



## COURSE DATASHEET

<b>Semester:</b>	2016/17/1
<b>Course:</b>	Nuclear Energetics
<b>Code:</b>	VEMKRKSV12A
<b>Responsible department:</b>	Institute of Radiochemistry and Radioecology
<b>Department code:</b>	MKRK
<b>Responsible instructor:</b>	dr. Zoltán Németh

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### Course objectives:

Acquirement of the basic aspects of the nuclear technology and atom energy.

### Course content:

Fundamentals: structure of atomic nucleus, radioactive decay modes, emission of radioactive particles, energy sources and energy production. An overview of the energetic and kinetics of special nuclear reactions (neutron-induced fission, fusion, spallation). Nuclear fuel-cycle. Types of nuclear reactors, tendencies in the development of nuclear reactors. Operation and safety of nuclear reactors. Production of nuclear fuels, fabrication of fuel elements, cladding. Other materials and units used in nuclear reactors. Reactor coolants, water chemistry. Radioactive contamination-decontamination, corrosion and corrosion prevention of structural materials. Emission of radionuclides from the nuclear power plants to the environment. Reprocessing procedures. Operation and units of the Paks Nuclear Power Plant. Safe operation and radiation protection system of Paks Nuclear Power Plant. Special fields of the application of nuclear reactors (isotope production, activation analysis, gamma-sources). Nuclear weapons and their effects on the environment.

### Requirements, evaluation and grading:

In the course of an oral examination two overall questions on the issues of the lectures are provided to each student. A short period of time (maximum 30 minutes) is supplied to the students to prepare some drafts of their answers. The exam is qualified in the following ways: - If draft and the answers provided by the student are clear, correct and explains every important relationship on the subject, the record is marked as excellent one (5). - If the student is able to make an overall analysis on the issue solely by the directions of the teacher, he (she) is assessed with a good record (4). - If the student is not able to give clear description on the main relationships of the subject but he (she) can define the fundamental conceptions, his grade is a fair (medium) (3). - If the student can define the fundamental conceptions of the issue by the directions of the teacher, he gets a pass (2). - Without having studied the fundamental conceptions the student is qualified with an unsatisfactory (fail) record (1).

### Required and recommended readings:

Nagy L. Gy.: Radiokémia és izotóptechnika. (Tankönyvkiadó, 1998.) A. Vértes, I. Kiss: Nuclear Chemistry. (Akadémiai és Elsevier Kiadó, 1987.) G. Choppin, J. Rydberg, J.O. Liljenzin: Radiochemistry and Nuclear Chemistry. (Butterworth, Oxford, 1995.) D. Bodansky: Nuclear Energy. AIP Press. (New York, 1996.)