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| **Title and Code** of the subject:  **Radiology in food industry MTMEL7019A** | **ECTS Credit Points: 3** |
| **Type** of the subject: compulsory | |
| **Ratio of theory and practice: 50/50** (credit%) | |
| **Type and number of classes per semester**: 28 hour(s) lecture and 14 hour(s) practice per **semester**  Number of teaching hours / week: 2+1 (lecture and practice) | |
| **Type of exam**: written or oral exam | |
| **Subject in the curriculum:** semester 4 | |
| Preliminary requirements:- | |

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| **Summary of content - theory**: |
| The purpose of the course is to know the sources, measurement and effects of radioactive contamination of foodstuffs. Students will learn about the types of ionizing radiation, the occurrence, measurement and application of radioactive isotopes. They learn about the possibilities of handling foods with ionizing radiation.  The topics of the lectures are the following:   1. History of radioactivity, basic concepts 2. Radioactive Isotopes, Radiations, Radioactive Decay, Legislation 3. Decomposition Forms, Radiations, Decomposition series, Artificial Radioactivity, Neutron Radiation, Other Particles in Radiations, Fission (Induced), Spontaneous Fission 4. Measurement of radioactive radiation, Interaction of radiation with the material, Detectors, Measuring devices and their characteristics, Dosimetry of ionizing radiations 5. Dose and Units, Accepted Dose, Equivalent, Effective Dose, Dose Measurement 6. Chemical and biological and health effects of ionizing radiation, Physical and chemical effects of radiation, Biological effects of radiation, Cellular effects of radiation, Radiation damage of tissues, organs and human organism, Deterministic and stochastic effects of radiations 7. Radiation Protection, Limit Values, Activity of Foods in a Nuclear Emergency, Treatment of Radioactive Materials 8. Radiological aspects of medical interventions, Diagnostics, Screening Techniques, Radioisotope Procedures, Therapy, Special Radiation Protection Issues in Medical Applications, Special Events, Emergency Management 9. Emergency, Accident Levels for Population, Natural Radiations, Radiation, Cosmogen Radionuclides, Earthquake Radiations, Limits and Regulations on Natural Radiations, Artificial Radiations, Radiation Detection 10. Nuclear Accidents, Three Mile Island Accident, Chernobyl, Tokai Mura, Fukushima, Weapons Accidents 11. The role of nuclear energy in power generation, Nuclear power plants and their environmental impacts, Short history of nuclear power plants, Principle of operation, Nuclear power plants, Nuclear power plants eradication 12. Investigating the radiation of foodstuffs 13. Treatment of Foods by Ionizing Radiation 14. Neutron activation analysis |
| **Summary of content - practice**: |
| Skills to be learnt:   1. 1-2. Visit: gamma sterilization 2. 2-3. Business Visit: Cyclotron 3. 3-6. Radiation measurement practice 4. 6-14. Evaluation of nuclear accidents and presentations |
| **Literature, handbooks in English** |
| 1. Handbook of Radioactivity Analysis Edited by:Michael F. L'Annunziata ISBN: 978-0-12-436255-0 1998 Elsevier Inc 2. Environmental Radioactivity and Emergency Preparedness Mats Isaksson, Christopher L. Raaf 2016 by CRC Press ISBN 9781482244649 3. Radioactivity Transfer in Environment and Food Authors: Vosniakos, Fokion K ISBN 978-3-642-28740-4 Springer 4. Radioactivity: Introduction and History 1st Edition Authors: Michael L'Annunziata Michael L'Annunziata eBook ISBN: 9780080548883 Hardcover ISBN: 9780444527158 Imprint: Elsevier Science |
| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**  * Have a good understanding of the basics of radioactivity.  1. **Skills:**  * Identifies specific problems in the food and radioactive isotopes relations.  1. **Attitude:**  * Committed to his profession, he knows and undertakes its core values and norms, strives to critically interpret and develop them, and solve problems on a professional basis. * It recognizes values in the field of radioactivity. |

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| **Responsible lecturer: Dr. Prokisch József** |
| **Other lecturer(s): -** |

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| **Terms of course completion:** |
| Exam |
| **Form of examination:** |
| Written test |
| **Requirement(s) to get signature:** |
| taking part in 60% of practice |

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| **Exam questions:** |
| 1. History of radioactivity 2. Types of Ionizing Radiations 3. Measurement of ionizing radiation 4. Definition of dose, unit of measurement 5. Dose-effect relationship, biological effect of radiation 6. Radioactive isotopes, their occurrence and use 7. The occurrence of radioactive substances in the environment, the origin of background radiation 8. Nuclear power, nuclear reactors 9. Nuclear accidents (examples, stories, consequences) 10. Principle, application, advantages and disadvantages of Neutron activation analysis 11. Food handling with ionizing radiation (purpose, application, examples) |