

## SYLLABUS OF A MODULE

Polish name of a module	<b>Matematyka II</b>
English name of a module	<b>Mathematics II</b>
ISCED classification - Code	0541
ISCED classification - Field of study	<i>Mathematics</i>
Languages of instruction	<i>English</i>
Level of qualification:	<i>1 – BSc (EQF 6)</i>
Number of ECTS credit points	6
Examination:	<i>A - assignment</i>

### Number of hours per semester:

Lecture	Exercises	Laboratory	Seminar	E-learning	Project
30	45	0	0	0	0

## **MODULE DESCRIPTION**

### **MODULE OBJECTIVES**

- O1. To introduce to the basics of differential and integral calculus of functions of one and many variables
- O2. To acquire the ability to calculate single, double, triple and line integrals, and to perform the analysis of functions of two and three variables

### **PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Knowledge of linear algebra and calculus in terms of Mathematics I
2. Ability to use different sources of information
3. Ability to work both independently and in a group

### **LEARNING OUTCOMES**

- LO 1 – Knowledge of the basics of integration of a function of one variable, calculations of proper and improper integrals, using various integration methods
- LO 2 – Knowledge of the basics of methods of calculation and applications of double, triple and line integrals
- LO 3 – Knowledge of the basics of differential calculus of functions of two and three variables
- LO 4 – Ability to calculate and apply single and multiple integrals, as well as line integrals,
- LO 5 – Ability to calculate partial derivatives and extremum of functions of two and three variables

## MODULE CONTENT

Type of classes – Lectures	Number of hours
L1 – Indefinite integral	2
L2 – Definite integral	2
L3 – Improper integral	2
L4 – Geometrical applications of definite integral	2
L5 – Functions of two and three variables: domain, limit, continuity	2
L6 – Partial derivatives	2
L7, L8 – Minima and maxima for functions of two and three variables	3
L9 – Double integral	3
L10 – Change of variables. Polar coordinates on plane	2
L11 – Double integral. Applications in geometry	2
L12 – Triple integral	2
L13 – Triple integral. Cylindrical and spherical coordinates	2
L14,L15 – Line integral of second kind. Applications	4
Type of classes – Tutorials	Number of hours
T1 – Indefinite integral	3
T2 – Definite integral	3
T3 – Improper integral	3
T4 – Geometrical applications of definite integral	3
T5 – Functions of two and three variables: domain, limit, continuity	3
T6 – Partial derivatives	3
T7, T8 – Minima and maxima for functions of two and three variables	6
T9 – Double integral	3
T10 – Change of variables. Polar coordinates on plane	3
T11 – Double integral. Applications in geometry	3
T12 – Triple integral	3
T13 – Triple integral. Cylindrical and spherical coordinates	3
T14,T15 – Line integral of second kind. Applications	6

## TEACHING TOOLS

1. – lecture with using multimedia presentations
2. – tutorials

## WAYS OF ASSESSMENT ( F – FORMATIVE, S – SUMMATIVE)

F1. - assessment of preparation for exercises
F2. - assessment of the ability to apply the acquired knowledge while doing the exercises
F4. - assessment of activity during classes
S1. - assessment of the ability to solve the problems posed*
S2. - assessment of mastery of the teaching material being the subject of the lecture - test

\*) in order to receive a credit for the module, the student is obliged to attain a passing grade in all laboratory classes as well as in achievement tests.

## STUDENT'S WORKLOAD

L.p.	Forms of activity	Average number of hours required for realization of activity
<b>1. Contact hours with teacher</b>		
1.1	Lectures	30
1.2	Tutorials	45
1.3	Laboratory	
1.4	Seminar	
1.5	Project	
1.6	Consulting teacher during their duty hours	5
1.7	Examination	
Total number of contact hours with teacher:		80
<b>2. Student's individual work</b>		
2.1	Preparation for tutorials and tests	30
2.2	Preparation for laboratory exercises, writing reports on laboratories	
2.3	Preparation of project	
2.4	Preparation for final lecture assessment	20
2.5	Preparation for examination	
2.6	Individual study of literature	10
Total number of hours of student's individual work:		60
Overall student's workload:		140
<b>Overall number of ECTS credits for the module</b>		6
Number of ECTS points that student receives in classes requiring teacher's supervision:		3,2
Number of ECTS credits acquired during practical classes including laboratory exercises and projects :		

## BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Lecture notes.
2. Polyanin A. D., Manzirow A., V., Mathematics for engineers and scientists, Chapman & Hall/CRC, 2007
3. Farlow J., Hall J. E., McDill J. M., West B. H., Differential equations & Linear Algebra, Person Education Inc., 2007
4. Ian Craw, Advanced Calculus and Analysis MA 1002, University of Aberdeen, 2000
5. Trench William F., Introduction to Real Analysis, Pearson Education, 2003
6. Bittinger Marvin L., Ellenbogen David J., Calculus and its applications, Pearson International Edition, 2007
7. Klimek M., Domański Z., Błaszczuk J., Mathematics II, 2009 – a handbook in an electronic version

## MODULE COORDINATOR (NAME, SURNAME, DEPARTMENT, E-MAIL ADDRESS)

Prof. dr hab. Inż. Małgorzata Klimek, Department of Mathematics, [malgorzata.klimek@im.pcz.pl](mailto:malgorzata.klimek@im.pcz.pl)