Course Syllabus

I. General Information

Course name	Calculus II
Programme	Mathematics
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	BA
Form of studies (full-time, part-time)	Full-time
Discipline	Mathematics
Language of instruction	English

Course coordinator/person responsible	dr Andrzej Michalski

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS Points
lecture	60	III	11
tutorial			
classes	60	III	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	Calculus I

II. Course Objectives

To present the basic concepts and theorems in calculus of several variables.
To develop skills in applied calculus of several variables.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
	KNOWLEDGE	
W_01	Basic concepts and definitions of calculus of several variables (K_W01, K_W02, K_W03, K_W04, K_W05, K_W07).	K_W01, K_W02, K_W03, K_W04, K_W05, K_W07
W_02	Basic methods and theorems of calculus of several variables (K_W01, K_W02, K_W03, K_W04, K_W05, K_W07).	K_W01, K_W02, K_W03, K_W04, K_W05, K_W07
W_03	Selected applications of calculus of several variables (K_W01, K_W02, K_W03, K_W04, K_W05, K_W07).	K_W01, K_W02, K_W03, K_W04, K_W05, K_W07
	SKILLS	
U_01	Solve typical problem using standard methods (K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15).	K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15
U_02	Analyze complex problem, propose and explain the optimal methods for its solution (K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15).	K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15
U_03	Solve selected practical problems (K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15).	K_U01, K_U02, K_U03, K_U04, K_U05, K_U06, K_U10, K_U12, K_U13, K_U14, K_U15
	SOCIAL COMPETENCIES	
K_01	Formulate and present opinions on the applicability of calculus methods taking into account own knowledge and skills (K_K01, K_K05).	K_K01, K_K05

IV. Course Content

Continuity and differentiability of functions of several variables. Higher order derivatives. Local and global extreme values. Implicit function. Local invertibility. Extreme values of an implicit function. Lagrange coefficients method. Mappings in Cartesian spaces. Multiple integrals. Iterated integrals. Change of variables. Line integrals. Green's theorem. Surface integrals. Divergence (Gauss-Ostrogradsky) theorem. Stokes theorem. Applications.

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods *(choose from the list)*	Forms of assessment *(choose from the list)*	Documentation type *(choose from the list)*
KNOWLEDGE			
W_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
W_02	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
W_03	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
SKILLS			
U_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
U_02	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
U_03	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol
SOCIAL COMPETENCIES			
K_01	conventional lecture, discussion, practical classes	test, written exam, oral exam	evaluated test, protocol

VI. Grading criteria, weighting factors.....

LECTURE:
The completion of classes is required. Written and oral exam together constitute the final grade (after each semester):
91 – 100% excellent
81 – 90% very good
71 – 80% good
61 – 70% satisfactory
51 – 60% sufficient
less than 51% fail
CLASSES:
At least 80% of attendance is required. Two tests together constitute the final grade (each semester):
91 – 100% excellent
81 – 90% very good
71 – 80% good
61 – 70% satisfactory
51 – 60% sufficient
less than 51% fail

Detailed assessment rules are given during lectures and classes.

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	Lecture: 60 hrs. Classes: 60 hrs. Individual consultations: 30 hrs. In total: 150 hrs.
Number of hours of individual student work	Preparation for classes: 60 hrs. Studying books: 45 hrs. Preparation for tests and exams: 45 hrs In total: 150 hrs.

VIII. Literature

Basic literature
Lecture notes. Worksheets.
Additional literature
In English: R. Ellis, D. Gulick, Calculus: One and Several Variables, Harcourt Brace Jovanovich, 1991. D. D. Berkey, P. Blanchard, Calculus, Saunders College Pub., 1992. S. L. Salas, E. Hille, J. T. Anderson, Calculus: One and Several Variables with Analytic Geometry, Wiley, 1986. In Polish: W. Rudin, Podstawy analizy matematycznej, PWN, Warszawa 2002. M. Gewert, Z. Skoczylas, Analiza Matematyczna 2, Oficyna Wydawnicza GiS, 2005. M. Gewert, Z. Skoczylas, Elementy analizy wektorowej. Teoria, przykłady, zadania., Oficyna Wydawnicza GiS, 2012. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, PWN, 2004. J. Banaś, S. Wędrychowicz, Zbiór zadań z analizy matematycznej, WNT, Warszawa 1996. G. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, 2005.