Program	Level of studies		**Second cycle**	
	Program name		**Physics**	
Course name	**PHYSICS IN RADIOTHERAPY**			
Course ID	Semester	Course status	ECTS credits	L+E
PAP9631	**I**	**ELECTIVE**	**6**	**2+2**
Lecturer	**Prof. dr. Davorin Samek**			
Aims and intended learning outcomes	Aim: to provide students with detailed theoretical and practical knowledge of physics in modern radiotherapy and to prepare students for independent work as medical physicists. Outcomes: master and understand the modern methods and techniques used in clinical radiotherapy and apply them in everyday medical practice			

Course content

1. Introduction. Absorbed dose measurement: Absorbed dose; The relationship between KERMA, exposure and absorbed dose. Calculation of the absorbed dose from the exposure; Calibration protocol for megavoltage beams; Transfer of absorbed dose from one medium to another; Exercises
2. Dose distribution and scatter analysis: Phantoms; Dose depth distribution; Percentage depth dose and dependence on beam parameters; Dosimetry calculation systematics; Linear accelerator calculations (SSDs and isocentric techniques); Co-60 calculations; Irregular and asymmetric fields; Exercises
3. Treatment Planning. Isodose distribution; Isodose diagram; Measurement of the isodose curves; Parameters of isodose curves; Wedge filters; Beam quality influence; Combined radiation fields; Opposite fields; Three-Field Technique; Special fields; Techniques using wedges; Intensity Modulated Radiation Therapy (IMRT), Volumetric modulated arc radiotherapy (VMAT); Total body irradiation (TBI), Stereotactic body radiotherapy and radiosurgery (SBRT and SRS), Image Guided Radiotherapy (IGRT), Gamma-Knife, Simulation and verification of treatment; Exercises
4. Electron Therapy: Electron interactions; Energy loss; Electron scatter; Determination of absorbed dose; Radiation output calibration; Dose depth distribution; Characteristics of clinical electron beam; Treatment planning; Total irradiation of the skin; Large field technique; Exercises.
5. Basics of brachytherapy: Radioactive sources; Construction and protection of sources in brachytherapy; Dose limits and risks; Linear sources; Calibration of brachytherapy sources; Brachytherapy in gynaecology; Brachytherapy dosimetry; Special techniques; exercises
6. Quality Control in Radiotherapy: Planning the structure and number of employees; Equipment; Dosimetry accuracy; Acceptance tests; Periodic quality control; Exercises.

Student workload (hours)		Grading	
Lectures and Exercises	60	Assessment method	Points
Exam preparation	80	Midterm	45
Other	10	Final	45
Total	150	Activity	10
		Total	100

Literature

1. Pdgoršak EB, editor. Review of Radiation Oncology Physics: A Handbook for Teachers and Students. Vienna, Austria: IAEA; 2005.
2. Johns HE, Cunningham JR. The Physics of Radiology. 4th ed. Springfield, IL: Charles C Thomas; 1983.

Remarks

Exercises are performed at the Clinical Centre of Sarajevo University.