UNIVERSITY OF PANNONIA

SUBJECT DATASHEET

Semester:	2010/11/2
Subject:	Nuclear Metrology
Code:	VEMKRK3212N
Responsible department:	Institute of Radiochemistry and Radioecology
Responsible department code:	MKRK
Responsible lecturer:	dr. János Somlai

Educational objectives:

Acquirement of the basic knowledge in the fields of nuclear metrology

Detailed content of the subject:

The radioactivity, radioactive decay modes, half life, decay scheme, energy of particles. Interactions of ?-, ?-, ?-ray and neutron radiation with matter. Classification of radiation detectors. Viewpoints of classification: detection of intensity and dose as well as energy analysis. Gas-filled radiation detectors: basic processes, ionization and excitation of gas molecules, recombination. General properties (and requirements) of gas-filled detectors. Operation, design and applicability of ionization chambers and proportional counters. Operation design and applicability of Geiger-Müller counters. The mechanism of scintillation. Design and operation of scintillation detectors. Photomultiplier tube characteristics. General properties of scintillators, organic, inorganic and liquid scintillators. Spectroscopy of ?-, ?-, ?-ray and neutron radiations with scintillators. Applications of scintillation detectors. General aspects of the operation of semiconductor detectors, semiconductor properties. Types and properties of semiconductor detectors: surface barrier detectors, diffused junction detectors, high purity or intrinsic detectors. Summary of the main features and applications of semiconductor detectors. Evaluation of experimental data. Deconvolution of energy spectra. Estimation of statistical accuracy. Electronic instrumentations: amplifiers, scalers, ratemeters. Single- and multichannel analyzers.

Requirements:

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 he 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 suggested references:

UNIVERSITY OF PANNONIA

SUBJECT DATASHEET

Semester:	2010/11/2
Subject:	Nuclear Metrology
Code:	VEMKRK3212N
Responsible department:	Institute of Radiochemistry and Radioecology
Responsible department code:	MKRK
Responsible lecturer:	dr. János Somlai

Required and suggested references:

(Butterworths, London,1980.) G.F. Knoll: Radiation detection and Measurement. (J. W. & Sons, New York, 1989.)