COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**PHYSICS OF RADIOTHERAPY. IRRADIATION TECHNIQUES**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]): **SC**	**Term** (1-4): **4**
Level	**Postgraduate (MA)**	**Course type** (Co/El/F[2]): **Co**	

I. Course structure

Number of hours/week				Credits	Total class hours/ semester	Total hours of individual activity	Examination type (C/Ex/CE[3])	Teaching language
Course	Seminar	Lab.	Project	**8**	**84**	**156**	**Ex**	**English**
3	**-**	**3**	**-**					

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Medical Physicist	Dr.	Mihaela DULCESCU	associate
Seminar				
Laboratory	Medical Physicist	Dr.	Mihaela DULCESCU	associate – "Sf. Spirodon" Hospital

III. Prerequisites

Basic knowledge of Radiation Sources, Nuclear Physics, Dosimetry, Radiobiology.

IV. Course objectives

This course provides the necessary practical and theoretical background for the support of a radiotherapy physics service within radiotherapy.

V. Course content

Course	**I. Radiotherapy machines** (Cobalt machines, linear accelerators, therapy with proton beams); **II. Radiotherapy** (informatics used in external exposure, treatment planning, photon beam therapy, electron beam therapy); **III. Conformal radiotherapy** (generalities, patient identification, anatomic data acquisition, beams definition, dose calculation and optimization, verification and treatment realization, volumes and dose determination in conformal radiotherapy); **IV. Intensity-Modulated Radiation Therapy** (principles and methods, importance of radiation intensity modulation in radiotherapy, treatment planning, mathematic modelling of IMRT, optimization algorithms); **V. Virtual simulation of the irradiation technique** (technological possibilities, medical imagery systems for anatomic data acquisition, the transfer of acquisitioned images, informatics used in treatment planning); **VI. Portal imagery** (different systems of portal imagery, comparison of portal imagery, status, limits and future in portal imagery, real time systems in portal imagery, computer programs, quality control, dosimetry through portal imagery); **VII. The treatment planning in three dimensions** (necessary elements, informatics, visualization methods, dose calculations methods, evaluation methods of 3D treatment plan, advantages and disadvantages of using 3D system in treatment planning); **VIII. Time factor in radiotherapy, conformal radiotherapy in the treatment of**

[1] FC – fundamental course, SC – specialty course, CC – complementary course
[2] Co – compulsory, El – elective, F – facultative
[3] C – colloquium, Ex – exam, CE – colloquium AND exam
[4] Professor / Associate professor / Lecturer / Assistant professor / Teaching assistant

	prostate cancer. **IX. Brachyteraphy** (Systems of Implant Dosimetry, Implantation Techniques, Afterloading, Quality Ansurance). **X. Radioprotection** (Principles of radioprotection, Radiation protection surveys, Administrative requirements, Technical requirements).
Laboratory	Investigation of percentage dose distributions on the irradiation beam axis. Determination of Tissue-Air Ratios (TAR). Dosimetric calculation for different protocols of cancer treatment. Quality control methods in radiotherapy. Oncology data bases. Calculation methods applied in the studies of cancer surviving patients.

VI. Minimal required references

[1] International commission on radiation units and measurements. ICRU Report 62, Prescribing, Recording. And Reporting Photon Beam Therapy, Bethesda, MD: ICRU Publications; 2000.

[2] Leksell L. Stereotaxic and surgery. Springfield, IL: Charles C. Thomas; 1967.

[3] Bamber JC, Tristan M. Diagnostic ultrasound in the physics of medical imaging. Web ed Adam Higler 1987;319/387**.**

[4] Abbatucci J, Quint R, Bloquel J, Roussel A, Delozier T. Technique de radiotherapie (photons – electrons) ed. l'ex-pansion scientifique francaise, paris, 1981.

[5] Tubiana M, Dutreix J, Dutreix A. bases physique de la radiotherapie et de la radiobiologie. masson ed. paris, 1963.

[6] Podgorsak E.B. Handbook for Teachers and Students. Review of Radiation Oncology Physics. AIEA, 1998.

VII. Didactic methods

Lectures, class discussion, problems solving, practical works.

VIII. Assessment

Pre-conditions	Attendance (20% from the final grade), active participation to class activities	
Exam dates	**1st Assessment**	**8th week**
	2nd Assessment	**16th week**

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	Written paper	50%
Seminar		
Laboratory	Presentation of a practical/research project	30%