UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	DIFERENCIALNE ENAČBE
Course title:	DIFFERENTIAL EQUATIONS

Študijski programi in stopnja	**Študijska smer**	**Letnik**	**Semestri**
Strojništvo, tretja stopnja, doktorski	Ni členitve (študijski program)		Celoletni

Univerzitetna koda predmeta/University course code: 7002

Predavanja	**Seminar**	**Vaje**	**Klinične vaje**	**Druge oblike študija**	**Samostojno delo**	**ECTS**
90					160	10

Nosilec predmeta/Lecturer:	Aljoša Peperko

Izvajalci predavanj:	Aljoša Peperko
Izvajalci seminarjev:	
Izvajalci vaj:	
Izvajalci kliničnih vaj:	
Izvajalci drugih oblik:	
Izvajalci praktičnega usposabljanja:	

Vrsta predmeta/Course type:	Izbirni predmet /Elective course

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina, Angleščina
	Vaje/Tutorial:	Slovenščina, Angleščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Veljajo splošni pogoji za doktorski študij.	General prerequisites for the third level studies.

Vsebina:	**Content (Syllabus outline):**
Linearne diferencialne enačbe: struktura rešitev, linearne diferencialne enačbe v kompleksnem, specialne funkcije. Robni problemi: definicija, zgledi pri navadnih linearnih diferencialnih enačbah drugega reda, lastna vrednost in lastni vektor, ortonormirani sistemi funkcij, Legen¬drovi polinomi, polinomi Čebiševa prvega in drugega reda, cilindrske funkcije, sferne funkcije. Parcialne diferencialne enačbe: definicija, fizikalne parcialne diferencialne enačbe drugega reda, hiperboličnega, paraboličnega in eliptičnega tipa, valovna enačba v mehaniki in elektromagnetiki, enačba prenosa toplote, Poissonova formula in Fouri¬erjeva metoda, Dirichletov in Neumannov robni problem.	Linear differential equations: structure of solutions, differential equations in the complex domain,special functions. Boundary value problems: definition, examples for second order linear differential equations, eigenvalues and eigenfunctions, orthonormal systems, Legendre polynomials, Chebishev polynomials of first and second order, cylindric functions, spherical functions. Partial differential equations: definitions, second order partial differential equations from physics, elliptical, hyperbolic and parabolic partial differential equations, wave equation in mechanics and electromagnetism, heat equation, Poisson formula and the Fourier method, Dirichlet and Neumann problems.

Temeljna literatura in viri/Readings:

[1] E. Zakrajšek, Analiza III, Društvo matematikov, fizikov in mehanikov, 1998.
[2] W. Walter, Ordinary differential equations, Springer, 1998.

[3] L. C. Evans, Partial Differential Equations, American Mathematical Society, 1998.
[4] E. Zakrajšek, Analiza IV, , Društvo matematikov, fizikov in mehanikov, 1998.
[5] S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover, 1993.

Cilji in kompetence:	**Objectives and competences:**
Cilji: Namen tečaja je sistematska predstavitev teorije diferencialnih enačb. **Kompetence:** Poznavanje diferencialnih enačb je nujno za uporabo v tehniških vedah, saj so pomembno orodje v mnogih vejah.	**Goals:** The principal goal is to systematically present the theory of differential and partial differential equations. **Competences:** The student acquires the firm theoretical background for the many applications of differential and partial differential equations.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: Obvladovanje obravnavane snovi in zmožnost njene uporabe in uporabe sorodnih matematičnih metod v lastnem raziskovalnem delu.	Knowledge and understanding: Substantial understanding of the contents of the course and the ability of its application and application of related mathematical methods in the student's own research work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, laboratorijske vaje, seminarsko delo, e-izobraževanje, konzultacije. Seminarsko delo v čim večji meri navezujoče se na področje doktorskega raziskovanja. Študij z uporabo priporočene literature	Lectures, laboratory practice & seminar work, e-education, consulting. The seminar work is related, as much as possible, to the student's doctoral research field. Study on a recommended literature basis.

Načini ocenjevanja:	**Delež/Weight**	**Assessment:**
Ustni izpit, poročilo o seminarskem delu. Pogoj za opravljanje ustnega izpita je uspešno izdelano in pozitivno ocenjeno seminarsko delo: • ustni izpit (70%) • seminarsko delo (30%)		Oral exam, report on seminar work. The condition for admission to oral exam is successful completion of seminar work, rewarded with a passing grade. • oral examination (70%) • project (seminar assignment) (30%)

Reference nosilca/Lecturer's references:

doc.dr Aljoša Peperko

MÜLLER, Vladimir, PEPERKO, Aljoša. Generalized spectral radius and its max algebra version. V: 17th Conference of the International Linear Algebra Society, Braunschweig, Germany, August 2011. Special issue on 17th ILAS conference, Braunschweig 2011, Linear Algebra and its Applications, ISSN 0024-3795, Vol. 439, iss. 4. Amsterdam [etc.]: Elsevier, 2013, str. 1006-1016.

PEPERKO, Aljoša. On the continuity of the generalized spectral radius in max algebra. Linear Algebra and its Applications, ISSN 0024-3795. [Print ed.], 2011, vol. 435, iss. 4, str. 902-907.

DRNOVŠEK, Roman, PEPERKO, Aljoša. On the spectral radius of positive operators on Banach sequence spaces. Linear Algebra and its Applications, ISSN 0024-3795. [Print ed.], 2010, vol. 433, iss. 1, str. 241-247.

MÜLLER, Vladimir, PEPERKO, Aljoša. On the spectrum and the spectral mapping theorem in max algebra. Preprint series, IMFM, ISSN 2232-2094, 2014, vol. 52, št. 1199, str. 1-22.

KANDIĆ Marko, PEPERKO Aljoša, On the submultiplicativity and subadditivity of the spectral and essential spectral radius, sprejeto v objavo v Banach J. Math. Anal., 2015.