COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**PHYSICAL BASES OF CLINICAL DOSIMETRY**	
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	Lecturer	Dr.	Dan MIHAILESCU	tenure
Seminar				
Laboratory	Lecturer	Dr. Dr.	Dan MIHAILESCU Mihaela DULCESCU	tenure associate – "Sf. Spirodon" Hospital

III. Prerequisites

Interaction of ionizing radiation with matter, Detectors, dosimetry and radioprotection, Radiobiology.

IV. Course objectives

On completion, students should have obtained theoretical and practical knowledge in the field of clinical dosimetry, according to national and international Codes of Practice.

V. Course content

Course	**I. Dosimetric principles, quantities and units** (1. Absorbed dose, Kerma and Cema, Exposure; 2. Stopping powers; Relationships between dosimetric quantities; 3. Cavity theory). **II. Radiation dosimeters** (1. Properties of dosimeters; 2. Ionizing chambers; 3. Film dosimetry; 4. Luminescence dosimetry; 5. Semiconductor dosimetry; 6. Other dosimetry systems; 7. Primary standards). **III. Radiotherapy with external photon beams: physical aspects** (1. Quantities used in describing a photon beam; 2. Dose distributions into a phantom/patient). **IV. Radiotherapy with external electron beams: physical aspects** (1. Dose distributions; 2. Dosimetric parameters of electron beams). **V. Dosimetry of electron and photon beams. Calibration of electron and photon beams** (1. Dosimetric methods; 2. Dosimetric protocols; 3. Determination of absorbed dose in water using different dosimetric systems. 4. Correction factors; 5. Errors and uncertainties). **VI. Acceptance tests and commissioning** (1. Measurement equipment. 2. Acceptance tests. 3. Commissioning). **VII. Brachytherapy: physical aspects and dosimetry** (1. Sources used in Brachytherapy; (2) Dose specification; (3) Dose distributions; (4) Dose

[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

	calculation procedures; (5) Commissioning). **VIII. Clinical dosimetry in hadron therapy** (1. Dosimetry equipment; 2. Beam quality specification; Detrmination of absorbed dose to water).
Laboratory	Study of dose distributions in different materials irradiated with high energy particle beams using Monte Carlo techniques; Evaluation of dosimetric parameters. Calculation of stopping power ratios for electron, photon, and heavy charged particle beams. Investigation of tissue-equivalent materials used in clinical dosimetry; Phantoms. Determination of the absorbed dose to water in electron and photon beams.

VI. Minimal required references

[1] Ervin B. Podgorsak, *Review of Radiation Oncology Physics: A Handbook for Teachers and Students*, IAEA Vienna, 2003.
[2] F.M. Khan, *The physics of radiation therapy*, Williams and Wilkins, Baltimore, Maryland, U.S.A., 1994.
[3] H.E. Johns, J.R. Cunningham, J.R., *The physics of radiology*, Thomas, Springfield, Illinois, U.S.A., 1984.
[4] D. Mihăilescu, Ionizing Radiation Dosimetry, Ed. Univ. "Al.I.Cuza", Iaşi, 2001 (in Romanian).
[5] D. Mihăilescu, C. Borcia, Interaction of ionizing radiation with matter (I: Charged particles), Ed. Sedcom Libris, Iaşi, 2007 (in Romanian).

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%