GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Dosimetry and Microdosimetry in Radiotherapy, PG_00069712		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish -
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Brygida Mielewska	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	6.0	0.0	0.0	4.0	20

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	20	3.0	27.0	50

Subject objectives

The aim of the course is to introduce students to the physical and radiobiological principles of ionizing radiation interactions with biological matter and their relevance in planning and evaluating the effectiveness of radiotherapy. Students will acquire knowledge and skills in dosimetry and microdosimetry, including computational and measurement methods, enabling the assessment of relative biological effectiveness in modern cancer therapies.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] has knowledge of materials science and understands its key role in the progress of civilization	The student understands the phenomena related to dose deposition in matter, particularly in biological tissue, and their consequences in the context of cancer induction and treatment.	[SW1] Assessment of factual knowledge
[K6_U06] can accurately present technological and scientific problems, related to the production and application of nanostructures, to specialists in related fields, and initiate and coordinate interdisciplinary cooperation.	The student is able to discuss the issues of modern radiotherapy tools using precise radiation beams (hadron therapy, nanoparticles in radiotherapy).	[SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task

<table>
<tr><td>Subject contents</td><td>1. Interaction of radiation with matter, including biological tissue
2. Physical foundations of radiotherapy
3. Radiobiological foundations of radiotherapy
4. Types of radiotherapy
5. Basic dosimetric quantities
6. Microdosimetry vs. dosimetry
7. Microdosimetric calculations in the assessment of relative biological effectiveness
8. Microdosimetric measurements
9. Microdosimetry in cancer therapy
10. Summary and module assessment</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>none</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>pral presentation</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>final test</td><td>50.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>C. Gunilla, C. Bentel, Nelson, Noell, Treatment Planning and Dose Calculation in Radiation Oncology, Elsevier 2014</td></tr>
<tr><td>Supplementary literature</td><td>L. Lindborg, A. Walker Microdosimetry Experimental Methods and Applications, wyd.Taylor&Francis 2017</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Discuss the basic quantities used in dosimetry and microdosimetry
Characterize dose deposition in proton therapy
Describe the BNCT method</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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