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| **Course title:** | Radiobiology |
| **Course title in Polish:** | Radiobiologia |
| **Course for discipline:** | biology |

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| **Semester:** | 4 | **Status of course:** | faculty | **Language:** | english |
| **Academic year:** | | **Catalog number:** | | | |

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| **Coordinator of course:** | dr Kamila Maliszewska-Olejniczak |
| **Lecturer od course:** | dr Kamila Maliszewska-Olejniczak |
| **Executing unit:** | KFB |
| **Ordering unit:** | Doctoral School SGGW |
| **Assumptions, goals and description of the course:** | Purpose: To familiarize students with the basic laws and modern biophysical methods that allow them to understand the mechanisms of phenomena observed in living organisms related to ionizing radiation. To impart the ability to use radiobiological techniques. Formation of skills in the use of software for the analysis of radiobiological data, preparation of graphic interpretation of data.<br><br>Scope of lectures: History of radiobiology. Fundamentals of radiobiology. Biological dosimetry. Basic radiobiology techniques. Cellular response to DNA damage, DNA repair systems. Types of radiation and biological effects associated with radiation. Ionizing radiation and human health, hormesis hypothesis, nuclear accidents and disasters. Anticancer therapies using ionizing radiation in Poland and around the world. Model organisms in radiobiology. NASA space research.<br>Exercises: Basic radiobiology tests - colony analysis using automated software developed for the clonogenic test. |
| **Didactic form, number of hours:** | Lectures - 6 hours; exercises - 4 hours |
| **Teaching methods:** | Multimedia presentations, demonstrations, simulations, case studies, analysis ai intepretation of sample experiments. |
| **Limit of people in the group:** | 40 - lectures, 20 - exercises |

**Learning outcomes**

| **KNOWLEDGE - the graduate knows and understands:** | **SKILLS - the graduate is able to:** | **COMPETENCES - the graduate is ready to:** |
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| To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues | Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline | Critically evaluate the achievments in the field/discipline represented |
| Major general development trends in the field/discipline | | Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect |
| | | Support the ethos of scientific circles and conduct independent research |

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| **The method of verification of learning outcomes:** | Credit for the course on the basis of the project. |
| **Form of documentation of achieved learning outcomes:** | The project in the form of a report including data analysis. |
| **Elements and weights of the final grade:** | Final evaluation-report of the completed project 100%. |
| **Place of the course:** | Lectures - teaching room KFB 0/23 bldg. 34; Exercises - computer room P/7 bldg. 37 |

**Basic and supplementary literature**

1. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation Biology: A Handbook for Teachers and Students, Training Course Series No. 42, IAEA, Vienna, 2010
2. Brzozowska B, Gałecki M, Tartas A, Ginter J, Kaźmierczak U, Lundholm L. Freeware tool for analysing numbers and sizes of cell colonies. Radiat Environ Biophys, 2019
3. Suchorska W, Radiobiology: basic mathematical models describing cell survival. Scientific Letters WCO, Letters in Oncology Science 2018;15(1):59-65.
Literatura uzupełniająca:
1. Maliszewska-Olejniczak et al., Immunofluorescence Imaging of DNA Damage and Repair Foci in Human Colon Cancer Cells. J Vis Exp. 2020
2. Maliszewska-Olejniczak et al., Molecular Mechanisms of Specific Cellular DNA Damage Response and Repair Induced by the Mixed Radiation Field During Boron Neutron Capture Therapy. Front Oncol. 2021

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| **Comments:** | |

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| **Estimated number of hours of work of the doctoral student necessary to achieve the assumed learning outcomes:** | 25 h |

**Leraning outcomes reference to the second degree characteristics of the National Qualification Framework (level 8) covering doctoral competences:**

| **Symbol:** | **Learning outcomes:** | **8 level NQF** |
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| SD1_KW01 | To the extent enabling to revise the existing pradigms in the field/discipline - the world achievments, gathering theoretical background as well as general and selected detailed issues | P8S_WG |
| SD1_KW02 | Major general development trends in the field/discipline | P8S_WG |
| SD1_KU05 | Carry out critical assessment of the scientific research findings and expert activities and their contribution to the knowledge development in the field/discipline | P8S_UW |
| SD1_KK01 | Critically evaluate the achievments in the field/discipline represented | P8S_KK |

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| SD1_KK03 | Recognise knowledge in solving cognitive and practical problems characteristic for the area of research (field/discipline) and in an interdisciplinary aspect | P8S_KK |
| SD1_KK08 | Support the ethos of scientific circles and conduct independent research | P8S_KR |