



UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

Predmet:	Izbrana poglavja iz diferencialnih enačb
Subject Title:	Advanced topics in differential equations

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Matematika		1 ali 2	1 ali 4
Mathematics		1 or 2	1 or 4

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
30	0	0			120	5

Nosilec predmeta / Lecturer:

Valerij Romanovskij

Jeziki /

Languages:

Predavanja / Lecture: Slovenski / Slovene

Vaje / Tutorial: Slovenski / Slovene

Pogoji za opravljanje študijskih obveznosti:

Znanje osnovnih pojmov in rezultatov iz teorije NDE

Prerequisites:

Basic knowledge of fundamental notions and results of the theory of ODE's

Vsebina:

Izbrana so posebna poglavja iz teorije dinamičnih sistemov, funkcij Ljapunova, normalnih form, Poincarejevega problema centra, invariant diferencialnih enačb, izohronosti nihanj, bifurkacij limitnih ciklov ali katerega drugega modernega področja teoriji dinamičnih sistemov. Izbira poglavij je odvisna od interesa in raziskovalne usmerjenosti študentov. Spodaj navedena literatura praviloma služi le kot osnova in je nadgrajena z bolj specializiranimi teksti.

Content (Syllabus outline):

Special topics in dynamical systems, Lyapunov functions, normal forms, Poincare center problem, invariants of differential equations, isochronicity of oscillations, limit cycles bifurcations or some other area of contemporary theory of dynamical systems are chosen. The choice depends on students' interests and their research orientation. The literature below in principle serves only as a basis, and is combined with more specialized texts.

Temeljna literatura in viri / Textbooks:

- D.K. Arowsmith, C.M. Place, Dynamical systems. Differential equations, maps and chaotic behaviour, Chapman and Hall Mathematics Series, Chapman & Hall, London 1992.
- S. N. Chow, J. K. Hale, Methods of bifurcation theory, Grundlehren der Mathematischen Wissenschaften, 251. Springer-Verlag, New York – Berlin 1982.
- J. Guckenheimer, P. Holmes, Nonlinear oscillations, dynamical systems and bifurcations of vector fields, Applied

Mathematical sciences, 42, Springer-Verlag, New York 1983.

- J. A. Murdock, Normal forms and unfoldings for local dynamical systems, Springer, New York, 2003
- V. G. Romanovski, D.S. Shafer, The Center and Cyclicity Problems A Computational Algebra Approach. Birkhäuser, Boston, 2009

Cilji:

- Razumevanje osnovnih načinov kvalitativne in bifurkacijske analize diferencialnih enačb
- Poznavanje metod študija lastnosti rešitev diferencialnih enačb in gladkih preslikav
- Pridobiti si sposobnost detajlne analize določenih matematičnih modelov opisanih navadnimi diferencialnimi enačbami ali gladkimi preslikavami

Objectives:

- Understanding main approaches to the qualitative and bifurcational analysis of differential equations
- Gaining knowledge of methods of studying the properties of solutions of differential equations and smooth maps
- Gaining skills of detail analysis of certain mathematical model described by ordinary differential equations or smooth maps

Predvideni študijski rezultati:

Znanje in razumevanje:

- Razumevanje metod kvalitativne in bifurkacijske analize dinamičnih sistemov
- Pridobivanje sposobnosti sistematskega študija rešitev dinamičnih sistemov in njihovih lastnosti

Prenesljive/ključne spretnosti in drugi atributi:

- podlaga za raziskovalno delo na področju dinamičnih sistemov

Intended learning outcomes:

Knowledge and understanding:

- Understanding of methods of qualitative and bifurcational analysis of dynamical systems
- Gaining some systematic approaches to studying of solutions of dynamical systems and their properties

Transferable/Key Skills and other attributes:

- a basis for research in the theory of dynamical systems

Metode poučevanja in učenja:

- predavanja;
- priprava seminarja;
- konzultacije;
- samostojni študij.

Teaching and learning methods:

- lectures;
- seminar work;
- consultations;
- self-study.

Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

- seminarsko predavanje;
- pisni izdelek;
- ustni izpit.

Delež (v %) /
Weight (in %)

20 %
30 %
50 %

Assessment methods:

Type (examination, oral, coursework, project):

- seminar talk;
- written work;
- oral examination.