COURSE DESCRIPTION

Academic year: 2022/2023

University: Comenius University Bratislava

Faculty: Faculty of Pharmacy

Course ID:	**Course title:**
FaF.KFChL/21-Mgr/21	Pharmaceutical Physics

Educational activities:
Type of activities: lecture / laboratory practicals
Number of hours:
per week: 2 / 2 **per level/semester:** 28 / 28
Form of the course: on-site learning

Number of credits: 5

Recommended semester: 1.

Educational level: I.II.

Prerequisites:

Course requirements:
Students are obliged to perform all laboratory experiments prescribed by the teacher and hand in all reports (assessment 0-8 points per report). Students will write at least two tests during semester regarding preparedness to experiment (assessment 0-6 points per test). In the middle and at the end of semester special tests will be written - problem solving regarding preparation and composition of solutions (assessment 0-3 points per test). The total assessment of laboratory practical is the sum of the average value of reports, average value of tests plus two special tests. Laboratory practical is successfully completed when the student achieves at least 10 points, the highest evaluation is 20 points.
During examination period students will take an exam with max. points 80. The assessment of this exam is added to the assessment of the laboratory practical and this sum determines the final mark. Applications MS Teams and Moodle may be utilized in the case of distance exam. Students will be given details of the exam in the first week of the semester.
The total assessment of the subject: A 92-100 %, B 84-91 %, C 76-83 %, D 68-75, E 60-67, Fx 59% and less.
Scale of assessment (preliminary/final): 20/80

Learning outcomes:
By the completion of the subject Pharmaceutical Physics student will achieve basic knowledge from these areas of physics that are necessary for understanding logical relationships in other subjects especially Physical Chemistry and Pharmaceutical Technology. Student will acquire skills needed for successful experimental work in laboratory. Student acquaints with simple physical methods described in pharmacopeia (measurement of density of liquids, surface tension of liquids, viscosity, measurement of meting and boiling point, electrical conductance of liquids, etc.). Emphasis is placed on elaboration, evaluation and interpretation of measured data.

Class syllabus:
Lectures:
Physical quantities and units.
Kinematics and dynamics of mass point: uniform motion, accelerated motion, circular motion, harmonic vibrations.

Newton’s laws. Mass and gravity. Mechanical work and power. Kinetic and potential energy.
Solid body mechanics: rotational motion, friction, distortion.
Hydrostatics: Pascal law, hydrostatic pressure, Archimedes principle, density and its measurement, surface tension and its measurement.
Hydrodynamics: flow of ideal liquid, continuity principle, Bernoulli's principle. flow of nonideal liquid. Poiseuille’s law.
Heat and temperature: absolute temperature scale, thermal expansion, processes in ideal gas, state equation of ideal gas, van der Waals equation of real gas, Dalton principle, Avogadro principle, Calorimetry. Transport of heat. 1. Fick's principle.
Reversible thermodynamics: internal energy and other thermodynamic potentials. Zero, first, second and third 0, I., II. and III. law of thermodynamics.
Electrostatics: Coulomb law. Intensity and potential of electric field. electrical properties of matter. Electrical current. Ohm's law. Galvanic cells.
Magnetism: Induction of magnetic field. Magnetic properties of matter Mass spectrometry. Electromagnetic radiation and its dual nature. Geometrical optics, refraction index and its measurement. Interference and polarization of light. RTG radiation. Absorption of electromagnetic radiation. Lambert-Beer law.
List of laboratory exercises:
Mass and weight – Weighing on the analytical balance.
Weighing and preparation of aqueous solutions.
Density determination by pycnometer.
Density determination by densimeter.
Polarimetry.
Conductometry – determination of the conductivity of acetic acid solutions.
Boiling point and melting point.
Surface tension of liquids measured by stalagmometer.
Determination of viscosity using Hőppler viscosimeter.
Calorimetry – determination of the specific melting heat of ice.
Refractometry.
UV VIS spectrometry.

Recommended literature:

Oremusová J., Sarka K., Vojteková M.: FYZIKA. Laboratórne cvičenia pre farmaceutov. Bratislava, Univerzita Komenského, 2009. 102 s. (skriptá)
Videoprednášky dostupné v MS Teams.
Video k laboratórnym cvičeniem dostupné v MS Teams.
Kopecký, F.: Prehľad fyziky pre farmaceutov I. (Mechanika, hydromechanika a náuka o teple). 4. vydanie, Bratislava, Univerzita Komenského, 1999. 184 s. (skriptá, http://www.fpharm.uniba.sk/index.php?id=2665).
Sarka, K., Kopecký, F.: Prehľad fyziky pre farmaceutov II. (Elektrina, magnetizmus a žiarenie). Bratislava, Univerzita Komenského, 1988. 104 s. (skriptá, http://www.fpharm.uniba.sk/index.php?id=2665).
Krempaský, J.: Fyzika. Bratislava, Alfa 1982. 752 s.
Halliday D., Resnick R., Walker J: Fyzika. Prometheus. Praha, 2000

Languages necessary to complete the course:

slovak language

Notes:

Past grade distribution
Total number of evaluated students: 225

A	ABS	B	C	D	E	FX
6,67	0,0	10,67	20,89	22,67	19,56	19,56

Lecturers: RNDr. Alexander Búcsi, PhD., doc. RNDr. Jana Gallová, CSc., doc. Mgr. Marcela Chovancová, PhD., Mgr. Mária Klacsová, PhD., Mgr. Lukáš Hubčík, PhD., Ing. Jarmila Oremusová, CSc., Mgr. Katarína Želinská, PhD., RNDr. Tomáš Fazekaš, PhD.

Last change: 30.03.2022

Approved by: doc. RNDr. Jana Gallová, CSc.