STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Calculus**		Code **1010341511010344916**

Field of study **Mathematics**	Profile of study (general academic, practical) **general academic**	Year /Semester **1 / 1**

Elective path/specialty **-**	Subject offered in: **polish**	Course (compulsory, elective) **obligatory**

Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **full-time**

No. of hours				No. of credits **11**
Lecture: **4**	Classes: **4**	Laboratory: **-**	Project/seminars: **-**	

Status of the course in the study program (Basic, major, other) **basic**	(university-wide, from another field) **from field**

Education areas and fields of science and art **the sciences**	ECTS distribution (number and %**)** **11 100%**

Responsible for subject / lecturer:

Prof. dr hab. Ryszard Płuciennik
email: ryszard.pluciennik@put.poznan.pl
tel. 61 665 33 59
Wydział Elektryczny
ul. Piotrowo 3A 60-965 Poznań

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of secondary school math.
2	**Skills**	Skills of efficient evaluating of algebraic formulas, Skills of transformation of trigonometric, logarithmic and exponential functions.
3	**Social competencies**	Znajomość ograniczeń własnej wiedzy i rozumienie potrzeby dalszego kształcenia

Assumptions and objectives of the course:

Deep knowledge in differential and integral calculus to a degree which is necessary to study mathematics. Skills for application of acquired knowledge to theoretical as well as practical problems in other subjects as chemistry, physics, engineering, economy.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. understand the role and weight of a proof In mathematics, and importance of assumptions.   - [K_W02]

2. present fundamental theorems of calculus and their proofs, Moreover, he will be familiar with examples illustrating concrete notions of calculus and find counterexamples that are necessary to exclude some situations. - [K_W05 K_W04]

3. understand partially the structure of mathematical analysis as a research theory. - [K_W07]

Skills:

1. present in a clear manner in words and writing mathematical deduction, formulate theorems and definitions and use quantifications and sentential calculus in proving theorems.   - [K_U01K_U02K_U04]

2. use (in different context) notions of convergence of sequences, limit of a sequence and a function, continuity of functions and integral.   - [K_U10]

Social competencies:

1. He is able to formulate precisely questions which lead to go deeply his own understanding of given problem or finding of missing elements of deduction. - [K_K02]

Assessment methods of study outcomes

Lecture Valuation of knowledge and skills during oral and written exam. Practical LessonsTwo large tests concerning an application of knowledge from the lectures in exercises (student can use his own notes) Systematic control of theoretical knowledge in form of short quizes. Valuation of student answers during lessons. Valuation of activity during lessons. teoretycznej w postaci kilku krótkich sprawdzianów. Ocena odpowiedzi studenta podczas prowadzonych zajęć.Ocena aktywności na zajęciach

Course description

Construction of the Real and the complex numbers. Sequences and their properties. Theorems on finite and infinite limits of sequences. Subsequences and problems connected with Bolzano-Weierstrass theorem. Series. Convergence tests of series. Elementary functions and their properties. Continuous functions and their properties. Function sequences and function series. Pointwise convergence and uniform convergence. Derivative of real and complex function. Properties of derivatives. Mean value theorems. First and Second Derivative Test. D?Hospitale Theorem and its application. Taylor formula and expansion of functions into exponential series. Elementary complex functions. Indefinite integral. Method of integration. Definite integral and its application In physics and mechanics.

Basic bibliography:

1. G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa 2007

2. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 1971

3. H. J. Musielakowie, Analiza matematyczna, Wydawnictwo Naukowe UAM 2000.

Additional bibliography:

1. W. Rudin, Analiza rzeczywista i zespolona, PWN, Warszawa 1998.

2. A. Sołtysiak , Analiza matematyczna? cz. I , cz. II. WN UAM, Poznań 2004.

3. W. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt Publishers 1998.

Result of average student's workload

Activity	Time (working hours)

Student's workload

Source of workload	hours	ECTS
Total workload	240	11
Contact hours	60	6
Practical activities	60	5