MATHEMATICS FOR PHARMACY STUDENTS

Year 2010/2011

Lecturer coordinator: János Karsai Ph.D, associate professor

Teacher of practicals:
János Karsai Ph.D, associate professor

Demonstrator:
Éva Bartus, 3rd year pharmacy student

Hours
Fall semester, 2+2 hours/week

Goals
To teach the mathematical concepts and methods needed for the later professional work of the students, to improve the students' logical and visual thinking, ability for creative problem solving.

Teaching method
The theory is illustrated by practical applications. The geometrical, physical, etc. meaning is emphasized. Computer applications and experiments are applied.

Expected knowledge
A good level of knowledge of the standard high school mathematics is needed.
Topics: Sets and logic, real numbers, and its properties, absolute value, operations on fractions, powers, logarithm; equation and inequalities: graphical interpretation and solving; linear and quadratic equations; vectors and coordinate systems; concept of functions, elementary functions and their properties: linear, quadratic, trigonometric exponential and logarithmic functions. Knowing some informatics is useful but not expected.

To estimate the preliminary knowledge the students write an anonym test on the first lecture. In the lack of an acceptable level of knowledge, the students should attend consultations organized regularly.

Detailed program, the main topics of the lecture:
Some topics of the high school math. Percentage, mixture problems; Mathematical logic and sets; real numbers, real line, plane, subsets, coordinate systems.
Functions: definitions, basic properties, domain, range, graph, inverse function, graphical methods, examples. Elementary functions: straight lines, powers, trigonometric functions, exponential and logarithmic functions.
Operations on functions and graphs: elementary transformations, composite and inverse functions, nonlinear scales, logarithmic transformations and plots. Graphical study of function in Pharmacy.
Elements of differential calculus: Limit, continuity, the rate of change, average and instantaneous speed, slope of curves, the definition and interpretations of the derivative, differentiation rules.
Applications of the derivative: monotonicity, convexity, limits, Approximation with Taylor polynomials. Applications in life sciences.
The elements of the integral calculus: Antiderivative as the inverse operation to the differentiation. Integration rules, techniques. Definite integral, geometrical, physical meaning. Integral function, Newton-Leibniz formula. Applications: Area and volume, motion, calculating the change from the derivative, numerical integration. Applications in life sciences.
Functions of several variables: graph, contours, partial derivatives, maxima and minima, applications. Curve fitting by the method of least square, regression.
Ordinary differential equations: notions, elementary methods for the equations in biology and pharmacy.

Practical:
Exercises, practical problems concerning the theoretical topics (see the topics of the lecture).

Evaluation: in a separate document.

Literature, handouts (*available on CD and web http://www.mathmodel.szote.u-szeged.hu/)*
Karsai J., *Problems in mathematics, exercises in Mathematica*

Karsai J., *Mathematics lecture illustrations for pharmacy students in Mathematica*
Karsai J., *test problems from the previous years and sample exam sheets*
Krisztina Boda and János Karsai: *Mathematics Exercises and problems*
János Karsai et al: *Exercises for the Mathematics practical for Pharmacy students*
Tibor Asztalos: *Mathematics for 1st year Pharmacy students*