**Nazwa przedmiotu:**

Calculus I

**Koordynator przedmiotu:**

prof. nzw. dr hab. Tadeusz Rze?uchowski

**Status przedmiotu:**

Obowiązkowy

**Poziom kształcenia:**

Studia I stopnia

**Program:**

Informatyka

**Grupa przedmiotów:**

Wspólne

**Kod przedmiotu:**

brak

**Semestr nominalny:**

1 / rok ak. 2009/2010

**Liczba punktów ECTS:**

6

**Liczba godzin pracy studenta związanych z osiągnięciem efektów uczenia się:**

**Liczba punktów ECTS na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich:**

**Język prowadzenia zajęć:**

polski

**Liczba punktów ECTS, którą student uzyskuje w ramach zajęć o charakterze praktycznym:**

**Formy zajęć i ich wymiar w semestrze:**

|  |  |
| --- | --- |
| Wykład:  | 30h |
| Ćwiczenia:  | 30h |
| Laboratorium:  | 0h |
| Projekt:  | 0h |
| Lekcje komputerowe:  | 0h |

**Wymagania wstępne:**

High school mathematics

**Limit liczby studentów:**

**Cel przedmiotu:**

To reinforce the knowledge on real number sequences and functions of one variable. To acquire the understanding of differential and integral calculus, definite and improper integrals their applications and computational processes.

**Treści kształcenia:**

Ways of defining sequences in R. Monotonic and bounded sequences. Definition of sequence limit - convergent and divergent sequences. Sandwich theorem. The constant e. Finite sums. Partial sum of a series. Convergent infinite series - necessary condition. Convergence test for series with positive terms: the comparison test, the Cauchys root test, dAlembert ratio test. Function domain and range. Inversion and composition of functions. Elementary functions. Properties of the exponential and logarithmic functions. Even and odd functions. Periodic functions. Trigonometric and cyclometric functions. Function limit at a given point and at infinity. Horizontal, vertical and oblique asymptotes. Function continuity at a point and in the interval. One-sided continuity. Properties of continuous functions. Function increment. Definition of the derivative of a function at a given point and its geometric interpretation. Derivatives of some common functions. The derivative of a sum, a product and a quotient of functions. The derivative of a composition. Tangent and normal lines at a point to a curve f(x). De lHospitals rule. Function differential. Higher order derivatives and differentials. Taylor and MacLaurin formulas - approximate values of expressions. Function extrema, necessary condition. Lagrange theorem implications. Monotonic functions. Sufficient conditions for function extremum. Supremum and minimum of a function on a closed interval. Derivatives of higher order with the use to identify extrema. Concave and convex functions. Inflection points. Necessary and sufficient conditions for inflection points. Examining the function and plotting its graph. Indefinite integral - definition; integral of some common functions; properties. Techniques of integration: by substitution and by parts. Integration of rational functions by partial fractions. Integration of trigonometric functions. Methods of integration certain irrational functions. Riemann integral. Properties of definite integrals. The Fundamental Theorem of Calculus. Integration by parts and by substitution for definite integrals. Applications of definite integrals; computing areas of planar figures, arc length of the curves, surface areas, volumes of revolved solids. Improper integrals of the first and the second kind.

**Metody oceny:**

The main assessment is made based on the written examinations held in June. Pass mark requires a score not less than 50%. Two tests during the term time with a total score of not less than 50% constitute a pass mark of tutorial classes. Students can attempt the examination in June without passed tests.

**Egzamin:**

**Literatura:**

R.L. Finney, G.B. Thomas - Calculus; K. Kuratowski - Introduction to Calculus; G. Berman - A Problem Book in Mathematical Analysis (or any other comparable problem book).

**Witryna www przedmiotu:**

**Uwagi:**

## Efekty przedmiotowe