Study program	Level of studies		First cycle		
	Study program name		**Physics Education**		
Course name	**MATHEMATICAL METHODS OF PHYSICS I FOR TEACHERS**				
Course ID	Semester	Course status	ECTS credits		L+E
PCS3712	**III**	**MANDATORY**	**6**		**3+3**
Lecturer					

Aims and intended learning outcomes	Introducing students to mathematical methods used in general and theoretical physics. After completing the course, student will be able to solve problems in courses of theoretical physics at senior years.

Course content

The Calculus of a function of several variables

Function of two and more variables: continuity, limits and differentiability, partial derivatives, geometrical interpretation of partial derivatives, higher partial derivatives, total differential tangent plane and linear approximation, the chain rule, Taylor's expansion, directional derivatives, gradient vector, maximum and minimum values, methods of Lagrange's multipliers.

Double integrals: Double integrals over rectangles and general regions, application of double integrals in mechanics (calculation of a surface area in a plane, volume, mass, moment of a inertia, surface area and centre of a mass of a solid), coordinate transformation in double integrals.

Triple and multiple integrals: triple integrals in physics (volume, mass, centre of a mass, moment of inertia, electrostatic potential, gravity force), coordinate transformations in triple integrals, using spherical, cylindrical and general coordinates to calculate triple integrals.

Vector calculus

Vectors field in physics, gradient, curl and divergence, potential field in physics, parametric curves, line integrals, Green's theorem, work of a vector field, conservative fields in physics, parametric surfaces surface integrals, Stoke's theorem and Gauss' theorem with application in physics (mass flux, heat flux, magnetic and electric field flux, etc).

Differential equations

Linear differential equation of first and second order, differential equations of constant coefficients, general and particular solution, examples of differential equations in physics (Newton's equations of motion, RLC circuit, damped and forced linear harmonic motion, etc), the variation of a constant method.

Student workload (hours)		Grading	
Lectures and Exercises	90	Assessment method	Points
Exam preparation	60	Midterm exam	50
		Final exam	50
Total	150		
		Total	100

Literature

1. Mirza Hadžimehmedović, Milan Pantić, *Matematičke osnove teorijske fizike I*,PrintCom, Tuzla, 2015.
2. James Stewart, *Calculus*, Thomson Learning – Brooks/Cole, 5th Edition, 2003.
3. V. Ilin, E. Poznyak, *Fundamentals of mathematical analysis*, Mir Publishers, Moscow, 1982.
4. D. Mihailović, D. Tošić, *Elementi matematičke analize II*, Naučna knjiga, Beograd, 1983.
5. M. P. Uščumlić, P. M. Miličić, *Zbirka zadataka iz više matematike II*, Naučna knjiga, Beograd.

Remarks