UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	MATEMATIKA IN STATISTIKA
Course Title:	MATHEMATICS AND STATISTICS

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
VŠP Kemijska tehnologija, 1. stopnja	**/**	**1.**	**1. in 2.**
HSP Chemical Technology, 1st Cycle	**/**	**1.**	**1st and 2nd**

Vrsta predmeta / Course Type: Obvezni / Mandatory

Univerzitetna koda predmeta / University Course Code: KT101S

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
90	**/**	**60 SV**	**/**	**/**	**150**	**10**

Nosilec predmeta / Lecturer: izr. prof. dr. Karin Cvetko Vah /
Dr. Karin Cvetko Vah, Associate professor

Jeziki / Languages:		
	Predavanja / Lectures:	**slovenski / Slovenian**
	Vaje / Tutorial:	**slovenski / Slovenian**

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	**Content (Syllabus outline):**
Limite funkcij: računske operacije s funkcijami (vsota, produkt, kompozitum, inverzna funkcija), zveznost, asimptote, lastnosti zveznih funkcij. **Odvod in njegova uporaba:** geometrijski pomen, pravila za odvajanje, odvodi elementarnih funkcij, diferencial in njegova uporaba, višji odvodi, L' Hospitalovo pravilo, ekstremi, konveksnost, konkavnost in prevoji, uporaba odvoda. **Funkcije več spremenljivk:** funkcija dveh spremenljivk in njen graf, zveznost, parcialni odvodi, posredno odvajanje, implicitne funkcije, totalni diferencial, gradient, ekstremi, vezani ekstremi.	**Limits of functions:** computation with functions (sum, product, composition, inverse), continuity, asimptotes, properties of continuous functions. **The derivative and its application:** the geometric meaning, rules for differentiation, the derivatives of elementary functions, the differential and its applications, higher derivatives, L'Hospitale rule, minima and maxima, convexity and concavity, application of the derivative. **Functions of several variables**: functions of two variables and their graphs, continuity, partial derivatives, the chain rule, implicit functions, extrema, constrained extrema.

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Nedoločeni integral: osnovne lastnosti, integriranje po delih, vpeljava nove spremenljivke, integrali osnovnih elementarnih funkcij (racionalnih in nekaterih trigonometrijskih). **Določeni integral**: geometrijski pomen in osnovne lastnosti, zveza z nedoločenim integralom, izlimitirani integrali. **Uporaba integrala:** ploščina, ločna dolžina, prostornina in površina vrtenine, težišče, vztrajnostni moment. **Diferencialne enačbe:** enačbe prvega reda z ločljivima spremenljivkama, homogene, linearne, linearne diferencialne enačbe drugega reda s konstantnimi koeficienti, sistemi linearnih diferencialnih enačb prvega reda s konstantnimi koeficienti, uporaba v kemiji in drugod. **Osnove statistike**: predstavitev podatkov, populacija, vzorec, cenilke. Hipoteze, korelacija in linearna regresija, metoda najmanjših kvadratov. Intervali zaupanja za srednjo vrednost in disperzijo ter testiranje hipotez.	**The indefinite integral**: basic properties, integration per partes, change of variables, integration of elementary functions (rational and certain trigonometric ones). **The definite integral**: the geometric meaning and basic properties, the fundamental theorem of calculus, improper integrals. **Application of integration:** calculations of areas, arc lenghts, volumes and surfaces of revolution, centers of mass, moments of inertia. **Differential equations**: equations of order 1, separation of variables, homogeneous and linear equations, second-order linear differential equations with constant coefficients, systems of linear differential equations, applications to chemistry and elsewhere. **The basics of statistics:** data presentation, population, samples, estimators. Hypothesis, correlation and linear regression, the least square method. Interval estimation and hypothesis testing.

Temeljna literatura in viri / Readings:

R. Jamnik, Matematika, DMFA Slovenije, Ljubljana, 1994.
P. Šemrl, Osnove višje matematike, DMFA Slovenije, Ljubljana, 2009.

Dopolnilna literatura:

- A. Turnšek, Tehniška matematika, FS, Ljubljana, 2007, 306 str.
- P. Mizori – Oblak, Matematika za študente tehnike in naravoslovja, FS, UL Ljubljana, 2001.
- P. Mizori – Oblak, Matematika za študente tehnike in naravoslovja, 2. del, FS UL, Ljubljana, 1997.
- I. Vidav, Višja matematika I, DMFA Slovenije, Ljubljana, 1994, 477 str.
- G. Doggett, B. T. Sutcliffe, Mathematics for Chemistry, Longman, 1995, 286 str.

Cilji in kompetence:	**Objectives and Competences:**
Cilj predmeta: Seznaniti študente z osnovnimi metodami matematične analize in linearne algebre, potrebnimi pri nadaljnem študiju, ki spadajo v temeljno izobrazbo naravoslovca ali tehnika. **Predmetno specifične kompetence:** Pridobljeno znanje bo študentu omogočilo boljše razumevanje drugih strokovnih predmetov. Imel bo možnost pridobiti nekaj temeljnih matematičnih pojmov in spretnosti, ki so potrebne za razumevanje strokovne	To familiarize students with calculus and basic linear algebra necessary for further study. This is a usual part of curriculum for students of science and technology. This enables students to better understnad some other areas of their study. It gives them an oportunity to acquire basic mathematical skills needed to follow the literature in their own speciality.

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literature in tudi za uspešno opravljanje dela.	

Predvideni študijski rezultati:	**Intended Learning Outcomes:**
Znanje in razumevanje Razumevanje pojmov funkcijske odvisnosti, limite, odvoda in integrala, poznavanje metod reševanja nekaterih elementarnih tipov diferencialnih enačb in njihove uporabe v kemiji (in drugod), osnovna analiza funkcij več spremenljivk.	Knowledge and Comprehension Students should understand the concepts of functional dependence, limits, differentiation and integration, and acquire the skill of solving certain types of differential equations and their application to chemistry (and elsewhere), basic analysis of functions of several variables.
Uporaba Uporaba zgoraj omenjenih pojmov pri reševanju konkretnih nalog iz matematike, fizike in kemije.	Application Students should be able to apply calculus and linear algebra to problems from physics and chemistry.
Refleksija Gre za poglobitev in bistveno razširitev v srednji šoli pridobljenega znanja matematike, ki je nujno za razumevanje naravoslovnih znanosti.	Analysis The course gives a considerable extension of the mathematical knowledge that the students acquired in high school, which is essential for the understanding of any natural science and chemistry in particular.
Prenosljive spretnosti Predmet daje tudi osnovo za razumevanje nekaterih računalniških postopkov in metod, ki jih bodo spoznali kasneje pri drugih predmetih in ob delu.	Skill-transference Ability The knowledge of calculus is necessary for effective use of computer modeling in science, which the students will meet later in the course of their study.

Metode poučevanja in učenja:	**Learning and Teaching Methods:**
Predavanja, vaje, sodelovalno učenje / poučevanje.	Lectures, exercises, homework, consultations.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit iz praktičnega dela (ali štirje kolokviji).	**50%**	Written practical exam (or four midterm tests).
Teoretični izpit. Od 6-10 (pozitivno), 1-5 (negativno).	**50%**	Oral exam.

Reference nosilca / Lecturer's references:

- **Cvetko-Vah, Karin**; Leech, Jonathan; Spinks, Matthew. Skew lattices and binary operations on functions, J. Appl. Log. 11 (2013), no. 3, 253--265.
- Bauer, Andrej; **Cvetko-Vah, Karin**. Stone duality for skew Boolean algebras with intersections, Houston J. Math. 39 (2013), no. 1, 73--109.
- **Cvetko-Vah, Karin**; Leech, Jonathan. Rings whose idempotents form a multiplicative set, Comm. Algebra 40 (2012), no. 9, 3288--3307.
- **Cvetko Vah, Karin**; Pisanski, Tomaž. A census of edge-transitive planar tilings, J. Combin. Math. Combin. Comput. 80 (2012), 243--265.
- Carfi, David; **Cvetko-Vah, Karin**. Skew lattice structures on the financial events plane, Appl. Sci.

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13 (2011), 9--20.

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