Course name: **Mathematics II**		
Type of study: **Mathematics**	Type of study: **Full-time**	Examination: **Assignment**
Course characteristics: **Compulsory**	Level: **First (B.Sc.)**	Year: **Spring Semester**
type of classes: **lecture, tutorials**	Hours per week: **2 L, 3 T**	ECTS points: **6 ECTS**

COURSE DESCRIPTION

COURSE OBJECTIVE

C1. To introduce to the basics of integral calculus of functions of one and many variables, line integrals; to introduce to the basis of the theory of functional series and differential calculus of functions of two and three variables; To introduce to applications of integrals

C1. To acquire the ability to solve single, double and triple integrals and line integrals; to analyse convergence of functional series and differentiation and analysis of functions of two and three variables

PREREQUISITES/ ASSUMED BACKGROUND

1. Knowledge on calculus in terms of Mathematics I.
2. Knowledge on linear algebra in terms of Mathematics I.

LEARNING OUTCOMES and **COMPETENCES TO BE ATTAINED**

LO1. Knowledge on the basics of integration of a function of one variable, calculations of proper and improper integrals using various integration methods.
LO2. Knowledge on the basics of theory of functional series, in particular power series and differential calculus of functions of two and three variables.
LO3. Knowledge on the basics of methods of calculation and applications of double and triple Riemann integrals and line integrals.
LO4. Ability to calculate and apply single and multiple integrals, and line integrals.
LO5. Ability to present basic functions as functional series, to test convergence of functional series, to calculate partial derivatives and extremum of functions of two and three variables

COURSE CONTENT

Lectures - Topics	**hours**
L1 – Functional series	**2**
L2 – Indefinite integral	**2**
L3 – Definite integral	**2**
L4 – Improper integral	**2**

L5 - Application of integration. Probability	**2**
L6 - Geometrical applications of definite integral	**2**
L7 - Functions of two and three variables: domain, limit, continuity	**2**
L8 - Partial derivatives	**2**
L9 - Minima and maxima for functions of two and three variables	**2**
L10 - Double integral	**2**
L11 - Change of variables. Polar coordinates on plane	**2**
L12 – Double integral. Applications in geometry	**2**
L13 – Triple integral	**2**
L14 – Triple integral – cylindrical and spherical coordinates	**2**
L15 – Line integral of a first and second kind. Applications	**2**
Σ	**30**

Tutorials - Topics	**hours**
T1 – Functional series	3
T2 – Indefinite integral	3
T3 – Definite integral	3
T4 – Improper integral	3
T5 - Application of integration. Probability	3
T6 - Geometrical applications of definite integral	3
T7 - Functions of two and three variables: domain, limit, continuity	3
T8 - Partial derivatives	3
T9 - Minima and maxima for functions of two and three variables	3
T10 - Double integral	3
T11 - Change of variables. Polar coordinates on plane	3
T12 – Double integral. Applications in geometry	3
T13 – Triple integral	3
T14 – Triple integral – cylindrical and spherical coordinates	3
T15 – Line integral of a first and second kind. Applications	3
Σ	**45**

TEACHING TOOLS

1 – lecture with using multimedia presentations
2– tutorials

RECOMMENDED AND ADDITIONAL BIBLIOGRAPHY

1. Farlow J., Hall J.E., McDill J.M., West B.H, *Differential Equations & Linear Algebra*, Person Education Inc., 2007.
2. Ian Craw, *Advanced Calculus and Analysis* MA 1002, University of Aberdeen, 2000.
3. Trench William F., *Introduction to Real Analysis*, Pearson Education, 2003.
4. Bittinger Marvin L., Ellenbogen David J., *Calculus and its Applications*, Pearson International Edition, 2007.
5. M. Klimek, Z. Domański, J. Błaszczuk, Mathematics II, 2009– a handbook in an electronic version

TEACHERS

- prof. dr hab. inż. Małgorzata Klimek, malgorzata.klimek@im.pcz.pl
- dr inż. Anita Ciekot, anita.ciekot@im.pcz.pl
- dr inż.Jolanta Pozorska, jolanta.pozorska@im.pcz.pl

ADDITIONAL NOTES

Links to course unit teaching materials can be found on the http://www.pcz.pl/english/ects-subjects website for current students.