

<b>Subject code</b>	<b>ECTS credits</b>
MAT4016	6

**Course title in Lithuanian**

**MATEMATIKOS SUNKESNIŲ, NESTANDARTINIŲ, PROBLEMINIŲ IR OLIMPIADINIŲ UŽDAVINIŲ SPRENDIMAS IR JŲ SPRENDIMO METODIKA**

**Course title in English**

**SOLVING OF MORE COMPLICATED AND OLYMPIAD LEVEL PROBLEMS**

**Short course annotation in Lithuanian (up to 500 characters)**

Dalyko metu studentai tobulins uždavinių sprendimo gebėjimus, gilindami teorines žinias ir jas taikydami praktiškai. Išklaušę kursą, baigusieji gebės laisvai mąstyti ir priimti sprendimus netradicinių uždavinių sprendime, integruodami kūrybiškumą, matematinę kultūrą bei turimas žinias. Taip pat įgys praktinių įgūdžių sprendžiant specifinius įvairių tipų ir įvairaus sudėtingumo uždavinius. Suvoks projektinio mokymo reikšmę mokant matematikos, gebės rasti ir suformuluoti projektų idėjas, sukurti planus jų įgyvendinimui.

**Short course annotation in English (up to 500 characters)**

The course of studies gives opportunity for students to improve the solving of tasks skills integrating theoretical and practical experience. After this course, students will gain experience in independent thinking in a solution space of an unusual mathematical situation, combining creativity, logical thinking, mathematical culture and knowledge. Also they will acquire practical skills in applying specific mathematics practices solving techniques of various types and varying degrees of problems. Will understand the **project-based works** requirements of mathematics education, will study in the finding of project ideas and creating the plans of the projects, addressing the topics of teaching mathematics and applied tasks.

**Prerequisites for entering the course**

Subjects of Mathematics and its Application programme

**Course aim**

To teach students solve more complicated, unusual, nonstandard, problematic and olympiad level problems and to apply methodology of their solving

**Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment**

No	Course outcomes	Criteria of learning achievement evaluation	Study methods	Methods of learning achievement assessment
1.	Ability to apply methodology of more complicated problem solving	Student demonstrates ability to apply methodology of more complicated problem solving	Lectures, practical works, individual work, consulting	Test, Assessment of practical works
2.	Ability to solve problematic and nonstandart problems	Student demonstrates ability to solve problematic and nonstandart problems	Lectures, practical works, individual work, consulting	Mid-term exam, Assessment of practical works
3.	Ability to apply methodology of olympiad level problems	Student demonstrates ability to apply methodology and solve olympiad level problems	Lectures, practical works, group and individual work, consulting	Group work presentation, assessment of practical works

4.	Ability to find ideas, plan and implement problem - based works	Student demonstrates ability to find ideas, plan and implement problem - based works	Lectures, practical works, individual work, consulting	Final exam, assessment of practical works
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#### Links between study programme outcomes and course outcomes

Study programme outcomes	Running number of course outcome			
	1	2	3	4
Know and understand the main theories of mathematical didactics, consolidate and integrate the main principles in education	+	+	+	+
Summarize and evaluate critically scientific and professional literature, as well as use various tools for collecting of information for the study process and for solving fixed practical/theoretical problems	+	+	+	+
Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies	+	+	+	+
Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions	+	+	+	+
Work individually and/or in groups by developing and adopting appropriate mathematical models and tools for use in case analysis	+	+	+	+

#### Content

No	Content (topics)
1.	Methodology of mathematical problem solving. Analysis and synthesis
2.	More complicated problems, their solving and analysis
3.	Solving techniques of problematic and nonstandard problems.
4.	Olympiad level problems. Solving methodology
5.	Project based works: finding of ideas, planning, implementation

#### Distribution of workload for students (contact and independent work hours)

<b>Lectures</b>	<b>30</b>
<b>Seminars</b>	<b>15</b>
<b>Group work</b>	<b>30</b>
<b>Individual students work</b>	<b>85</b>
<b>Total:</b>	<b>160</b>

#### Structure of cumulative score and value of its constituent parts

Mid-term exam 20%, group work - project 20 %, test 10%, final exam – 50%

#### Recommended reference materials

No	Publication year	Authors of publication and title	Publishing house	Number of copies in		
				University library	Self study rooms	Other libraries
<i>Basic materials</i>						
1.	2006	Lileikienė T., Meškauskaitė V, Patalauskienė A. „Matematikos uždaviniai ir jų sprendimas“ (Mathematical Problems and their Solutions)	Kaunas „Šviesa“	10	5	

2.	2006	Kašuba R, „ Kaip spręsti, kai nežinai kaip“	Vilnius	1	1	
3.	1990-2003	Mačys J.,A. Grincevičius „Lietuvos jaunųjų matematikų olimpiadiniai uždaviniai“ (Tasks for Lithuanian Young Mathematicians Olympiad )	Vilnius	3	1	
4.	1998	Lileikienė T. ir kiti. „Kelias į olimpą“- 5, 6, 7,8 , 9, 10, 11, 12 kl. (Way to Olympus)	Kaunas		8	
5.	2002	Zalubienė J., Matematikos projektinių darbų idėjos (Ideas of Mathematical Projects)	Šiauliai	1	1	
6.	2000	Grebeničenkaitė P, Tumėnaitė E, Probleminiai ir nestandartiniai uždaviniai ir jų sprendimai (Problematic and Nonstandard Tasks and Solutions)	Šiauliai	1	1	
<b>Supplementary materials</b>						
1.		<a href="http://www.olimpiados.lt/">http://www.olimpiados.lt/</a>				
2.		Kengūra 3-12klasės	Vilnius			
3.		<a href="http://www.imo.math.ca/">http://www.imo.math.ca/</a>				

**Course programme designed by**

Assoc. prof. dr. Aušra Rutkienė
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