

Program	Level		Second cycle				
	Name of the program		Mathematics Education				
COURSE							
Course title	Teaching Methods in Gifted Education						
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)			
EDU 530	III	Elective course	8	3+2+0			
Lecturer							
Course Goals	<p>Functional equation is an equation in which a function is the unknown. The concept of the function is intuitively clear, so the functional equations area is attractive enough for college students and gifted high school students to study.</p> <p>While solving functional equations, different techniques are demonstrated (differences in techniques stem from differences in functions: they can be one-to-one, periodical, bounded, monotonic, continuous, polynomial...). Every course on functional equations must include Cauchy functional equation and equations similar to it. In this course one will also learn about d'Alembert's, Aczel's, Jensen's, and Davison's functional equations. Chebyshev polynomials of the first kind will be described as a solution of some polynomial functional equations.</p>						
Learning Outcomes	<p>Review of different classes of real functions – this time in the context of solving functional equations. Reinterpretation of elementary functions (polynomial, logarithmic, exponential, sine function...) in a new way – as a solution of some functional equation. This should enable better understanding of important concepts from Elementary Mathematics and Analysis.</p>						
COURSE CONTENT							
<ul style="list-style-type: none"> - Formulation of the problem. Solving simpler equations I. - Cauchy functional equation. Solving simpler equations II. - Equations similar to Cauchy functional equation. - Functional equations with one-to-one or even function as a solution. - Cauchy functional equation in a plane. - Jensen's functional equation. - Pexider's functional equation. - Functional equations with bounded or monotonic function as a solution. - Biadditive functional equation. - Quadratic functional equation. - d'Alembert-Poisson's functional equation. - Functional equations with continuous or differentiable function as a solution. - Characterization of cosine function. - Pompeiu functional equation. - Polynomial functional equation. - Davison's and Aczel's functional equations. - Description of the Chebyshev polynomials of the first kind. 							
LITERATURE							
<p>[1] Sahoo, P.K., Kannappan, P., Introduction to Functional Equations, Chapman & Hall-CRC, 2011. [2] Andrei Gh, et al, Algebra – partea I, Constanta, 1990. [3] Maskina, M.S., Mojsejev, S.A., Uvod u teoriju funkcionalnih jednačina, Rjazanj, RGPU, 2002. [4] Lihtarnikov, L.M., Elementarni uvod u funkcionalne jednačine, Lan, Sankt-Petersburg, 1997.</p>							
STUDENT WORKLOAD (hours in a semester)							
Lectures	45	Tutorial	30	Individual work	100	T o t a l	175
GRADING				REMARKS			
Criterion	Maximum points	Minimum points					
Midterm exams (I+II)	40+40	23+22					
Homework assignments (I+II)	10+10	10					
Final exam	40	22					
T o t a l	100	55					

