



JOHN WESLEY THEOLOGICAL COLLEGE
COURSE THEMATICS



Course: Environmental radiometry	Course type: seminar	Credits: kreditszám	Course ID: KTAK246
Course responsible: Dr Attila Nagy	Programme type: full time	Hours/Semester 20	Assessment: exam
Course objectives:			
Students get to know the origin, properties, and use of different physical radiations in the environment.			
Competencies to be improved:			
Knowledge: T1, T3, T8 Ability: K2 Attitude: A2, A3 Autonomy and responsibility: F1, F2			
Compulsory literature:			
Dr. Sükösd Csaba: Kísérleti atommagfizika Kiss Ádám; Tasnádi Péter: Környezetfizika			
Recommended literature:			
Kiss Ádám; Tasnádi Péter: Környezetfizika Várhegyi András: A környezeti sugárzás anomáliái			
Course content:			
<ol style="list-style-type: none">Chemical elements. Elements in the universe, origin (theories) and their distribution. Periodic table. Isotope concept, discovery, separation, and detection of isotopes.The nucleus. Discovery, composition, and nucleons. Models to describe the nucleus. Physical characteristics of nuclei; mass, lack of mass, energy - binding energy, special units of energyRadioactivity. Discovery and history of radioactivity. Radioactive decay. Forms and characteristics of radioactive decay, Alpha, beta, gamma, and particle radiation. Properties of different radiations, their energetic characterization. Natural and artificial radioactivity. Decay chains, radioactive equilibrium. Interactions of ionizing radiation with matter. Nuclear Reactions.Detection and measurement of radiation. Radiation detectors. Particle trace detectors. Particle counter detectors. Detector efficiency. Scintillation and semiconductor detectors. Neutron detectors. Multiwire Proportional Counter (MWPC). Gamma spectrometry, the structure of the spectrum. Electromagnetic spectrum. Energy Resolution. X-radiation and its characteristics.Nuclear fuels. The special situation of uranium. Enrichment. Nuclear fission, chain reaction, self-sufficiency, role of moderator, neutrons. Nuclear fission reactor types, structure, operation. Chernobyl, Fukushima. Uranium mining and related environmental issues. (Mecsek). Fundamentals of fusion energy production. Fusion in the stars. Possibilities of controlled nuclear fusion, current efforts. Particle accelerators.Human utilization of radiation Geological use. Natural radioactivity of rocks. Geochronology, OSL dating. Earth's heat production. Radioactive methods of well-logging in geophysics. Methods for quantitative analyses based on radioactive and X-ray radiations.Biological effects of radiation. Effects of ionizing radiation on humans. Dose, concepts of different doses, units of doses. Stages of biological effects of radiation. Biochemical and			



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radiobiological processes. Factors influencing the effect of radiation. DOSES OF RADIATION, exposure limits of radiation. Radiation protection. Physical protection, prevention.

Course requirements:

Completion of the semester requires to attend at 50% of the lectures.

Oral exam.

Grading scale:

>90 %: excellent, 89-80 %: good, 79-66 %:satisfactory, 65-50 %:pass

Course Programme: WJLF ENVIRONMENTAL SCIENCE	Semester: 2022_2023_1	Lecturer: Nagy Attila
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