Mathematics A2 (BMETE90AX02).

Dr. Peter MOSON (www.math.bme.hu, +3614632690, +36309329626) on Tuesdays, Wednesdays. Office hour: H. building 41. Wednesday, 7-8 a.m.

Program

Mathematics A2a -Vector Functions (of parts taught by Peter Moson).
Functions in several variables: continuity, differential and integral calculus, partial derivatives, Young's theorem. Local and global maxima/minima. Vector-vector functions, their derivatives, Jacobi matrix. Integrals: area and volume integral.
Infinite series: convergence, divergence, absolute convergence. Sequences and series of functions, convergence criteria, power series, Taylor series.
Fourier series: expansion, odd and even functions.

Literature:

Thomas' Calculus by Thomas, G.B. et al. Addison-Wesley, 2005. (ISBN0321185587).
Hungarian translation is available: http://www.interkonyv.hu/konyvek/Thomas_kalkulus_3

Test 1. Function of several variables. March 22, 2016. *13%*,

Test 2. Vector-vector functions. Functional sequences, series. May 3, 2016. *13%*.

Make up tests: 14-th week (May 17-20).

Written exam. Dates: May 23, June 7, June 14, June 21, 2016.

Detailed Program (weeks 6-11)

2016-03.23.
Applications of triple integrals in Cartesian, spherical, cylindrical coordinates. Mass, center of gravity, moment of inertia. Examples (center of gravity of homogeneous solids (prism, sphere, cylinder, cone – parts belonging to the first octant).

2016-03.29.
Vector fields.
Derivation. derivative tensor, divergence, rotation.
Integration. Flux. Gauss-Ostrogradsky theorem. Example: Calculation of derivative tensor, divergence, rotation, and triple integrals in Cartesian, spherical, cylindrical coordinates.

2016-03.30.
Vector fields.
Further examples for Gauss-Ostrograndsky theorem.

2016-04.05.
Work. Calculation of line integrals in case of potential vector fields.

2016-04.06.
Invited lecture in the framework of Erasmus+ program (Prof. Ali Serdar Nazlipinar).

2016-04.12.
Functional sequences, series. Convergence definitions (pointwise, uniform, absolute).

Power series. Radius of convergence. Taylor series. Calculation of approximate values of integrals.

2016-04.13.
Taylor series of basic elementary functions. Approximate calculation of the values of functions.
Power series. Calculation of their exact sums.

2016-04.19.
Development of 2π periodic functions into trigonometric polynomials (2 methods – trigonometric, exponential identities – example $f(x)=\sin^2 x$), Fourier series (scalar product of functions, general formula – example $f(x)=x^2$).
Application of results (integration, exact value of sums).

2016-04.20.
Fourier series. Continuation: f(x)=abs(x), sgn(x). Convergence, DINI criterion.

2016-04.26.
Practical lecture. Solution of Sample Test 2.

2016-04.27.
Practical lecture. Solution of selected problems related to Test2 (power series, Fourier series, cylindrical coordinates, etc.)