

**ERASMUS 2010/2011**

**Faculty/ Field of study:** Faculty of Mathematics and Natural Sciences / Computer Science  
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**Departmental Coordinator:** dr inż. Piotr Romanowski ... e-mail: [proman@univ.rzeszow.pl](mailto:proman@univ.rzeszow.pl)  
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**Winter/Summer semester 2010/2011**

Course name	Number of hours	ECTS	Teacher	Language
Mathematical Analysis	30/45		Dr. Andrzej Gębarowski	Polish, English

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**SYLLABUS**

**SUBJECT:** MATHEMATICAL ANALYSIS .....

**TEACHER:** dr Andrzej Gębarowski .....

**COURSE DESCRIPTION:**

The purpose of the course is to provide the fundamentals of mathematics used in computer science applications.

**Lecture: Introduction to the Theory of Limits in  $\mathbf{R}$ .** The limit of sequence. Sufficient condition existence of limit. Number  $e$ . Theorems concerning limits. Examples. **Infinite Series.** The sum of series. Series of positive terms. Tests for convergence. The geometric series, absolute convergence of series. Operations on the series. **The Derivative.** The limit of a function, continuity. The derivative. Higher order derivatives. Rules of differentiation. Application of the derivative. *Lagrange* and *Taylor's* theorems and its applications. Extreme values. Concavity and intervals of monotony function. Asymptotes. Partial derivatives. *Taylor's* formula for the function two variables. Local extreme values. **The Indefinite Integral.** Methods of integration. *Riemann's* integral and its applications. **Improper Integrals** (unbounded interval, unbounded integrand). The functions series and **power series.** Differentiation and integration of power series. *Taylor's* and the *Maclaurin's* series for function  $f$ . **Differential Equations** and their solutions. Types of differential equations. The *Cauchy* problem (initial value problem) for a differential equation. Solution techniques for first-order equations. Second-order linear equations with constant coefficients.

**Classes:** Practical exercises concerning realization of basic notions from lectures; limit of sequence, convergence of series, operations on the series, application of the derivative, local

extreme values of the function two variables, application of Riemann's integral, expanding function in power series, solution techniques for ordinary differential equations.

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**LEARNING OUTCOMES:**

A student should receive a basic knowledge about fundamentals of mathematics.

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**GRADING POLICY:**

**Lecture:** Written test.

**Classes:** Two written tests and short questions before every classes.

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**TIMETABLE**

Number of hours:

**Lecture:** 2h x 15 weeks = 30 hours (1 semester) .....

**Classes:** 3h x 15 weeks = 45 hours (1 semester) .....

**TEXTBOOK AND REQUIRED MATERIALS:**

1. L. I. Holder, *Calculus with Analytic Geometry*, Wadsworth Pub. Com. , California
  2. K. Kuratorski, *Rachunek różniczkowy i całkowy*, PWN (1979)
  3. R. Rudnicki, *Wykłady z analizy matematycznej*, PWN (2002)
  4. W. Kryszicki, L. Włodarski, *Analiza matematyczna w zadaniach*, PWN, wydanie dowolne
  5. G. M. Fichtenholz, *Rachunek różniczkowy i całkowy*, PWN wyd. dowolne
  6. J. Banaś, S. Wędrychowicz, *Zbiór zadań z analizy matematycznej*, Wydaw. Nauk. Tech. (1996)
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**PREREQUISITES:**

High school course in mathematics .....

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