University of Gdańsk

Subject card

Subject name and code	Didactics of Mathematics in Secondary School II, PG_00207045						
Field of study	Mathematics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		5.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agnieszka Demby				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		3.0		62.0	125
Subject objectives	The aim of the course is to prepare students in the field of mathematics didactics to teach mathematics at post-primary school level.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
		The student is able to: identify typical school tasks with educational objectives, particularly with the general requirements of the core curriculum, and with key competencies; analyze the distribution of material; identify the connections between the content of the subject being taught or the activities being conducted and other curricular content; adapt the method of communication to the developmental level of students; create teaching situations that foster student activity and interest, and promote knowledge; collaborate effectively with parents or guardians of students, school staff, and the community outside of school during the teaching process; select classroom methods and teaching resources, including those in the field of information and communication technology, that engage students and take into account their diverse learning needs; substantively, professionally, and reliably assess student work in class and at home; construct a test to assess specific student skills; recognize student errors typical of the subject being taught or the activities being conducted and utilize them in the teaching process; conduct a preliminary diagnosis of student skills.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work [SU4] test/exam - oral or written

Course outcome	Subject outcome	Method of verification
	The student is ready to: adapt work methods to the needs and diverse learning styles of students; promote knowledge among students in the school and extracurricular environments; encourage students to undertake research and engage in regular physical activity; promote responsible and critical use of digital media and respect for intellectual property rights; develop problem-solving skills; build a system of values and develop students' ethical attitudes, as well as shape their communication skills and cultural habits; develop students' curiosity, activity, and cognitive independence, as well as logical and critical thinking; develop the habit of systematic learning and using various sources of knowledge, including the Internet; stimulate students towards lifelong learning through independent work.	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work

Course outcome	Subject outcome	Method of verification
	The student knows and understands: the place of a given subject or type of activity in the framework of curricula at individual educational stages; the core curriculum of a given subject, the educational objectives and content of the subject or activities at individual educational stages, the subject or type of activity in the context of prior and further education, the structure of knowledge within the subject or activities, and key competencies and their development within the teaching of the subject or activities; intra- and cross-curricular integration; issues related to the curriculum – creation and modification, analysis, evaluation, selection and approval, and the principles of designing the educational process and distributing material; the teacher's substantive, didactic, and educational competencies, including the need for professional development, including the use of information and communication technology, and adapting communication methods to students' developmental levels and stimulating students' cognitive activity, including creating teaching situations; the importance of teacher authority and the principles of student-teacher interaction during lessons; moderating interactions between students; The role of the teacher as a disseminator of knowledge and the importance of teacher collaboration in the teaching process with students' parents or guardians, school staff, and the community outside of school; Conventional and unconventional teaching methods, including activating methods and project methods, the process of learning by doing, discovery or scientific inquiry, and student research, as well as the principles for selecting teaching methods typical for a given subject or type of activity; Methodology for implementing specific educational content within a subject or activity – substantive and methodological solutions, good practices, adapting interactions to the needs and abilities of students or student groups with different learning potential and styles, student errors typical of a subject or type of activity, their role and ways of utilizing them in the teaching process; Organization of work in the classroom and in groups: the need for individualized teaching, the issue of interdisciplinary teaching, forms of work specific to a given subject or type of activity: field trips, field and laboratory activities, experiments and competitions,	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work

Course outcome	Subject outcome	Method of verification
	and issues related to homework; Methods of organizing the classroom space, taking into account the principles of universal design: teaching aids (textbooks and educational packages), teaching aids – selection and use of educational resources, including electronic and foreign-language ones, educational applications of media and information and communication technologies; computational thinking in solving problems within the subject taught or classes conducted; the need to search, adapt, and create electronic educational resources and multimedia design; teaching methods in relation to the subject taught or classes conducted, as well as the importance of shaping an attitude of responsible and critical use of digital media and respect for intellectual property rights; the role of diagnosis, monitoring, and assessment in teaching; assessment and its types: ongoing, semester, and annual assessment, internal and external assessment; assessment functions; exams at the end of the educational stage and methods of constructing tests, quizzes, and other tools useful in the process of assessing students within the subject taught; initial diagnosis of the student group and each student in the context of the subject taught or classes conducted, and ways of supporting students' cognitive development; the need to develop concepts, attitudes, and practical skills, including problem-solving and the use of knowledge; methods and techniques for effective learning; methods of structuring knowledge and the need to repeat and consolidate knowledge and skills; the importance of developing students' personal and socio-emotional skills: the need to develop students' collaboration skills, including group problem-solving and building a value system and developing students' ethical attitudes, as well as developing communication skills and cultural habits; teacher's work skills; the appropriate use of lesson time by students and teachers; issues related to checking and assessing the quality of education and its evaluation, as well as the need to analyze and evaluate one's own teaching and educational work; the need to shape students' positive attitudes towards learning, develop curiosity, activity, and cognitive independence, logical and critical thinking, shape	

Course outcome	Subject outcome	Method of verification
	motivation to learn a given subject and systematic learning habits, use various sources of knowledge, including the Internet, and prepare students for lifelong learning by stimulating them to work independently. teaching tasks implemented by the school.	

Subject contents

1. Teaching mathematics in relation to mathematics as a scientific discipline.
2. Introducing mathematical concepts in secondary school. Learning to use theorems and proofs.
3. The objectives and content of mathematics teaching in secondary school, including in the context of final high school exam requirements.
4. Analysis of proposed detailed methodological solutions. Formal and intuitive aspects of various approaches.
5. Solving problems from selected areas of mathematics taught in secondary school, with particular emphasis on final high school exam problems. Reflection on various solution methods and their appropriateness for different groups of students.
6. Characteristic difficulties of students with selected topics in mathematics in secondary school.
7. Mathematical modeling as preparation for solving problems in various areas of science and life.
8. Methodology for solving problems.
9. Review of current mathematics curricula and textbooks. Criteria for evaluating curricula and textbooks. 10. Teaching methods and resources appropriate for teaching mathematics in secondary school. Visualizations. The use of new technologies.
11. Initiating students into independent mathematics learning and self-control.
12. Selected aspects of student monitoring and assessment. Diagnosing students, including assessment after primary school.
13. Problems with individualizing student work: the specifics of working with students with excessive difficulties, stimulating the development of gifted students in mathematics.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Observation of student's attitude	51.0%	0.0%
Test	51.0%	25.0%
Activity	51.0%	15.0%
Exam	51.0%	35.0%
Project	51.0%	25.0%

Recommended reading

Basic literature

1. Articles selected for the subject topic from the magazines "Dydaktyka Matematyki", "Matematyka", "Matematyka w Szkole".
2. Websites devoted to the theory of mathematics didactics and practical solutions and good practices in this area of teaching mathematics in secondary school.
3. Education law documents and guidelines of the Central Examination Board on the organization of the Matura exam. Proposals of educational publishers on the methodology of preparing students for the Matura exam. Collections of tasks and Matura exam papers.
4. Examples of mathematics teaching programs and didactic plans as well as textbooks and collections of tasks for teaching mathematics in secondary school.
5. Books and articles of a methodological nature.

Supplementary literature

1. Gucewicz-Sawicka (red.), Podstawowe zagadnienia dydaktyki matematyki, PWN, Warszawa 1982.
2. S. Turnau: Wykłady o nauczaniu matematyki, PWN, Warszawa 1991.
3. P.Zarzycki: Dydaktyka matematyki. Zagadnienia ogólne, PWN, Warszawa 2023.
4. P.Zarzycki: Dydaktyka matematyki. Nauczanie w szkole ponadpodstawowej, PWN, Warszawa 2023.
5. Popular science books and articles.

eResources addresses

Example issues/ example questions/ tasks being completed	Provide 3 methodological tips for teachers preparing students for the Matura exam in mathematics, concerning: a) organization of revision of the material, b) work with different types of tasks appearing in the Matura exam, c) strategies for working with the Matura exam paper.
Work placement	Not applicable

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