

Course Syllabus**I. General Information**

Course name	Application of mathematics
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 Wiesław Głowczyński
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture			5+5
tutorial			
classes			
laboratory classes			
workshops			
seminar	30 +30	V+VI	
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	-----
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II. Course Objectives

C1. To prepare the BA thesis.
C2. To prepare the presentation of the BA thesis.
C3. To prepare for the BA thesis defence.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	The student understands the importance of mathematics and its applications, in particular its role in the context of contemporary civilization's dilemmas.	K_W01,
W_02	The student has a good understanding of the role and importance of proof in mathematics, and the notion of essence of hypotheses.	K_W02,
W_03	The student understands the structure of mathematical theories, can use mathematical formalism to construct and analyze simple mathematical models in other areas of science.	K_W03,
W_04	The student has advanced knowledge of the basic areas of higher mathematics, in particular in calculus, algebra, geometry, logic, measure and integral, probability theory, differential equations, statistics, set theory, topology and others selected fields of mathematics and its applications.	K_W04,
W_05	The student knows basic examples both those that illustrate concrete mathematical notions, and those that allow false hypotheses or unsupported argumentation.	K_W05,
W_06	The student knows selected notions and methods of mathematical logic, set theory and discrete mathematics contained in the fundamentals of other branches of mathematics.	K_W06,
W_07	The student knows the fundamentals of differential and integral calculus of one and several variable functions, and other branches of mathematics applied in differential calculus with special attention of linear algebra and topology.	K_W07
SKILLS		
U_01	The student can in a clear manner, in speech and writing, present correct mathematical reasoning, formulate theorems and definitions.	K_U01,
U_02	The student uses sentential and quantifier calculus, can properly use quantifiers in colloquial language.	K_U02,
U_03	The student is able to conduct easy and more advanced proofs by means of complete induction, can define functions and recurrent relations.	K_U03,
U_04	The student can apply classical logic system to formalize mathematical theories.	K_U04,
U_05	The student is capable to create new object by means of construction of quotient spaces or Cartesian products	K_U05,
U_06	The student can examine and explain functional interconnections, expressed in the form of formulas, tables, schemes and apply them in practical problems.	K_U11,
U_07	The student uses definition of the integral of one and several variable real functions, can explain the analytical and geometrical sense of this notion	K_U13,
U_08	The student is able to integrate one and several variable functions by parts and substitution, can interchange ordering of integration, can express the area of smooth surfaces and volume as appropriate integrals	K_U14,

U_09	The student can utilize numerical tools and methods to solve selected problems of differential and integral calculus, in particular those based on its applications	K_U15,
U_10	The student uses the notion of linear space, vector, linear transformation and matrix	K_U16,
U_11	The student can compute determinants and knows their properties, can give geometrical interpretation of determinant and understands its connection with mathematical analysis.	K_U18,
U_12	The student can interpret the system of ordinary differential equations in geometrical language, applying the notion of vector field and phase space.	K_U22,
U_13	The student knows at least one foreign language.	K_U37,
U_14	The student is able to use his knowledge to formulate complex and unusual mathematical problems in a correct and understandable way, discuss them and methods of solving them and present mathematical results and contents, in particular using information and communication techniques.	K_U38,
U_15	The student can properly select sources of information, in particular electronic, based on their analysis and evaluation, and synthesize the knowledge gathered on their basis.	K_U39,
U_16	The student is able to communicate in the strict language of mathematicians, use specialist terminology, present and evaluate opinions, in particular, take part in debates on the foundations of higher mathematics.	K_U40,
U_17	The student can plan and organize own work and effectively perform and coordinate tasks in a team, also of an interdisciplinary nature.	K_U41,
U_18	The student can independently acquire knowledge and develop professional skills and plan their own path of self-education and consistently strive to achieve it throughout their lives.	K_U42
SOCIAL COMPETENCIES		
K_01	The student is prepared to take into account the limits of his own knowledge and skills, adequate assessment of his level of competence, his weaknesses, the need to constantly improve his professional skills, and at the same time know his strengths and present a critical attitude towards opinions not supported by rational justification.	K_K01,
K_02	The student is prepared to appreciate the role and importance of knowledge in solving cognitive and practical problems, typical of occupations and workplaces appropriate for graduates in the field of mathematics and consulting experts in the case of difficulties in solving the problem.	K_K02,
K_03	The student is ready to fulfill social obligations resulting from the nature of work typical of mathematics, in particular he actively works for the public interest.	K_K03,
K_04	The student is ready to responsibly carry out professional roles, respect professional achievements and traditions, and observe professional ethics and act on behalf of others.	K_K04,
K_05	The student is ready to present selected achievements of higher mathematics in a popular way.	K_K05

IV. Course Content

Defining the topic of work. Preparing the source materials. Developing the source materials. Preparing the BA

thesis content. Thesis edition. Preparing for defense.
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V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods <i>(choose from the list)</i>	Forms of assessment <i>(choose from the list)</i>	Documentation type <i>(choose from the list)</i>
KNOWLEDGE			
W_01- W_07	conversational lecture, discussion	paper, oral test	BA thesis, protocol
SKILLS			
U_01- U_17	conversational lecture, discussion	paper, oral test	BA thesis, protocol
SOCIAL COMPETENCIES			
K_01- K_05	conversational lecture, discussion	paper, oral test	BA thesis, protocol

VI. Grading criteria, weighting factors

Assessment based on the advancement of the BA thesis and oral test:

91 – 100% excellent

81 – 90% very good

71 – 80% good

61 – 70% satisfactory

51 – 60% sufficient

less than 51% fail

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	Seminar: 60 hrs. Individual consultations: 60 h In total: 120 h
Number of hours of individual student work	Preparing for seminar: 60 h Studying books: 120 h Preparing the BA thesis content: 180 h Preparing for defense: 120 h In total: 480 h

VIII. Literature

Basic literature
Depending on the topic of the BA thesis.
Additional literature
Depending on the topic of the BA thesis.