Study programme(s): Mathematics (M3)	
Level: bachelor	
Course title: Ordinary Differential Equations(M3-11)	
Lecturer: Jelena O. Aleksić	
Status: obligatory	
ECTS: 7	
Requirements: passed exams in courses: *Analysis 2*	

Learning objectives

To introduce students to the basic concepts of differential equations, the problems of existence and uniqueness of solutions, and basic methods of solving ODEs.

Learning outcomes

Minimal: Students will understand the basic concepts and learn techniques of solving differential equations.

Desirable: Some students will develop a sense of qualitative analysis of differential equations, and the self-modelling of various phenomena.

Syllabus

Theoretical instruction

First order differential equations. Direction fields and integral curves. Autonomous equations. The existence and uniqueness theorems. Dependence of solutions on the initial conditions and parameters. Solution prolongation. Method of successive approximations. Linear equations, homogeneous equations, exact equations. Differential equations in implicit form. Laplace transform.

Systems of differential equations. Existence and uniqueness. Linear systems. Homogeneous and non-homogeneous systems. Linear systems with constant coefficients. Fundamental set of solutions.

Linear equation of n-th order, homogeneous and non-homogeneous, the variation of parameters. Equations with constant coefficients. Solving through the ranks, ordinary and regular singular point. Analysis of solutions of differential equations: stability of solutions, critical point, equilibrium states.

Application of differential equations to model the physics, biology, economics and other sciences.

Practical instruction

Tasks and problems practised on exercises follow the content of lectures.

Literature

1. V. Marić, M. Budinčević: *Diferencijalne i diferencne jednačine*, PMFNS 2005.
2. V. Marić, M. Budinčević, A. Pavlović: *Zbirka zadataka iz diferencijalnih i diferencnih jednačina, u pripremi*
3. W.E. Boyce, R. C. DiPrima, *Elementary Differential Equations and Boundary Value Problems*, Wiley, 2009.
4. G. Teschl, *Ordinary Differential Equations and Dynamical Systems*, AMS, 2012.
5. V. I. Arnol'd, *Ordinary Differential Equations*, Springer, 1992.

Weekly teaching load				Other: 0
Lectures: 3	Exercises: 3	Other forms of teaching: 0	Student research: 0	

Teaching methodology

Mostly plenary lectures with occasional computer presentations. Discussions with students. Analysis and solving typical problems during the problem sessions.

Grading (maximum number of points 100)			
Pre-exam obligations	**points**	**Final exam**	**points**
Colloquia	50	Oral exam	50