student Achievement

2.1	Writing experiment report	25%
2.3	Oral exam	20%
2.3	Practical exam	30%
2.4	Performance	25%

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. Philip Mayles, Alan Nahum, Jean-Claude Rosenwald. Handbook of radiotherapy physics therory and practice: Talor & Francis Group; 2007
2. Faiz M. Khan. The Physics of Radiation Therapy: Lippincott Williams & Wilkins, a Wolters Kluwer business, 4th edition; 2010
3. Hendee WR, Ibbott GS. Radiation therapy physics, 2nd ed. New Jersey: Wiley-Liss; 2005.
4. Van Dyk J. The modern technology of radiation oncology :a compendium for medical physicists and radiation oncologist.Wisconsin : Medical Physics Publishing; 1999.
5. International Commission on Radiation Units and Measurements. Prescribing, recording and reporting Photon beam therapy (supplement to ICRU Report 50), ICRU Report 62. Bethesda : ICRU; 1999.
6. Glasgow GP, Bourland JD, Grigsby PW, et al. Remote afterloading technology : a report of AAPM task group No.41. New York: American Institute of Physics; 1993.
7. GoddenTJ. physical aspects of brachytherapy, Medical Physics Handbooks 19. Philadelphia: IOP Publishing; 1988
8. International Atomic Energy Agency. The use of plane parallel ionization chambers in high energy electron and photon beams : An international code of practice for dosimetry, Technical Reports Series No. 81. Vienna : International Atomic Energy Agency; 1996.
9. Kubo DH, Glasyow GP, Pethel TD, Thomadsen BR, Williamson JF. High dose- rate brachytherapy treatment delivery: Report of the AAPM Radiation Therapy Committee task group No. 59. Med Phys 1998; 25: 375-403.
10. Fraass B, Doppke K, Hunt M, Kutcher G, Starkschall G, Stern R, van Dyke J. Quality assurance for clinical radiotherapy treatment planning. Med Phys 1998; 25: 1773 – 1829.
11. Constantinou C. Protocol and procedures for quality assurance of linear accelerators. Brockton : Radiation Oncology Department Brockton Hospital; 1993.
12. American Association of Physics in Medicine. Comprehensive QA for radiation oncology: report of AAPM Radiation Therapy Committee task group 40, Med Phys 1994; 21: 581–618.