Univerza
v Ljubljani

Fakulteta
za gradbeništvo
in geodezijo

Učni načrti

Univerzitetni študijski program prve stopnje
GRADBENIŠTVO (BA)

Course Syllabi

1st cycle academic study
GRADBENIŠTVO (BA)

Velja od študijskega leta 2018/2019 / Valid from study year 2018/2019

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UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Uvod v gradbeništvo
Course title:	Introduction to civil engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	1
Civil Engineering – first cycle academic		1	1

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45					45	3

Nosilec predmeta / Lecturer: Predstojnik oddelka / Head of department

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Motiv za zanimanje za gradbeno stroko. Zgodovina gradbeništva: razvoj konstrukcijskih oblik; razvoj mostov; razvoj gradbenih materialov; razvoj cestogradnje; razvoj tehnologij gradnje; razvoj gradbene znanosti. Vloga gradbeništva v sodobni družbi. Enciklopedija sodobnega gradbeništva: sodobne stavbe; sodobna visokogradnja; sodobni mostovi; sodobna geotehnika; sodobna hidrotehnika; sodobne tehnologije gradnje. Interdisciplinarnost v gradbeništvu. Vloga in odgovornost inženirja v procesu načrtovanja in gradnje objektov. Od ideje do objekta: načrtovanje gradnje; izvajanje gradnje. Izvedba projektne naloge: idejna rešitev podanega problema; priprava projektne dokumentacije; izdelava makete; izvedba laboratorijskega preskusa; izdelava končnega poročila. Pregled predavanj, projektnih nalog in zaključek.	What is the motive for the interest in civil engineering. History of civil engineering: development of construction forms; development of bridges; development of materials; development of road construction; development of building technologies; development of civil engineering science. Role of civil engineering in modern society. Encyclopaedia of modern civil engineering: modern buildings; modern bridges; modern geotechnical engineering; modern hydrology, modern technologies in civil engineering. Interdisciplinary nature of civil engineering. Role and responsibility of an engineer in the process of planning and construction: from a concept to a building; planning of construction; process of construction. Team work on a project: proposing conceptual solution of a bridge/building; preparing project documentation; making a physical model; perform laboratory tests; write final report. Conclusions.

Temeljni literatura in viri / Readings:

Gosar, L., Steinman, F. 2003. Osnove gradbeništva. Ljubljana, Univerza v Ljubljani, 101 str, posamezna poglavja.
Humar, G. 2000. Slovenski mostovi 1. del. Ljubljana, 112 strani.
Humar, G. 2002. Slovenski mostovi 2. del. Ljubljana, 112 strani.
Humar, G. 2004. Predori: iskanje svetlobe. Ljubljana, 136 strani.
70 wonders of the modern world. 1998. Readers digest, 160 str.
Dolšek, M. 2013. Projektna naloga za izdelavo modela stavbe in mostu, 17 str.

Cilji in kompetence:

Cilji
- Motivacija študenta za študij
- Razvijanje študentove inženirske intuicije
- Poznavanje osnov zgodovine gradbeništva in sodobnega gradbeništva
- Pridobitev izkušnje s projektnim delom v skupini

Kompetence
- Razume vlogo in odgovornost inženirja
- Zna izvesti lažjo projektno nalogo

Objectives and competences:

Objectives
- To motivate student for further study
- To develop student's engineering intuition
- To get student to know some history of civil engineering
- To provide student information about modern civil engineering
- To provide a team work experience to student

Competences
- Understanding the role and responsibility of an engineer
- To be able to carry out and complete a simple project

Predvideni študijski rezultati:

- Spozna zgodovino gradbeništva
- Spozna vlogo gradbeništva v družbi
- Spozna bistvene dejavnosti znotraj gradbeništva
- Spozna osnovno strokovno terminologijo
- Razume vlogo inženirja v gradbeništvu
- V skupini izvede prvi projekt (Idejna zasnova, Načrtovanje, Gradnja, Predaja in preizkušanje)
- Začne razvijati svojo inženirsko intuicijo
- Izvede svoj prvi laboratorijski preskus

Intended learning outcomes:

- To appreciate rich history of civil engineering
- To recognize the role of civil engineering in society
- To be able to recognize different activities in modern civil engineering
- To be able to use basic professional terminology
- To carry out the first project (conceptual design, planning, construction, completion and testing)
- To be able to further develop engineering intuition
- To perform the first laboratory test

Metode poučevanja in učenja:

Predavanja se izvajajo v klasični učilnici s pomočjo veliko slikovnega gradiva. Projektno nalogo rešujejo pod vodstvom, vendar samostojno.

Learning and teaching methods:

Lectures are carried out in a classroom with extensive use of photos, drawings, figures. Students perform a team project work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit	**70 %**	Exam
Ocena projektne naloge	**30 %**	Project work

Reference nosilca / Lecturer's references:

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Fizika
Course title:	Physics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	1
Civil Engineering – first cycle academic		1	1

Vrsta predmeta / Course type: Obvezni splošni / Obligatory general

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
75	15	45			135	9

Nosilec predmeta / Lecturer: Zvonko Jagličić, Jože Peternelj

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Merske napake; (*)kinematika; sile, navori, dinamika; gibalna in vrtilna količina; delo, moč, energija; gravitacija: Kepplerjevi zakoni, Newtonov gravitacijski zakon, potencialna energija, gibanje satelitov; nihanje in valovanje; (*)zgradba snovi; deformacije (*); mirujoče tekočine: težni tlak, manometri, vzgon (*); temperatura: temperaturne skale, razteznost, plinska enačba; energijski zakon: notranja energija, toplota, prenos toplote, spremembe agregatnega stanja, vlažnost; elektrostatika (*); električni tok: Ohmov zakon, delo in moč, električni instrumenti (*); magnetizem; indukcija (*); elektromagnetno valovanje; sevanje segretih teles; svetloba; svetlobni izvori: sonce, prehod svetlobe skozi ozračje, fotometrija; geometrijska optika: odboj svetlobe, zrcala, lom svetlobe, leče, optični instrumenti; valovna optika: polarizacija, interferenca; fotonska teorija svetlobe; posebna teorija relativnosti.

Content (Syllabus outline):

Physics and measurements; (*)kinematics; forces, torques, dynamics; momentum and angular momentum; work, power, energy; gravitation (Keppler's laws, Newton's gravity law, potential energy, motion of satellites); oscillations and waves; (*) structure of matter; (*) elastic deformations; (*) static of fluids: pressure, pressure measurements, Buoyant forces; temperature, various temperature scales, thermal expansion, equation of state for ideal gas; the first law of thermodynamics, internal energy, heat transfer(*) , phase changes; electrostatics (*); electric current (Ohm's law, work and power, electric instruments (*)); magnetism; (*) induction; electromagnetic waves; radiation of heated bodies; visible light; light sources (Sun, absorption of light in atmosphere, photometry); geometric optics (reflection and refraction of light, mirrors, lenses, optic instruments); wave optics: polarization and interference of light; photons as quanta of light; special theory of relativity.

Vsebine označene z (*) bodo podrobneje obravnavane na seminarjih ali kot računski zgledi na seminarskih vajah.	Topics labelled with (*) will be discussed in more detail at seminars or as assigned exercises.

Temeljni literatura in viri / Readings:

R. Kladnik. 1979. Osnove fizike I. in II. del. Ljubljana, DZS.

R. Kladnik. 1989. Visokošolska fizika, del I., II. in III. 1989. Ljubljana, DZS.

R.A. Serway. 1996. Physics for Scientists & Engineers with Modern Physics. Saunders College Publ., Philadelphia.

R. Kladnik, H. Šolinc. Zbirka fizikalnih nalog z rešitvami, I. del. (1996) in 2. del (1991).

Zbirka vaj - dostopno na: www.kmf.fgg.uni-lj.si/fizika

Cilji in kompetence:	**Objectives and competences:**
- Spoznati osnovne zakonitosti in pomen fizikalnih metod pri opisu naravnih pojavov. Študent pridobi naslednje kompetence: - Fizikalni način razmišljanja pri formulaciji in reševanju tehničnih problemov, - Obvladovanje praktične in teoretične osnove fizike, potrebne za študij in razumevanje stroke.	- To learn the basic physical laws and will become acquainted with the methods used for the description of natural laws, - To recognize, formulate and solve engineering problems using the methods of physics, - To manage practical and theoretical basics of physics necessary for study and understanding of the profession.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje in razumevanje osnovnih znanj iz poglavij fizike, ki so opisana v vsebini predmeta. Obravnavane vsebine so predvsem podlaga za nekatere strokovne predmete. - Študenti se bodo naučili uporabljati osnovne fizikalne zakonitosti pri računski obravnavi zgledov, ki so povezani s prakso v tehniki. - Cilj dela pri vajah in seminarju je, da se študenti naučijo, kako določen zahteven fizikalno-tehniški problem smiselno poenostavijo in s preprostimi računskimi operacijami ocenijo velikost neznane količine. - S pridobljenim znanjem bodo študenti prepoznavali fizikalno ozadje različnih naravnih pojavov in tehnoloških procesov ter pridobili sposobnost kritične analize le-teh.	- Solid knowledge and understanding of the topics listed in the content section. The topics chosen are considered as a necessary background for some of the technical courses. - Moreover, the students will learn to apply the methods of physics in order to solve engineering problems. - In addition, the seminars and problem solving classes are structured so as to teach the students how to simplify complex problems and obtain an approximate solution.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in seminar z demonstracijskimi poskusi in računalniškimi simulacijami. Računski zgledi na seminarskih vajah. Individualne naloge ali seminarji.	Lectures and seminars together with laboratory demonstrations and computer simulations. Problem solving classes. Individual assignments or seminars.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Računski del (pisno)	**50 %**	Written solution of assigned problems
Teoretični del (pisno in ustni zagovor)	**40 %**	Written answers to selected theoretical questions
Projekt (seminarska naloga)	**10 %**	Written seminar report

Reference nosilca / Lecturer's references:

JAGLIČIĆ, Zvonko, PAJIĆ, Damir, TRONTELJ, Zvonko, DOLINŠEK, Janez, JAGODIČ, Marko. 2013. Magnetic memory effect in multiferroic K3Fe5F15 and K3Cr2Fe3F15. Appl. phys. lett., 102.
COTIČ, Patricia, JAGLIČIĆ, Zvonko, NIEDERLEITHINGER, Ernst, EFFNER, Ute, KRUSCHWITZ, Sabine, TRELA, Christiane, BOSILJKOV, Vlatko. 2013. Effect of moisture on the reliability of void detection in brickwork masonry using radar, ultrasonic and complex resistivity tomography. Materials and Structures 46, 1723–1735.
JAGLIČIĆ, Zvonko, ZENTKOVÁ, Mária, MIHALIK, Marián, ARNOLD, Zdeněk, DROFENIK, Mihael, KRISTL, Matjaž, DOJER, Brina, KASUNIČ, Marta, GOLOBIČ, Amalija, JAGODIČ, Marko. 2012. Exchange bias in bulk layered hydroxylammonium fluorocobaltate NH3(OH)2CoF4. J. phys., Condens. matter 24, 056002.

KRANJC, Tomaž, JAGLIČIĆ, Zvonko, PETERNELJ, Jože. 2006–2008. Fizika za srednje šole, Rešitve nalog. 1. izd. Ljubljana, DZS, 3 zv., ilustr.
KUŠČER, Ivan, MOLJK, Anton, KRANJC, Tomaž, PETERNELJ, Jože. 2012. Fizika za srednje šole. 1. izd. Ljubljana, DZS, Zv. <1->
KRANJC, Tomaž, PETERNELJ, Jože. Heat flow in composite rods : an old problem reconsidered. Int. j. heat mass transfer. [Print ed.], apr. 2011, letn. 54, št. 9-10, str. 2203-2206.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Gradiva
Course title:	Construction and building materials

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	1
Civil Engineering – first cycle academic		1	1

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
60			60		120	8

Nosilec predmeta / Lecturer: Violeta Bokan Bosiljkov

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Sistematični pregled gradiv in njihovih značilnosti. Osnove nauka o inženirskih materialih. Osnove standardizacije in obravnavanja gradiv v standardih in predpisih za načrtovanje in gradnjo objektov. Osnove kemičnih, fizikalnih in mehanskih lastnosti gradiv in njihovo določanje in preverjanje istovetnosti s pomočjo eksperimentalnih preiskav. Keramična gradiva: kamen; gradbena keramika in steklo; mineralna veziva, malte in ometi; betoni. Kovinska gradiva: železove kovine in neželezove kovine ter zlitine. Polimerna gradiva: umetne mase; ogljikovodikova gradiva. Kompozitna gradiva: umetna gradiva (z delci in vlaknasto armirane plastike, lastnosti, področja uporabe); naravna gradiva (les, papir in ostala naravna vlaknasta gradiva). Pregled metod in značilnosti eksperimentalnega preskušanja gradiv.	Systematic review of construction and building materials and their characteristics. Basics of science of engineering materials. Basics of standardization, construction and building materials in standards and regulations for the design and construction of buildings and civil engineering structures. Fundamentals of chemical, physical and mechanical properties of construction and building materials and their quantification and identification by means of testing. Ceramics: stone; building ceramics and glass; mineral binders, mortars and renders and plasters; concrete. Metals: ferrous and non-ferrous metals and metal alloys. Polymer materials: plastics; bitumen and asphalt. Composite materials: plastic composites (particle- and fibre-reinforced plastic, properties, application); natural building materials (wood, paper and other natural fibre materials). Review of methods and significance of the experimental testing of materials.

Temeljni literatura in viri / Readings:

Roko Žarnić. 2005. Osnove gradiv. Ljubljana, UL FGG (Katedra za PMK), 350 strani.
R. Žarnić, V. Bokan-Bosiljkov, V. Bosiljkov. 2017. Gradiva – vaje. Ljubljana, UL FGG (Katedra za PMK), 146 strani, 9 sklopov laboratorijskih vaj z računskimi primeri.
J.F. Shackelford. 2008. Introduction to Materials Science for Engineers, 7th edition. Prentice Hall, Part I – The Fundamentals, strani 22-380.
Soutsos, M. and Domone, P. (Ed.). 2017. Construction Materials – Their Nature and Behaviour, 5th edition, CRC Press, Taylor&Francis Group, a Spon Press book, 820 strani.

Cilji in kompetence:

Cilji
- Spoznavanje osnovnih in pomožnih gradbenih materialov, virov in tehnologij priprave ter predelave izhodnih materialov ali izdelkov.
- Spoznavanje metod projektiranja gradiv (beton, malte, kompoziti).

Predmetno specifične kompetence
- Študent obvlada znanja o lastnostih gradbenih materialov in njihovi ekonomični uporabi.
- Študent je usposobljen za preverjanje lastnosti gradiv in klasifikacijo kakovosti s pomočjo standardnih in nestandardnih metod laboratorijskih in terenskih preiskav.

Objectives and competences:

Objectives
- Getting to know the basic and auxiliary construction and building materials, and technologies of preparation and processing of raw materials or products.
- Getting to know the methods of the design of materials (concrete, mortars, composites).

Competences
- Student has knowledge about properties of construction and building materials and their economical use.
- Student is trained to check the properties of construction and building materials and for their classification by using standard and non- standard laboratory and in-situ test methods.

Predvideni študijski rezultati:

- Pridobljeno znanje omogoča reševanje manj zahtevnih problemov v praksi in je ustrezno izhodišče za poglobljeno spoznavanje posameznih gradbenih materialov s pomočjo obsežne literature in primerov iz prakse. Študentje so sposobni izvesti preproste preiskave gradbenih materialov in rezultate kritično ovrednotiti.
- Znanja in spretnosti pridobljena v okviru predmeta omogočajo ustrezno izbiro gradbenih materialov v praksi, ki temelji na izpolnjevanju postavljenih zahtev.
- Študentje pridobijo spretnost uporabe standardov s področja gradbenih materialov ter spretnost uporabe domače in tuje literature s tega področja. V okviru laboratorijskih vaj se spoznajo s timskim delom ter kritičnim analiziranjem lastnosti gradbenih materialov ter njihovim klasificiranjem.

Intended learning outcomes:

- Acquired knowledge enables solution of less complex problems in practice and is an appropriate starting point for an in-depth understanding of individual construction and building material, with the help of extensive literature and case studies. Students are able to carry out simple tests of construction and building materials and critically evaluate the obtained results.
- Knowledge and skills acquired in this course enable student appropriate selection of construction and building materials in practice, which is based on meeting the set requirements.
- Students acquire skills in using the standards in the field of construction and building materials and the ability to use both national and international literature in this field. In the framework of laboratory tutorials students are acquainted with teamwork and critical analysis of the properties of construction and building materials and their classification process.

Metode poučevanja in učenja:	Learning and teaching methods:
Osnovni del snovi se podaja v obliki predavanj na osnovi učbenika, ki ga je pripravil nosilec predmeta. Predavanjem sledijo laboratorijske vaje v skupinah po 15 študentov v laboratoriju FGG. Pri tem se uporablja posebej pripravljena literatura v obliki delovnega zvezka. V okviru vaj se podajo tudi računski zgledi in naloge s področja vrednotenja lastnosti gradiv (malte, betoni, kovine, polimerni kompoziti, les) in njihovega projektiranja (malte, betoni, polimerni kompoziti). Del poučevanja je posvečen delu v skupinah petih študentov, kjer vsaka skupina dobi problem, ki ga je možno rešiti s povezavo različnih znanj, pridobljenih v okviru predavanj, vaj in dodatne literature. Rezultati so posterji in predstavitve, s katerimi študentje predstavijo svoje ugotovitve.	The main part of the course is provided in the form of lectures based on the textbook, prepared by the lecturer. Lectures are followed by laboratory exercises/tutorial, in groups of 15 students in the UL FGG laboratory. Students are using log book specially prepared for the laboratory work. Within tutorial also calculations are carried out, along with exercises about evaluation of properties of materials (mortar, concrete, metal, polymer composites, wood) and their design (mortars, concretes, polymer composites). Part of the teaching is devoted to work in groups of five students, where each group receives a problem that can be solved by linking different knowledge gained in the course of lectures, exercises and by using additional literature. The results are posters and presentations, with which students present their findings.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Rezultati dela v skupinah	**20 %**	Results of work in groups
2 kolokvija ali izpit	**80 %**	Two mid-term exams or exam

Reference nosilca / Lecturer's references:

URANJEK, Mojmir, BOKAN-BOSILJKOV, Violeta. Influence of freeze-thaw cycles on mechanical properties of historical brick masonry. Construction & building materials, ISSN 0950-0618. [Print ed.], jun. 2015, letn. 84, str. 416-428, ilustr., doi: 10.1016/j.conbuildmat.2015.03.077,
SIMČIČ, Tina, PEJOVNIK, Stane, SCHUTTER, Geert De, BOKAN-BOSILJKOV, Violeta. Chloride ion penetration into fly ash modified concrete during wetting-drying cycles. Construction & building materials, ISSN 0950-0618. [Print ed.], 2015, letn. 93, št. sept., str. 1216-1223, ilustr., doi: 10.1016/j.conbuildmat.2015.04.033,
ČESEN, Aleš, KOSEC, Tadeja, LEGAT, Andraž, BOKAN-BOSILJKOV, Violeta. Corrosion properties of different forms of carbon steel in simulated concrete pore water = Korozijske lastnosti različnih oblik jekel v simulirani porni vodi betona. Materiali in tehnologije, ISSN 1580-2949. [Tiskana izd.], jan.-feb. 2014, letn. 48, št. 1, str. 51-57, ilustr. http://mit.imt.si/Revija/
KILAR, Vojko, KOREN, David, BOKAN-BOSILJKOV, Violeta. Evaluation of the performance of extruded polystyrene boards : implications for their application in earthquake engineering. Polymer testing, ISSN 0142-9418. [Print ed.], dec. 2014, letn. 40, str. 234-244, ilustr., doi: 10.1016/j.polymertesting.2014.09.013
ŠTUKOVNIK, Petra, SIMČIČ, Tina, PEJOVNIK, Stane, BOKAN-BOSILJKOV, Violeta. Alkali-carbonate reaction in concrete and its implications for a high rate of long-term compressive strength increase. Construction & building materials, ISSN 0950-0618. [Print ed.], jan. 2014, letn. 50, str. 699-709, doi: 10.1016/j.conbuildmat.2013.10.007

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika I
Course title:	Mathematics I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	1
Civil Engineering – first cycle academic		1	1

Vrsta predmeta / Course type: Obvezni splošni / Obligatory general

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
75		75			150	10

Nosilec predmeta / Lecturer: Marjeta Kramar Fijavž, Mitja Lakner

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Množice in preslikave: operacije z množicami, definicijsko območje, zaloga vrednosti, enakost preslikav, kompozitum, graf, injektivnost, surjektivnost, bijektivnost, inverzna preslikava.
Naravna, realna in kompleksna števila: princip popolne indukcije, natančna spodnja in natančna zgornja meja (*inf* in *sup*), absolutna vrednost, kompleksna števila: geometrijska predstavitev, računske operacije, polarni zapis, de Moivreova formula, osnovni izrek algebre.
Geometrijski vektorji: vsota, produkt s skalarjem, linearna kombinacija, linearna neodvisnost, baza, skalarni produkt, vektorski produkt, mešani produkt, analitična geometrija v prostoru.
Številska zaporedja in vrste: omejenost in konvergenca, Cauchyjev kriterij, limita, računska pravila, konvergenca številske vrste, geometrijska in harmonična vrsta, konvergenčni kriteriji.
Limita in zveznost funkcije realne spremenljivke: limita funkcije v dani točki, računska pravila, posplošene limite, asimptota, zveznost funkcije,

Content (Syllabus outline):

Sets and mappings: operations with sets, domain, range, equality of maps, composition, graph, injectivity, surjectivity, bijectivity, inverse map.
Natural, real and complex numbers: induction principle, exact upper and lower bound (*inf* and *sup*), absolute value, complex numbers: geometric representation, operations, polar form, de Moivre formula, fundamental theorem of algebra.
Geometric vectors: sum, product with scalars, linear combination, linear independence, basis, scalar product, vector product, mixed product, analytic geometry.
Numerical sequences and series: boundedness and convergence, Cauchy criterium, limit, computation rules, convergence of a series, geometric and harmonic series, convergence criteria.
Limit and continuity of functions of one real variable: limit of a function at a given point, computation rules, generalized limits, asymptotae, continuity of a function, properties of continuous functions on closed bounded interval.

lastnosti zveznih funkcij na zaprtem omejenem intervalu. Odvedljivost funkcije realne spremenljivke: definicija odvoda, tangenta na graf funkcije, računska pravila, Rolleov in Lagrangeov izrek, stacionarne točke in lokalni ekstremi, globalni ekstrem na zaprtem intervalu, l'Hospitalovo pravilo, višji odvodi, Taylorjeva formula, diferencial, konkavnost, konveksnost, prevoj, risanje grafov funkcije. Matrike: matrične operacije, inverzna matrika, matrični zapis sistema linearnih enačb, struktura rešitev, Gaussova metoda eliminacije, matrične enačbe, determinante, lastne vrednosti in lastni vektorji, karakteristični polinom, diagonalizacija. Integral funkcije realne spremenljivke: določen integral, Riemannova vsota, integrabilnost, lastnosti, Newton-Leibnizov izrek, primitivna funkcija, nedoločen integral, uvedba nove spremenljivke, integracija po delih (per partes), posplošeni (izlimitirani) integral, uporaba določenega integrala. Potenčne vrste: konvergenčni polmer, odvajanje, integriranje.	Derivative of functions of one real variable: definition, tangent on a graph of a function, computation rules, theorem of Rolle and Lagrange, stationary points and local extrema, global extremum on a closed interval, l'Hospital rule, higher derivatives, Taylor formula, differential, concavity, convexity, inflection point, plotting graphs. Matrices: matrix operations, inverse matrix, matrix form of a system of linear equations, structure of solutions, Gauss elimination method, matrix equations, determinant, eigenvalues and eigenvectors, characteristic polynomial, diagonalization. Integral of functions of one real variable: definite integral, Riemannian sum, integrability, properties, Newton-Leibniz formula, primitive function, indefinite integral, substitution, integration by parts (per-partes), application of definite integral. Power series: convergence radius, derivation, integration.

Temeljni literatura in viri / Readings:

Foerster, G.O. 1984. Analysis 1 Vieweg Studium.
Kolar, M.B. 1996. Zgrablić, Več kot nobena, a manj kot ... rešena naloga iz LA. Ljubljana. Pedagoška fakulteta.
Lampret, V. 2012. Matematika 1 - prvi del: Preslikave, števila in vektorski prostori. Ljubljana, UL FGG.
Leon, S. J. 2006. Linear Algebra With Applications, Prentice Hall, Pearson International Edition.
Mizori-Oblak, P. 1987. Matematika za študente tehnike in naravoslovja I. Ljubljana, UL FS.
Vidav, I. 1973. Višja matematika I, II. Ljubljana, DMFA Slovenije.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Podati osnovna znanja, na katerih lahko grade strokovni predmeti, - Zagotoviti obvladovanje osnovnih računskih veščin - Omogočiti razumevanje matematičnega aparata, ki ga uporabljajo strokovni predmeti Pridobljene kompetence - Sposobnost abstraktne formulacije konkretnih problemov, - Krepiti smisel za sistematičnost, jasnost in preciznost formulacij, - Razvijanje matematičnega mišljenja- sklepanje od splošnega k posebnemu in obratno.	Objectives - To provide general basic knowledge for the engineering courses, - To ensure mastering of basic computational skills - To enable understanding of mathematical tools used by engineering courses. Gained competences - Ability of abstract formulation of practical problems, - Improvement of the capacity to establish systematic, clear and precise formulation, - Development of mathematical thinking – reasoning from general to special and vice versa.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje in razumevanje osnovnih znanj iz algebre geometrijskih vektorjev, linearne algebre in iz matematične analize - Obvladovanje osnovnih računskih spretnosti - Doseženo matematično znanje uporabljajo strokovni predmeti in omogoča nadaljevanje študija matematike, ki jo uporablja tehnika - Sposobnost abstraktne formulacije konkretnih problemov - Spretnost sistematičnega, jasnega in preciznega formuliranja problemov - Sposobnost sklepanja od splošnega k posebnemu in obratno - Spretnost uporabe literature	- Basic knowledge and understanding of the algebra of geometric vectors, linear algebra and mathematical analysis - Mastering basic computational skills - The achieved mathematical knowledge is used by the engineering courses and enables the study of mathematics used in technology - Ability of abstract formulation of practical problems - Capability of systematic, clear and precise formulation of problems - Ability of reasoning from general to special and vice versa - Skills in using literature

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske vaje, konzultacije, internet	Lectures, tutorials, consultations, internet

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit (teoretičen del)	**30 %**	Exam (theoretical part)
Računske naloge in sprotno delo	**70 %**	Exercises and homework

Reference nosilca / Lecturer's references:

ENGEL, Klaus, KRAMAR FIJAVŽ, Marjeta, KLÖSS, Bernd, NAGEL, Rainer, SIKOLYA, Eszter. Maximal controllability for boundary control problems. Appl. math. optim., 2010, vol. 62, no. 2, str. 205-227.
KRAMAR FIJAVŽ, Marjeta, MUGNOLO, Delio, SIKOLYA, Eszter. Variational and semigroup methods for waves and diffusion in networks. Appl. math. optim., 2007, vol. 55, no. 2, str. 219-240.
KRAMAR FIJAVŽ, Marjeta, SIKOLYA, Eszter. Spectral properties and asymptotic periodicity of flows and networks. Math. Z., 2005, vol. 249, no. 1, str. 139-162. Dostopno na: http://springerlink.metapress.com/app/home/issue.asp?wasp=9ed0dca63b2b46c3ad74b3d0e2855bcc&referrer=parent&backto=journal,5,116;linkingpublicationresults,1:100443,1.

LIPAR, Peter, LAKNER, Mitja, MAHER, Tomaž, ŽURA, Marijan. Estimation of road centerline curvature from raw GPS data. The Balt. j. road bridge eng., 2011, letn. 6, št. 3, str. 163-168, ilustr., doi: 10.3846/bjrbe.2011.21.
KRAMAR FIJAVŽ, Marjeta, LAKNER, Mitja, ŠKAPIN-RUGELJ, Marjeta. An equal-area method for scalar conservation laws. The Anziam journal, 2012, vol. 53, iss. 2, str. 156-170. Dostopno na: http://dx.doi.org/10.1017/S1446181112000065.
SKUBIC, Blaž, LAKNER, Mitja, PLAZL, Igor. Sintering behavior of expanded perlite thermal insulation board : modeling and experiments. Ind. eng. chem. res.. [Print ed.], 9. jul. 2013, vol. 52, no. 30, str. 10244-10249, ilustr. doi: 10.1021/ie400196z. Dostopno na: http://pubs.acs.org/doi/ipdf/10.1021/ie400196z .

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika II
Course title:	Mathematics II

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	2
Civil Engineering – first cycle academic		1	2

Vrsta predmeta / Course type: Obvezni splošni / Obligatory general

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. Work	ECTS
60		60			120	8

Nosilec predmeta / Lecturer: Marjeta Kramar Fijavž, Mitja Lakner

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Opravljen izpit iz predmeta Matematika I oz. drugega predmeta s primerljivo vsebino.	Passed exam in Mathematics I or other courses with comparable content.

Vsebina:

Skalarne funkcije več realnih spremenljivk: metrika prostora R^n, definicijsko območje, graf, nivojnice, limita in zveznost funkcije več realnih spremenljivk, odvod v dani smeri, parcialni odvodi, gradient, stacionarne točke, vezani ekstremi, globalni ekstremi, višji parcialni odvodi, Taylorjeva formula, Jacobijeva matrika za vektorsko funkcijo vektorskega argumenta, verižno pravilo.
Dvojni in trojni integral: Riemannova integralska vsota, integrabilnost, lastnosti, prevedba dvojnega (trojnega) integrala na dvakratni (trikratni) integral, uvedba novih spremenljivk (polarne, cilindrske, sferne koordinate).
Integrali s parametrom: integriranje, odvajanje, funkciji gama in beta.
Diferencialna geometrija: pot, krivulja, parametrizacija, dolžina krivulje, naravni parameter, osnovni trieder, fleksija, torzija, krivinski polmer, Frenet-Serrejeve formule, gladka elementarna ploskev, parametrizacija, tangentna ravnina, površina.

Content (Syllabus outline):

Scalar functions of several real variables: metrics of the space R^n, domain, graph, isohipses, limit and continuity of a multivariate real function, directional derivative, partial derivative, gradient, stationary points, constrained extrema, global extrema, higher partial derivatives, Taylor formula, Jacobi matrix for vector function of a vector argument, chain rule.
Double and triple integral: Riemannian sum, integrability, properties, transformation of double (triple) integral to twice (three times) univariate integral, substitution (polar, cylindric, spheric coordinates).
Integrals with parameter: integration, derivation, functions gamma and beta.
Differential geometry: path, curve, parameterization, curve length, natural parameter, basic trihedron, inflection, torsion, curvature radius, Frenet-Serre formulae, smooth elementary surface, parameterization, tangent plane, area.

Krivuljni integral: krivuljni integral 1. vrste skalarnega polja po krivulji, orientacija krivulje, krivuljni integral 2. vrste vektorskega polja po orientirani krivulji, Greenova formula. Ploskovni integral: ploskovni integral 1. vrste skalarnega polja po ploskvi, orientacija ploskve, ploskovni integrala 2. vrste vektorskega polja po orientirani ploskvi. Integralski izreki: diferencialni operatorji: grad, div, rot, Gaussov in Stokesov izrek, gradientnost (potencialnost, konzervativnost) vektorskega polja. Navadne diferencialne enačbe: rešitev, DE prvega reda (ločljive spremenljivke, homogena, linearna), začetni problem, linearna DE n-tega reda s konstantnimi koeficienti.	Line integral: line integral of a scalar field along a curve, curve orientation, line integral of a vector field along an oriented curve, Green formula. Surface integral: surface integral of a scalar field on a surface, surface orientation, surface integral of order 2. of a vector field on an oriented surface. Integral theorems: differential operators: grad, div, rot, theorems of Gauss and Stokes, gradient (potential, conservative) vector fields. Ordinary differential equations: solution, ODE of first order (separate variables, homogenous, linear), initial problem, linear ODE of order n with constant coefficients.

Temeljni literatura in viri / Readings:

G. O. Foerster. 1984. Analysis 2, 3 Vieweg Studium.
M. Lipschutz. 1969. Differential Geometry, Schaum's outline series. McGraw-Hill Book Company.
Mizori-Oblak. 1987. Matematika za študente tehnike in naravoslovja II, III. Ljubljana.
B. Thomas, M. D. Weir. 1996. Calculus and Analytic Geometry, 9th ed. Addison-Wesley.
I. Vidav. 1975–. Višja matematika II, III. Ljubljana, DMFA Slovenije.
V. A. Zorich. 2004. Mathematical Analysis I, II. Springer Verlag, Universitext.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Omogočiti razumevanje matematičnega aparata, ki ga uporabljajo strokovni predmeti - Usposobiti za kritično presojo podatkov in dobljenih računskih rezultatov. Študent pridobi naslednje kompetence - Sposobnost abstraktne formulacije konkretnih problemov, - Zna uporabiti matematiko pri inženirskih problemih - Razvijanje matematičnega mišljenja – sklepanje od splošnega k posebnemu in obratno.	Objectives - To enable understanding of mathematical tools used by engineering courses - To train for critical judgement of data and obtained numerical results. Gained competences - Ability to formulate practical problems abstractly - To be able to use mathematics in engineering problems - Development of mathematical thinking – reasoning from general to special and vice versa.

Predvideni študijski rezultati:	Intended learning outcomes:
- Imeti osnovna znanja iz matematične analize, diferencialne geometrije in vektorske analize - Imeti osnovne računske spretnosti - Doseženo matematično znanje uporabljajo strokovni predmeti in omogoča nadaljevanje poglobljenega študija tiste matematike, ki jo uporablja tehnika - Matematika se izkaže kot uporabna, celo kot nujna osnovna znanost pri študiju tehnike - Spoznanje, da je matematika prisotna v vseh porah človekovega delovanja - Sposobnost abstraktne formulacije konkretnih problemov - Sposobnost kritične presoje podatkov in dobljenih računskih rezultatov - Sposobnost sklepanja od splošnega k posebnemu in obratno - Spretnost uporabe literature	- To possess basic knowledge in mathematical analysis, differential geometry and vector analysis - To handle basic computational skills - The achieved mathematical knowledge is used by the engineering courses and enables the study of mathematics for technology - Mathematical science is essential in the study of technology - Mathematics is present in all pores of human activity - Ability of abstract formulation of practical problems - Capability of critical judgement of data and Obtained numerical results - Ability of reasoning from general to special and vice versa skills in using literature - Ability to use relevant literature

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminarske vaje, konzultacije, internet	Lectures, tutorials, consultations, internet

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit (teoretičen del)	**30 %**	Exam (theoretical part)
Naloge in sprotno delo	**70 %**	Exercises and homework

Reference nosilca / Lecturer's references:

ENGEL, Klaus, KRAMAR FIJAVŽ, Marjeta, KLÖSS, Bernd, NAGEL, Rainer, SIKOLYA, Eszter. Maximal controllability for boundary control problems. Appl. math. optim., 2010, vol. 62, no. 2, str. 205-227.
KRAMAR FIJAVŽ, Marjeta, MUGNOLO, Delio, SIKOLYA, Eszter. Variational and semigroup methods for waves and diffusion in networks. Appl. math. optim., 2007, vol. 55, no. 2, str. 219-240.
KRAMAR FIJAVŽ, Marjeta. The structure of irreducible matrix groups with submultiplicative spectrum. Linear multilinear algebra, 2005, vol. 53, no. 1, str. 13-25.

LIPAR, Peter, LAKNER, Mitja, MAHER, Tomaž, ŽURA, Marijan. Estimation of road centerline curvature from raw GPS data. The Balt. j. road bridge eng., 2011, letn. 6, št. 3, str. 163-168, ilustr., doi: 10.3846/bjrbe.2011.21.
KRAMAR FIJAVŽ, Marjeta, LAKNER, Mitja, ŠKAPIN-RUGELJ, Marjeta. An equal-area method for scalar conservation laws. The Anziam journal, 2012, vol. 53, iss. 2, str. 156-170. Dostopno na: http://dx.doi.org/10.1017/S1446181112000065.
SKUBIC, Blaž, LAKNER, Mitja, PLAZL, Igor. Sintering behavior of expanded perlite thermal insulation board : modeling and experiments. Ind. eng. chem. res.. [Print ed.], 9. jul. 2013, vol. 52, no. 30, str. 10244-10249, ilustr, doi: 10.1021/ie400196z.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Inženirska komunikacija
Course title:	Engineering communication

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	2
Civil Engineering – first cycle academic		1	2

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		15			45	3

Nosilec predmeta / Lecturer: Žiga Turk

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Pomen inženirske komunikacije skozi njen zgodovinski razvoj. Inženirska komunikacija kot informacijski proces. Inženirska komunikacija v pravnem okviru graditve objektov. Inženirska risba in standardni inženirski grafični jezik. Osnovne risarske veščine. Splošno o projekcijah in projiciranju. Razvoj sposobnosti prostorske predstave skozi Mongeovo projekcijo (projekcija osnovnih geometrijskih elementov, reševanje položajnih in metričnih problemov). Osnove računalniške grafike. MVC model risarske programske opreme s poudarkom na različnih pomenskih globinah modelov, ki predstavljajo narisano informacijo – torej od pixla do 4D informacijskega gradnika iz gradbene stroke, od foto programov do BIM programov. Osnovni grafični algoritmi in podatkovne strukture. Napredni grafični algoritmi in vizualni realizem. Okolja in orodja za komunikacijo z risbami (deljenje in izmenjava risb, korekture, opombe, sledenje spremembam, delotoki, podpisovanje risb …).

Content (Syllabus outline):

The importance of engineering communication through its historical development. Engineering communication and information processes. Engineering communication within the legal framework of construction industry. Engineering drawings and standard engineering graphic language. Elementary drawing skills. Introduction to projections and projection methods. Development spatial awareness through the multiview orthographic projection. Projection of basic geometric elements, solving of spatial and metric problems. Fundamentals of computer graphics. Model-View-Controller model of drawing software with a focus on various depths of semantic model representation (from pixel via lines and BIM to 4D Information). Basic graphics algorithms and data structures. Advanced graphics algorithms and visual realism. Environments and tools for communicating with drawings (division and exchange of drawings, corrections, notes, tracking changes workflow, signing drawings ...).

Temeljni literatura in viri / Readings:

Turk, Ž. .1999. Uvod v gradbeno informatiko in tehnično risanje, Katedra za gradbeno informatiko, FGG, Ljubljana. Dostopno na: http://kgi.fgg.uni-lj.si/pouk/opisna/folije/
Turk, Ž. 2004. Dvočrtni postopek, Katedra za gradbeno informatiko, FGG, Ljubljana, http://kgi.fgg.uni-lj.si/pouk/opisna/folije/
Turk, Ž. 2004. Risanje z računalnikom, študijsko gradivo, Katedra za gradbeno informatiko FGG, Ljubljana, Dostopno na: http://kgi.fgg.uni-lj.si/pouk/opisna/folije/
Cerovšek, T . 2006. Tranformacije in inženirska grafika. http://www.fgg.uni-lj.si
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilj
- Študent spozna pomen inženirske komunikacije in se nauči standardov, pravil in veščin, ki so potrebna za učinkovito komunikacijo s pomočjo risb, modelov in drugih oblik nebesedne komunikacije.

Kompetence
- Pozna standarde in pravila inženirske komunikacije s pomočjo risb, obvlada osnovne risarske veščine, uporablja računalniška orodja za risanje in modeliranje in razume osnove njihovega delovanja.

Objectives and competences:

Objective
- Students learn the importance of engineering communication and the standards, rules and skills that are necessary to communicate effectively with drawings, models and other forms of non-verbal communication.

Competences
- Student knows the standards and rules of engineering communication with drawings, masters the basic drawing skills, uses computer tools for drawing and modelling and understands the principles of their operation.

Predvideni študijski rezultati:

- Pomen inženirske komunikacije, risanje, preslikava med dvema in tremi dimenzijami, mehanizmi delovanja računalniške grafike.
- Uporaba osvojenih znanj pri izdelavi risb, modelov in projekcij, ročno in predvsem z računalnikom.
- Sistematizacija znanja o računalniški grafiki, gledanju, projiciranju, delovanju programske opreme.
- Risanje in modeliranje sta osnovni veščini, ki ju inženir potrebuje za učinkovito komuniciranje svojega dela. Ni dovolj, da zna pravilno klikati v programih, ampak mu globlje razumevanje pomena komuniciranja, modelov in postopkov omogoča, da se bo o tem hitro razvijajočem se področju lahko skozi svojo kariero učinkovito samostojno izobraževal in osveževal znanje.

Intended learning outcomes:

- The importance of communication in engineering, skilful drawing, mapping between two and three dimensions, mechanisms of operation of computer graphics.
- Using the knowledge in the production of drawings, models and projections, to a limited extent manually and especially with the computer tools.
- The systematization of knowledge about computer graphics, viewing in 3D, projection, inner workings and algorithms of the software.
- Drawing and modelling are basic skills that are needed for efficient engineering communication. It is not enough to be able to correctly click within programs. A deeper understanding of the importance of communication, representation models and processes allows student to continue with self-education and other life-long-learning methods well after the end of the study. In such rapidly developing fields as those related to computer science, this is very much needed.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja z diskusijo s študenti. Vaje in demonstracije v šoli. Samostojno delo s korekturami doma.	Lectures including discussion with students. Tutorials and demonstrations. Home project work with evaluation.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Aktivnost pri predavanjih in vajah	**10 %**	Activity in face-face time.
Kakovost elaborata samostojnega dela	**10 %**	Homework quality.
Izkazano znanje na kolokvijih ali izpitu	**80 %**	Exam

Reference nosilca / Lecturer's references:

MEŽA, Sebastjan, TURK, Žiga, DOLENC, Matevž. Component based engineering of a mobile BIM-based augmented reality system. *Automation in construction*, ISSN 0926-5805. [Print ed.], jun. 2014, letn. 42, št. X, str. 1-12, ilustr.
KLINC, Robert, TURK, Žiga, DOLENC, Matevž. Raziskava o rabi informacijsko - komunikacijskih tehnologij v slovenski gradbeni industriji = Survey of the information and communication technologies usage in Slovenian AEC industry. *Gradbeni vestnik*, ISSN 0017-2774, nov. 2010, letn. 59, str. 269-276, ilustr.
KLINC, Robert, TURK, Žiga, DOLENC, Matevž. ICT enabled communication in construction 2.0. *Pollack periodica*, ISSN 1788-1994, April 2010, letn. 5, št. 1, str. 109-120, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Računalništvo in informatika
Course title:	Computer science and informatics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	2
Civil Engineering – first cycle academic		1	2

Vrsta predmeta / Course type: Obvezni splošni / Obligatory general

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Matevž Dolenc, Vlado Stankovski

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Osnove računalništva – razvoj računalništva, delovanje računalnikov, pravni in sociološki vidiki računalništva in informatike. Operacijski sistemi – pregled in delovanje operacijskih sistemov, virtualizacija. Uporabniški programi – pregled računalniških programov (splošni programi, programi v inženirstvu ...). Izdelava dokumentov – dokumentni standardi, osnovni koncepti, priprava daljših/zahtevnejših dokumentov, računanje s preglednicami – osnovni koncepti. Tabelarično računanje, uvoz podatkov, izdelava grafov, makro ukazi ... Podatkovni standardi - pregled podatkovnih standardov, sistemi za kodiranje znakov, uvod v XML ... Sodobni informacijski sistemi v inženirstvu (računalništvo v oblaku, računska okolja, ...). Programski jeziki. Osnove programiranja – osnove razvoja preprostih inženirskih programov. Osnove grafičnih uporabniških vmesnikov. Izdelava in uporaba spletnih servisov.

Content (Syllabus outline):

Introduction to computing – overview, history, legal / social and other views on computing and informatics. Operating systems – overview, modern desktop and mobile operating systems, virtualization... End-user applications – general and engineering applications. Documents – standards, use of general purpose document based applications ... Computing with spreadsheets – overview, basic concepts, using built-in functions, using graphical presentation of data, import/export of data... Data standards – overview of data standards, introduction to XML/JSON... Advanced information systems in engineering (cloud computing, computing environments...). Programming languages. Introduction to programming – introduction to development of simple engineering applications. Introduction to graphical user interfaces. Development and use of web services.

Temeljni literatura in viri / Readings:

Rogers Y., Sharp H., Preece J. 2011. Interaction Design: Beyond Human-Computer Interaction, John Wiley & Sons.
Hughes J.F., van Dam A., McGuire M., Sklar D.F., Foley J.D., Feiner S.K., Akeley K. 2013. Computer Graphics: Principles and Practice, Addison-Wesley Professional.
Hunt A. and Thomas D. 1999. The Pragmatic Programmer: From Journeyman to Master, Addison Wesley.
Frederick P. Brooks Jr. 1995. The Mythical Man Month and Other Essays on Software Engineering, Addison Wesley.
Opisi predavanj, spletni viri. Dostopno na: http://matevzdolenc.com/gr-uni-ri.

Cilji in kompetence:

Cilji predmeta zajemajo:
- izboljšati splošno računalniško pismenost,
- spoznati sodobne namenske programe in
- informacijsko-komunikacijske tehnologije v gradbeništvu ter spoznati osnove programiranja.

Pridobljene kompetence vključujejo:
- samostojno uporabo različnih namenskih programov (urejevalnik besedil, preglednice, program za predstavitve)
- sposobnost kritičnega odločanja o različnih informacijsko-komunikacijskih tehnologijah
- samostojno reševanje inženirskih nalog s pomočjo računalnika
- samostojen razvoj enostavnih inženirskih programov

Objectives and competences:

The objectives of the course include:
- advance basic understanding of computers,
- learn about modern general-purpose applications and
- different information-communication technologies in AEC, and learn about basic programming.

Competences include:
- engineering use of general purpose applications (word processing, spreadsheet, presentations)
- critical thinking on different information-communication technologies in AEC
- engineering problem solving with computers
- development of simple engineering applications

Predvideni študijski rezultati:

- Osnovno razumevanje računalništva in uporaba različnih računalniških tehnologij v inženirstvu
- Poglobljeno znanje uporabe splošnih programov v inženirstvu
- Uporaba preglednic za reševanje preprostih inženirskih nalog – upravljanje s podatki, vizualizacija podatkov in rezultatov, uporaba vgrajenih funkcij
- Razumevanje namembnosti in uporabe različnih programskih jezikov
- Samostojna izdelava preprostih inženirskih programov brez ter z grafičnim uporabniškim vmesnikom

Intended learning outcomes:

- Basic understanding of general computing subjects and different computing technologies that can be applied in engineering
- Use of general purpose application in providing solutions to engineering problems
- Use of spreadsheet applications in engineering – data management, graphical data vizualization, use of built-in functions
- Understanding the purpose and use of different programming languages
- Development of simple engineering applications with and without graphical user interfaces

Metode poučevanja in učenja:

Predavanja, vaje, samostojno delo

Learning and teaching methods:

Lectures, tutorials, individual work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Pisni izpit (teorija)	**40 %**	Written exam (theory)
Pisni izpit (vaje)	**30 %**	Written exam (practical)
Samostojna projektna naloga	**30 %**	Project work

Reference nosilca / Lecturer's references:

DOLENC, Matevž, KATRANUSCHKOV, Peter, GEHRE, Alexander, KUROWSKI, Krzysztof, TURK, Žiga. The InteliGrid platform for virtual organisations interoperability. J.inf. tech. constr., 2007,vol. 12, str. 459-477. Dostopno na: http://www.itcon.org/cgi-bin/works/Show?2007_30.
KLINC, Robert, TURK, Žiga, DOLENC, Matevž. Engineering collaboration 2.0 : requirements and xpectations. J. inf. tech. constr., 2009, letn. 14, pos. št., str. 473-488, ilustr.
Dostopno na: http://www.itcon.org/2009/31 .
PERUŠ, Iztok, KLINC, Robert, DOLENC, Matevž, DOLŠEK, Matjaž. A web-based methodology for the prediction of approximate IDA curves. Earthquake eng. struct. dyn.. [Print ed.], 2012, letn. 41, št. , str. 1-18, ilustr., doi: 10.1002/eqe.2192.

KÖNIG, Matija, DIRNBEK, Jaka, STANKOVSKI, Vlado. Architecture of an open knowledge base for sustainable buildings based on Linked Data technologies. Autom. constr.. [Print ed.], nov. 2013, letn. 35, str. 542-550, ilustr., doi: 10.1016/j.autcon.2013.07.002.
STANKOVSKI, Vlado, PETCU, Dana. Developing a Model Driven Approach for engineering applications based on mOSAIC : Towards sharing elastic components in the Cloud. Cluster comput., 2013, letn. XX, št. XX, str. 1-10, ilustr., doi: 10.1007/s10586-013-0263-x.
STEGNAR, Gašper, ŠIJANEC-ZAVRL, Marjana, STANKOVSKI, Vlado. Uporaba informacijskih virov pri tipizaciji stavb v Sloveniji = The use of information sources for typification of buildings in Slovenia. Gradb. vestn., nov. 2012, letn. 61, str. 256-262, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Osnove statike in dinamike
Course title:	Introduction to statics and dynamics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	2
Civil Engineering – first cycle academic		1	2

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
75		60			135	9

Nosilec predmeta / Lecturer: Dejan Zupan, Igor Planinc

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Modeliranje gradbenih konstrukcij: modeli podpor in vezi; modeli konstrukcij (linijske, ploskovne in 3D konstrukcije; paličja, prostoležeči in previsni nosilci, kontinuirni nosilec, Gerberjev nosilec, okvirji, lokovi, tričlenski lok, plošča, lupina); modeli obtežb (mehanske in nemehanske obtežbe, statične in dinamične obtežbe, linijska, površinska in prostorninska obtežba; lastna teža, veter, sneg, potres, sprememba temperature, koristna obtežba, krčenje, posedanje podpor, eksplozije, trki, najneugodnejša lega obtežbe); mehanski modeli konstrukcij (togo in deformabilno telo; elastičen, plastičen, viskozen, krhek, duktilen material). Statika konstrukcij. Koncepti: ravnotežje sil; notranje sile; ravnotežne enačbe linijskega nosilca; pomiki in zasuki; statična določenost in nedoločenost in vloga podpor in vezi. Metode reševanja: račun reakcij, notranjih sil, pomikov in zasukov; račun ovojnic notranjih sil in reakcij; račun vplivnic. Račun mehanskih lastnosti sestavljenih prerezov.

Content (Syllabus outline):

Fundamental modelling in civil and structural engineering: supports and kinematic pairs (fixed and hinged support, revolute and sliding joint). Linear structural elements (rods, beams, arches, truss, cables …), surface elements (walls, plates, shells …), solid elements. Structural load modelling: body and surface forces, dead and live loads, environmental loads (wind, temperature, seismic loads,…), creep, foundation settlement, explosion, impacts. Rigid and deformable body concept. Elementary properties of engineering structures: stiffness, flexibility, ductility. Static analysis of a rigid body: Force equilibrium requirement; internal forces and moments; equilibrium equations of a beam; kinematic equations; classification of statically determinate and indeterminate structures. Free body diagrams. Force and moment reactions at the supports and connections of a statically determinate structure. Techniques required for determining the forces and moments at the supports, joints and internal forces. Envelopes and influence lines.

Dinamika. Delec, togo telo in deformabilno telo. Definicije in koncepti. Sile in momenti v dinamiki. Enačbe gibanja delca in togega telesa v vektorski obliki: izrek o gibalni količini, izrek o vrtilni količini. Začetni pogoji. Začetni problem. Postopek za sistematično nastavljanje enačb gibanja delca in teles. Primeri: enačbe prostega in vsiljenega premega nihanja delca in njihovo integriranje; enačbe vodoravnega ravninskega nihanja večetažnega okvirja ob predpostavkah neskončne osne togosti stebrov in neskončne upogibne togosti prečk ter linearne elastičnosti stebrov in majhnih vodoravnih pomikov; enačbe prostega in vezanega gibanja togega telesa v ravnini za različne praktične primere.	Determination of the most unfavourable load position. Geometric properties of plane areas. Elementary concepts in dynamics: particle, rigid and deformable body. Forces and moments in dynamics. Conservation of linear and angular momentum. Initial value problems, simple solution methods. Practical examples: vibration of a particle, analysis of various systems of rigid bodies, dynamics of a deformable plane frame.

Temeljni literatura in viri / Readings:

A. HANNOR. 1998. Principles of structures, Blackwell science Ltd., Oxford , 1998.
M. STANEK, G. TURK. 2005. Statika I, učbenik, 2. popravljena in dopolnjena izdaja. Ljubljana, UL FGG, 329 str.
M. SAJE. 1994. Kinematika in dinamika, učbenik. Ljubljan, UL FGG, 418 str.
M. PAZ, W. LEIGH. 2004. Structural dynamics, Springer, 5. izdaja, poglavja 1, 2, 3, 7 (str. 3--63, 67--79, 205--208).
D. ZUPAN, M. SAJE. 2004. Računalniški program Nodi z navodili za uporabo (spletna izdaja). Dostopno na: www.km.fgg.uni-lj.si .

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Spoznati osnovne koncepte modeliranja gradbenih konstrukcij; - Razumeti osnovne mehanske koncepte v statiki in dinamiki konstrukcij; - Poznati tipičen računalniški program za statično in dinamično analizo konstrukcij; - Spoznati osnovne koncepte gradbenih predpisov; - Dobro se naučiti računskih metod za analizo enostavnih linijskih konstrukcij; - Navajati študente na sistematičen pristop k reševanju mehanskih problemov; - Vzpostaviti povezavo predmeta z drugimi temeljnimi in strokovnimi predmeti. Kompetence: - Pozna in razume pojme kot so notranje sile, pomiki, hitrosti, pospeški; - Pozna in zna rešiti osnovne mehanske enačbe togega telesa in sistemov togih teles; - Razume osnovne računske modele za statično analizo statično določenih linijskih konstrukcij, zna rešiti enačbe, interpretirati rezultate in jih kritično oceniti;	Objectives - Learn the elementary concepts of modelling in civil and structural engineering. - Understand the fundamental principles in structural mechanics. - Knowledge of typical computer programs for static and dynamic analysis. - Gain the insight into the main concepts of structural design. - Ability to calculate the internal forces in simple statically determinate frames. - Develop the essential problem solving skills. - Relate the knowledge with other subjects. Competences - Knowledge of elementary quantities: internal forces, displacements, velocities and accelerations. - Ability to formulate and solve the governing equations of a rigid body and a system of rigid bodies. - Understanding, interpretation and critical evaluation of data and results of various static analyses of statically determinate frames.

- Zna uporabljati računalniški program za račun linijskih konstrukcij.	- Ability to use simple computer programs for structural analysis.
Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent pozna poglavitne lastnosti in računske modele konstrukcij; - Na preprostih primerih zna določiti reakcije in notranje sile; - Pozna enačbe statičnega in dinamičnega ravnotežja sistemov togih teles; - Pozna temeljne metode za statično in dinamično analizo preprostih konstrukcij. - Pridobi sposobnost interpretacije in presoje pravilnosti podatkov in rezultatov statičnih in dinamičnih analiz enostavnih linijskih konstrukcij. - Pridobljeno znanje je pogoj za uspešno nadaljevanje študija pri predmetih s področja analize in projektiranja konstrukcij; - Študent spozna računalniški program za mehansko analizo konstrukcij; - Izboljša sposobnosti sistematičnega reševanja nalog; - Izboljša sposobnosti priprave pisnih poročil.	Knowledge and understanding of - fundamental properties and models of engineering structures - free-body diagrams, reaction forces, internal forces and moments - static and dynamic equilibrium of the system of rigid bodies - fundamental methods for static and dynamic analysis of simple engineering structures - Ability to interpret the behaviour of the structure and critically evaluate the calculated results - Gained knowledge is a prerequisite for many courses in structural analysis and design. - Knowledge of computer programs for structural analysis. - Ability to analyse problems in a systematic manner. - Ability to prepare a written report.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje potekajo klasično. Vaje se izvajajo v skupinah po 30. Po dve skupini vaj se izvajata vzporedno.	Lectures, seminars, demonstrations, computer based learning employing modern methods. Use of open-source program, developed by course coordinators.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Skupna ocena je ena sama. Sestavljena je iz ocen preskusa znanja in pisnega izpita	 **30 %** **70 %**	2 midterms final exam, practical part final oral exam, theoretical part

Reference nosilca / Lecturer's references:

ZUPAN, Eva, SAJE, Miran, ZUPAN, Dejan. On a virtual work consistent three-dime
nsional Reissner-Simo beam formulation using the quaternion algebra. Acta Mech., avg. 2013, letn. 224, št. 8, str. 1709–1729.
ČEŠAREK, Peter, SAJE, Miran, ZUPAN, Dejan. Dynamics of flexible beams: Finite-e lement formulation based on interpolation of strain measures. Finite elem. Anal. Des., sept. 2013, letn. 72, str. 47–63.
KROFLIČ, Aleš, SAJE, Miran, PLANINC, Igor, ZUPAN, Dejan. Buckling of asymmetrically delaminated three-dimensional composite beam - analytical solution. Compos., Part B Eng., 2011, letn.42, št. 7, str. 2047–2054.

KOLŠEK, Jerneja, PLANINC, Igor, SAJE, Miran, HOZJAN, Tomaž. The fire analysis of a steel-concrete side-plated beam. Finite elem. Anal. Des., okt.2013, letn. 74, str. 93–110.
SCHNABL, Simon, PLANINC, Igor. The influence of boundary conditions and axial deformability on buckling behavior of two-layer composite columns with interlayer slip. Eng. Struct., oktober 2010, letn. 32, št. 10, str. 3103–3111.
KRAUBERGER, Nana, BRATINA, Sebastjan, SAJE, Miran, SCHNABL, Simon, PLANINC,

Igor. Inelastic buckling load of a locally weakened reinforced concrete column. Eng. Struct., 2012, letn. 34, št. 1, str. 278–288.

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Stavbarstvo I
Course title:	Buildings I

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1	2
Civil Engineering – first cycle academic		1	2

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45	15	30			90	6

Nosilec predmeta / Lecturer: Mitja Košir

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Sistem: grajeno okolje v naravnem okolju. Metodologija inženirskega oblikovanja. Struktura temeljnih pravnih okvirov oblikovanja bivalnega in delovnega okolja: zgodovina, EC, SI. Modularna koordinacija. Razvoj stavb. Gradbeno fizikalne zahteve na osnovi funkcionalne analize aktivnih prostorov. Opredelitev pojma funkcionalnih con: konstrukcijskih sklopov v okviru sistema material – struktura – prostor. Identifikacija in specifikacija funkcionalnih con: konstrukcijskih sklopov na stavbi. Osnovne matrike: NK-TI, NK-HI, NK-TI-HI. Funkcionalna zasnova konstrukcijskega sklopa do opisa za izvedbo. Poenostavljen izračun prehoda toplote in definiranje položaja parne ovire (stacionarno). Dimenzioniranje toplotne izolacije.

Content (Syllabus outline):

System: the relationship between built and natural environment. The methodology of engineering design. Basic legal framework governing the field of living and working environment design: history, EC, SI. Modular coordination. Historical overview of building development. Definition of building physics requirements based on functional analysis of active spaces. Definition of functional zones: constructional complexes in the framework of material – structure – space system. Identification and specification of functional zones: constructional complexes in the building. Basic matrix load bearing function (LB) - moisture retention function (MR) -heat retention function (HR). The functional design of constructional complexes; from abstract concept to final description for execution. Simplified calculations of heat transfer (steady calculation) and simplified method for the positioning of water vapour barrier. Thermal insulation specification.

Temeljni literatura in viri / Readings:

Krainer, A. 2002. Modularna koordinacija. Modul 1, Konstrukcijski sklopi 3. Ljubljana; Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Krainer, A. 2002. Strehe. Modul 1, Konstrukcijski sklopi 4. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Krainer, A. 2002. Sistem. Modul 1, Konstrukcijski sklopi 1. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Neufert, E. 2002. Projektiranje v stavbarstvu : osnove, standardi, predpisi za konstrukcije, gradnja, oblikovanje, potrebni prostor, namembnost prostorov, mere zgradb, prostorov in opreme – s človekom kot merilom in ciljem : priročnik za projektante, izvajalce in študente. Ljubljana : Tehniška založba Slovenije,
e-učilnica Katedre za stavbe in konstrukcijske elemente na spletu: http://kske.fgg.uni-lj.si

Cilji in kompetence:

- Namen predmeta je z uporabo analize identificiranih funkcij bivalnega in delovnega prostora doseči razumevanje principov delovanja posameznih konstrukcijskih sklopov (in stavbe kot celote).
- Razumevanje osnovnih principov študenta vpne v proces inženirskega načrtovanja, konkretizacija abstraktnih konceptov pa oblikuje povezavo s prakso.

Študent po opravljenih vajah in izpitu pridobi naslednje kompetence:
- razumevanje kakovosti grajenega bivalnega in delovnega okolja v smislu profesionalne etike obvladanje znanja, tehničnih spretnosti in inovacijske sposobnosti za dvig kakovosti projektov na ravni grafičnega predpisa za izvedbo
- delen pregled nad stroko
- študent pozna konstitutivne elemente in procese, ki definirajo položaj umetnega okolja v naravnem okolju z upoštevanjem principa kontinuuma prostora in časa
- sposoben je oblikovati kontekstne sheme na ravni identifikacije problemov, ki izhajajo iz funkcionalne analize aktivnih prostorov in ki so osnova za zasnovo in oblikovanje konstrukcijskih sklopov (KS)
- razume pojem "projekt" v okviru proizvodno potrošnega kroga
- obvlada specifikacijo zahtev za posamezen KS, oblikovanje KS od koncepta do recepta za izvedbo in dimenzioniranje zaščitnega ovoja

Objectives and competences:

- The purpose of this course is to use the functional analysis of living and working environment to achieve an understanding of the principles of functioning of individual constructional complexes (and the building as a whole). Understanding of the basic principles engages student with the process of engineering design.
- Concretization of abstract concepts forms a link with practice.

After completing the exercises and exams student obtains the following competencies:
- understanding the concept of quality in built living and working environment in terms of professional ethics, mastery of the profession specific knowledge, technical skills and innovative capabilities to improve the quality of projects at the level of project design specifications,
- partial overview of the professional practice.
- student is acquainted with the constituent elements and processes that define the relation of the built environment to the natural environment, taking into account the principle of the continuum of space and time,
- student is able to create a contextual scheme for identifying the problems arising from the functional analysis of active spaces, which are the basis for the design and creation of constructional complexes,
- understand the concept of "project" in the framework of the greater socio-economic context,
- student is able to independently design and specify the structure of specific constructional complexes from design concept to final description for execution.

Predvideni študijski rezultati:	Intended learning outcomes:
- Sposobnost načrtovanja, dimenzioniranja in analize zaščitnih funkcij konstrukcijskih sklopov v odvisnosti od zahtev notranjega bivalnega in delovnega okolja ter razmer v zunanjem, naravnem okolju. - Razumevanje iteracijskega procesa inženirskega načrtovanja kot virtualne simulacije izvedbe v naravi na poti od abstraktnega do konkretnega. - Uporaba predstavljenih postopkov pri načrtovanju celovitih konstrukcijskih sklopov (v povezavi s sistemi nosilne konstrukcije, ki se obravnavajo v okviru "konstrukcij" stavb pri drugih predmetih). Kritična ocena izdelanih projektov in proizvodov. - Osnovno izhodišče za doseganje posamičnih ciljev in končnega cilja v naravi optimalno delujočega gradbenega sistema v okviru obravnave konstrukcijskih sklopov je, da študent na vsaki stopnji reševanja problema, kjer sta funkcionalno povezana morfologija (od abstraktnega h konkretnemu) in postopek (iteracijski). Ta pristop se praktično uporablja pri obravnavi konstrukcijskih sklopov.	- Ability to design, analyse and specify functions of constructional complexes in relation to the requirements of the internal living and working environment as well as to the climatic conditions in the external environment. - Understanding the iteration process of engineering design as a virtual simulation of a building from abstract towards concrete solutions. - Using the outlined procedures in the design of constructional complexes (in conjunction with the loadbearing systems that are lectured in other courses). Critical assessment of projects and building products. - The starting point of achieving intermediate targets as well as the final goal of an optimally functioning building system in the context of constructional complexes design is that at each stage of problem solving, which are functionally related to morphology (from the abstract to the concrete) and process (iterative). This approach is practically implemented by students in the design of constructional complexes.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminar, seminarske vaje.	Lectures, seminar, tutorial.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Seminarske vaje in seminarska naloga	**70 %**	Tutorial and project assignment
Pisni izpit	**30 %**	Written exam

Reference nosilca / Lecturer's references:

KOŠIR, Mitja, KRAINER, Aleš, KRISTL, Živa. Integral control sistem of indoor environment in continuously occupied spaces. Autom. constr.. [Print ed.], 2012, letn. 21, št. 1, str. 199-209, ilustr., doi: 0.1016/j.autcon.2011.06.004.
KOŠIR, Mitja, KRAINER, Aleš, DOVJAK, Mateja, KRISTL, Živa. Automatically controlled daylighting for visual and nonvisual effects. Light. res. technol. (2001, Print). [Print ed.], 2011, letn. 43, št. 4, str. 439- 455, ilustr., doi: 10.1177/1477153511406520.
KRAINER, Aleš, KOŠIR, Mitja, KRISTL, Živa, DOVJAK, Mateja. Pasivna hiša proti bioklimatski hiši = Passive house versus bioclimatic house. Gradb. vestn., marec 2008, letn. 57, št. 3, str. 58-68, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Ceste
Course title:	Roads

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	3
Civil Engineering – first cycle academic		2	3

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45			45		90	6

Nosilec predmeta / Lecturer: Peter Lipar

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Prometna politika; planiranje in okolje; razdelitev cest; projektna dokumentacija; določitev prečnega prereza; horizontalni potek osi; vertikalni potek osi; prostorsko vodenje; preglednost; trenje; razširitve; odvodnjevanje; dimenzioniranje zgornjega ustroja, objekti; vrste križišč; kolesarske površine; peš površine; umirjanje prometa; mirujoči promet; prometna signalizacija.

Content (Syllabus outline):

Transport policy; planning and environment; road distribution; project documentation; cross-section of the road; horizontal leading of road axis; vertical leading of road axis; space interaction of the road; sight field; friction; widening of the road; water management; surfacing; road objects; intersections; bicycle infrastructure; pedestrian infrastructure; traffic calming; parking facilities; traffic signalization.

Temeljni literatura in viri / Readings:

Juvanc A., 2004. Temeljni pogoji za določanje cestnih elementov. Ljubljana, FGG - PTI.
Juvanc A., 2004. Geometrijski elementi ceste in vozišča. Ljubljana, FGG - PTI.
Tehnični predpisi za projektiranje cest (domači in tuji).

Cilji in kompetence:

Cilji
- Seznaniti se s transportnimi sistemi in s stvarnimi in predpisanimi pogoji za načrtovanje cest in spremljajočih ureditev ter tehničnimi rešitvami.

Kompetence

Objectives and competences:

Objectives
- To be aware of the transport systems and prescribed conditions for road design and related arrangements and technical solutions.

Competences

- Sposobnost za samostojno izdelavo enostavnega projekta za cesto - Pridobitev sposobnosti za sodelovanje pri gospodarjenju s cestami in za skupinsko delo - Razumevanje metod in postopkov pri načrtovanju, projektiranju in gradnji.	- Ability to independently produce a simple project of the road - Gaining the ability to participate in the management of roads and teamwork - Understanding the methods and procedures for planning, design and construction of roads.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje prometnih sistemov - Poznavanje voznodinamičnih zakonitosti in sistema VOZNIK-VOZILO-OKOLJE in elementov ceste in način njihovega usklajevanja - Razumevanje metod in postopkov pri načrtovanju, projektiranju in gradnji cest. - Študent pridobi sposobnost samostojnega sprejemanja odločitev, kritične presoje variantnih rešitev in sodelovanja v delovnem teamu.	- Knowledge and understanding of traffic systems - Knowledge of driving dynamic legality and system DRIVER-VEHICLE-ENVIRONMENT and road elements and how they are co-ordinated - Understanding of the methods and procedures for planning, design and construction of roads. - Student acquires the ability of independent decision-making, critical assessment of alternative solutions and participation in a team work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in uporaba pridobljenih znanj pri vajah in projektnem izdelku	Lectures and application of acquired knowledge to design a road during practical work

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni in/ali ustni izpit	**50 %**	Written and / or oral examination
Vaje/projektni izdelek	**50 %**	Practical work - design

Reference nosilca / Lecturer's references:

LIPAR Peter (avtor), »Umirimo promet«, Ljubljana: Ministrstvo za promet, Direkcija Republike Slovenije za ceste, 2007. 48 str., Ilustr.
KOSTANJŠEK, Jure, LIPAR, Peter. Pedestrian Crossing Priority for Pedestrian Safety. V: 3rd Urban Street Symposium : uptown, downtown or small town : designing urban streets that work : Seattle, Washington, June 24-27, 2007.
LIPAR, Peter, KOSTANJŠEK, Jure, ŽURA, Marijan. Uporaba prostorske statistike za določevanje zgostitev prometnih nesreč = Identification of road accident hot spots using spatial statistics. Geod. vestn., 2010, letn. 54, št. 1, str. 61-69, ilustr.
Dostopno na: http://www.geodetski- vestnik.com/54/1/gv54-1_061-069.pdf.
LIPAR, Peter, LAKNER, Mitja, MAHER, Tomaž, ŽURA, Marijan. Estimation of road centerline curvature from raw GPS data. The Balt. j. road bridge eng., 2011, letn. 6, št. 3, str. 163-168, ilustr., doi: 10.3846/bjrbe.2011.21.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Tehnologija
Course title:	Technologies in civil engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	3
Civil Engineering – first cycle academic		2	3

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	15	30			75	5

Nosilec predmeta / Lecturer: Andrej Kryžanowski

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Uvod v tehnologijo gradnje
Zgodovinski pregled razvoja tehnologij; pregled sodobnih tehnoloških procesov v gradbeništvu; tehnološke posebnosti pri posameznih konstrukcijah.
Osnovni tehnološki procesi v gradbeništvu
Tehnološki procesi zemeljskih del: pripravljalna dela (čiščenje terena, geološke-geomehanske raziskave, geodetska izmera); gradbena jama (način izvedbe, transporti, nasipi, izkopi, načini zavarovanja gradbene jame…); način izvedbe temeljenja objektov (plitko, globoko temeljenje…); tehnološki procesi zidarskih del: tipi osnovnih zidanih konstrukcij, dimenzioniranje malt, zidanje (priprava gradbišča, priprava malte, pomožna dela …); izdelava ometov (priprava gradbišča, klasični, strojni); tehnološki procesi armiranobetonskih del: projekt betona (osnove projektiranja betona, odri in opaži, opažni načrt); vgrajevanje betona (zunanji in notranji transporti betona, standardni postopki vgradnje betona, betoniranje pri nizkih in visokih temperaturah, nega betona …); polaganje

Content (Syllabus outline):

Introduction to building technology
Historical background of development of technologies; overview of contemporary technological processes in civil engineering; technological specifications of structures.
Basic technological processes in construction
Technological processes of earthmoving work: site preparation works (site-clearance work, geological and geomechanical surveying, geodetic surveying); construction pit (type of execution, transport, earthworks, excavation, ways of securing the construction pit etc.); structure foundation design (shallow, deep etc.); technological processes of masonry and bricklaying work: types of basic masonry structures, dimensioning of mortars and grouts, bricklaying (site preparation works, grout preparation, ancillary works etc.); renderings (site preparation works, classical, mechanical); technological processes of reinforced-concrete work: concrete design project (fundamentals of concrete design, scaffolding, shuttering, formwork design); concrete placement (transport of concrete,

armature (priprava materiala, vgradnja na gradbišču …); tehnološki procesi osnovnih montažnih del: področja uporabe prefabrikatov v gradbeništvu, suhi-mokri montažni postopki; proizvodni obrati v gradbeništvu: obrati za proizvodnjo in predelavo materialov (kamnolomi, separacije, drobilnice, betonarne, železokrivnice, mizarski-tesarski obrati), pomožni obrati (strojni), obrati za obrtniška dela (fasaderski, slikopleskarski ...), proizvodni obrati za montažne elemente (konstrukcijski elementi, galanterija ...); zagotavljanje in spremljanje kvalitete gradnje v vseh projektnih fazah. Specialni tehnološki procesi betonskih konstrukcij Tehnologije specialnih betonov; opredelitve tipov specialnih betonov (masivni, abrazijsko odporni, mikroarmirani, visokotrdni, valjani ....), projektiranje specialnih betonov, možnosti in način uporabe specialnih betonov; tehnologije zahtevnih opažnih in podpornih sistemov; opredelitve tipov opažev s podporno konstrukcijo (tradicionalni, kovinski, prenosni, tunelski ...), osnove dimenzioniranja opažne konstrukcije, način gradnje opažnih konstrukcij s primeri iz prakse (pregrade, mostovi ...). Seminarske vaje Izdelava tehnoloških projektov priprave gradnje Izdelava tehnoloških projektov gradnje za primer uporabe različnih tipov vgradnih materialov.	standard placement procedures, placing concrete in low and high temperatures, curing etc.); reinforcement laying (preparation of material, installation on the site etc.); technological processes of basic assembly works: prefabricated units and elements in construction, dry/wet assembly procedures; production plants for civil engineering construction: plants for production and processing of materials (quarries, separation plants, crushing plants, concrete mixing plants, iron bending facilities, carpentry and joinery facilities), auxiliary plants (mechanical), finishing works (plastering, painting etc.), production plants for prefabricated units (structure elements, ironmongery etc.); - quality assurance and quality control in all project stages. Special technological processes of concrete structures Technologies of special types of concrete; types of concrete (massive, wear resistant, micro-reinforced, high-performance, roller compacted etc.), design of special types of concrete, possibilities and ways of use; technologies of complex formwork and support systems; definition of types of formwork with support structures (traditional, metal, transportable, tunnel form etc.), fundamentals of formwork dimensioning, ways of formwork assembly with practical cases (dams, bridges etc.). Seminar Elaboration of technological projects of construction preparation. Elaboration of technological construction projects by using various types of installation materials.

Temeljni literatura in viri / Readings:

Bogdan Trbojević. 1981. Organizacija gradjevinskih radova. Beograd. GK.
P. K. Mehta and P. J. M. Monteiro. 2006. Concrete: microstructures, properties and materials, 3th edition. New York, McGraw.Hill, strani: 3-21, 121-202, 281-316, 317-340, 341-386, 449-558.
Herbert L. Nichols, Jr. and David A. Day. 2005. Moving the earth, 5th edition. McGraw-Hill, strani 4.1-4.35 in 5.1-5.63.
Milan Gojković. 1988. Oplate i skele. Beograd, Naučna knjiga.
Učna gradiva v spletni učilnici.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati osnovne koncepte za projektiranje in izvedbo osnovnih in del specialnih tehnoloških procesov pri gradbenih konstrukcijah; - Naučiti se izdelave osnovnih tehnoloških projektov v pripravljalni fazi ter upravljanje osnovnih tehnoloških procesov med gradnjo. Kompetence - Povezovanje znanja s področja tehnologij gradenj, teorije gradbenih konstrukcij in organizacije ter vodenja gradnje gradbenih objektov; - Izdelovanje preprostih tehnoloških projektov kot so: projekt betona, opažni načrt in podobno.	Objectives - To learn about the basic concepts of design and execution of basic, and partially specific, technological processes in building structures; - To learn to elaborate basic technological design projects in the preparation stage, and management of basic technological processes during construction. Competences - Integration of knowledge in building technologies, building structure theory, and construction organisation and management; - Elaboration of simple technological projects, such as concrete design project, formwork design, and similar.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje - tehnološke priprave gradnje, - tehnoloških procesov osnovnih gradbenih del, - specialnih tehnoloških procesov v gradbeništvu, - postopke za zagotavljanje in spremljanje kakovosti gradnje v vseh projektnih fazah, - odvisnost in povezovanost tehnoloških procesov v gradbeništvu zaradi različnih lastnosti gradbenih materialov in gradbenih konstrukcij. - Pridobljeno znanje omogoča študentom v nadaljnjem študiju lažje razumevanje načrtovanja optimalne organizacije gradnje in projektiranje gradbenih konstrukcij.	Knowledge and understanding - of technological preparation for construction, - of technological processes of basic construction works, - of specific technological processes in construction, - of procedures for provision and monitoring of building quality in all project stages, - of dependence and integration of technological processes in construction due to different characteristics and performance of building materials and building structures. - The acquired knowledge will help the students in their future studies by facilitating understanding of the planning of optimum organisation of building and structural design.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Izdelava individualne seminarske naloge na izbrano temo z zagovorom. Izdelava računskih vaj s praktičnimi primeri iz prakse. Ekskurzija	Elaboration of individual seminar coursework on a selected topic, including defence. Elaboration of calculation exercises with practical cases. Excursion

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izdelava seminarske naloge	**30 %**	Elaboration of seminar coursework and
Pisni izpit (teoretični in praktični del)	**70 %**	Written examination (theoretical and practical parts)

Reference nosilca / Lecturer's references:

KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, UKRAINCZYK, Velimir, PLANINC, Igor. Testing of concrete abrasion resistance in hydraulic structures on the lower Sava river. Stroj. vestn., apr. 2012, vol. 58, no. 4, str. 245-254, SI 51

KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, PLANINC, Igor. Abrasion Resistance of Concrete in Hydraulic Structures. ACI mater. j., julij-avgust 2009, letn. 106, št. 4, str. 349-356,

KRYŽANOWSKI, Andrej, SAJE, Miran, PLANINC, Igor, ZUPAN, Dejan. Analytical solution for buckling of asymmetrically delaminated Reissner's elastic columns including transverse shear. Int. j. solids struct. [Print ed.], 2008, letn. 45, št. 3/4, str. 1051-1070,

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Trdnost
Course title:	Strength of materials

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	3
Civil Engineering – first cycle academic		2	3

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
75		75			150	10

Nosilec predmeta / Lecturer: Igor Planinc

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljeni izpiti iz predmetov Osnove statike in dinamike, Fizika, Matematika I in Matematika II oz. osvojena ustrezna primerljiva znanja.

Prerequisites:

Passed exams in Introduction to Statics and Dynamics, Physics, Mathematics I and II or similar subjects.

Vsebina:

Osnove mehanike deformabilnega telesa: koncept deformiranja in gibanja telesa, materialni in prostorski opis gibanja; kinematične enačbe deformabilnega telesa (tenzor deformacij in vektor pomikov deformabilnega telesa, geometrijski pomen normalnih in strižnih deformacij, ravninsko deformacijsko stanje); ravnotežne enačbe deformabilnega telesa (napetostni vektor, napetostni tenzor, normalna in strižna napetost, ravninsko napetostno stanje, glavne normalne napetosti); posplošeni Hookov zakon (elastični modul, Poissonov količnik, strižni modul); osnovne enačbe linearne teorije elastičnosti in reševanje na konceptualnem nivoju in z uporabo računalniškega programa; izrek o virtualnih pomikih in izrek o virtualnih silah; značilne konstitutivne enačbe gradbenih materialov (hiperelastični modeli, plastični modeli, viskoelastični modeli).

Content (Syllabus outline):

Fundamental concepts and principles in mechanics of deformable body: deformations and displacements. Material and spatial description of a deformable body. Kinematics of deformable body: strain tensor and vector field of displacements. Strain measures and geometric interpretation of strain tensor. Plane strain. Equilibrium of deformable body. Stress vector and stress tensor. Normal and shear stresses. Plane stress. Principal stresses. Generalized Hooke's law, Young's modulus, Poisson ratio, shear modulus. Governing equations of elastic body. Solution strategies at a conceptual level. Solutions with computer programs. Principle of virtual work. Principle of virtual displacements and principle of virtual forces. Constitutive models of engineering materials: hyperelastic, plastic, viscoelastic.

Analiza linijskih konstrukcij: osnovne predpostavke in enačbe upogiba z osno silo, račun notranjih sil, deformacij in pomikov preprostih elastičnih nosilcev z metodo direktne integracije, račun normalnih in strižnih napetosti v prečnem prerezu nosilca, glavne napetosti, geometrijske karakteristike prečnega prereza; osnovne predpostavke in enačbe enakomerne torzije, račun napetosti pri nosilcu s tankostenskim prečnim prerezom, torzijski vztrajnostni moment; analiza elastičnih linijskih konstrukcij z metodo pomikov in metodo sil in s pomočjo računalniškega programa, togostna matrika in obtežni vektor, vplivnice in ovojnice statično nedoločenih linijskih konstrukcij; osnovne predpostavke in enačbe elastičnih kompozitnih nosilcev, pomen zdrsa med nosilci, račun notranjih sil, deformacij, zdrsa in pomikov preprostih dvoslojnih kompozitnih nosilcev z in brez uporabe računalniškega programa; osnovne enačbe geometrijsko nelinearne teorije ravninskih nosilcev, uklon elastičnega in plastičnega stebra, uklonska nosilnost stebra in vpliv različnih nepopolnosti na njegovo nosilnost, stabilnost konstrukcij; plastična in viskoelastična analiza ravninskih nosilcev, metoda plastičnih členkov, mehčanje prečnih prerezov in prerazporeditev notranjih sil, mejna nosilnost prečnega prereza in mejna nosilnost konstrukcij.	Analysis of beam-like structures: pure bending. Assumptions. Differential equation of the deflection curve. Normal and shear stresses in bending. Principal stresses. Geometric properties of plane cross-sections. Torsion. Fundamental equations of pure torsion. Shear stresses in thin-walled beams. Torsional constant. Linear analysis of elastic frames. Displacement method. Method of forces. Statically indeterminate frame structures. Envelopes and influence lines. Fundamental equations of elastic composite beams. Interlayer slip. Analysis of internal forces, strains, interlayer slip and displacements for simple problems. Geometrically nonlinear beams. Buckling of elastic columns. Load carrying capacity and imperfections. Structural stability. Plastic and viscoplastic analysis of plane frames. Method of plastic hinges. Strain softening and stress redistribution. Bearing capacity of a cross-section. Bearing capacity of a structure.

Temeljni literatura in viri / Readings:

Izbrana poglavja iz:
SRPČIČ, Stane. 2003. Mehanika trdnih teles. Ljubljana, Fakulteta za gradbeništvo in geodezijo, XII, 651 str.
STANEK, Marjan, TURK, Goran. 1998. Osnove mehanike trdnih teles. Ljubljana, Univerza v Ljubljani, Fakulteta za gradbeništvo in geodezijo, 254 str.
STANEK, Marjan, TURK, Goran. 2006. Trdnost, študijsko gradivo. Ljubljana, Univerza v Ljubljani, Fakulteta za gradbeništvo in geodezijo, str. 1-274, 606-704.
SRPČIČ, Stane, VRATANAR, Blaž, FLAJS, Rado. 1976-2003. Izbor rešenih nalog iz mehanike trdnih teles. Ljubljana, Fakulteta za gradbeništvo in geodezijo. Dostopno na: http://km.fgg.uni-lj.si/PREDMETI/Trdnost-UNI/Trdnost.html,
ZUPAN, Dejan. 2013. Trdnost : gradivo za vaje na študiju 1. stopnje Operativno gradbeništvo. Ljubljana, Fakulteta za gradbeništvo in geodezijo, 1 optični disk (CD-ROM).

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati osnovne mehanske koncepte pri analizi deformabilnega telesa in gradbenih konstrukcij (upogib z osno silo, enakomerna torzija), - Predstaviti pojav uklona stebra in vpliv različnih nepopolnosti na njegovo uklonsko nosilnost, - Spoznati mejno nosilnost prečnega prereza ter mejno nosilnost konstrukcije,	Objectives - Learn the elementary concepts of the analysis of deformable bodies and engineering structures (bending, torsion). - Present the buckling phenomenon and study it for elastic columns with our without imperfections. - Learn the concept of bearing capacity of a cross-section and bearing capacity of a structure.

- Naučiti osnovne metode reševanja elastičnih, kompozitnih, plastičnih in viskoplastičnih preprostih linijskih konstrukcij z in brez uporabe računalniškega programa. Kompetence - Razumevanje, interpretiranje in kritično presojanje rezultatov različnih analiz gradbenih konstrukcij, - Razumevanje določitve uklonsko nosilnost stebrov, - Razumevanje osnovnih metod reševanja preprostih statično določenih in nedoločenih linijskih gradbenih konstrukcij z uporabo različnih reoloških modelov materiala, uporabljati računalniški program pri analizi gradbenih konstrukcij.	- Ability to analyze simple statically determinate and indeterminate structures with different constitutive models (with or without computer program). Competences - Understanding, interpretation and critical evaluation of data and results of various static analyses of statically determinate and indeterminate structures. - Understanding of buckling and ability to determine the critical buckling load of elastic columns. - Ability to understand, formulate and solve geometrical linear equations of simple statically determinate and indeterminate frames for several constitutive models. - Ability to use simple computer programs for structural analysis.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje: - osnovne enačbe linearne teorije elastičnosti, - osnove modeliranja gradbenih konstrukcij (upogib z osno silo, enakomerna torzija), - osnovni reološki pojavi in pripadajoči modeli gradbenih materialov, - uklonske sile stebrov, - določitev statičnih, deformacijskih in kinematičnih količin linijskih gradbenih konstrukcij z in brez uporabe računalniških programov. - Uporaba domače in tuje strokovne literature kot podlaga za reševanje raznovrstnih problemov - Uporaba računalniških programov s področja analize konstrukcij.	Knowledge and understanding of: - fundamental equations of the linear theory of elasticity - basic concepts in modelling the structural behaviour (buckling, torsion - rheological properties of materials and constitutive models of engineering materials - Euler buckling loads - fundamental methods for solving statically determinate and indeterminate frames - Ability to use different software for structural analysis - Use of Slovenian and foreign literature. - Ability to analyze problems in a systematic manner. - Ability to critically estimate and represent the results.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, domače naloge, kolokviji.	Lectures, seminars, demonstrations, computer based learning. Use of open-source programs, developed by course coordinators.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Kolokviji	**40 %**	2 midterms
Pisni in/ali ustni izpit	**60 %**	final exam, written practical part and oral theoretical part

Reference nosilca / Lecturer's references:

HOZJAN, Tomaž, SAJE, Miran, SRPČIČ, Stane, PLANINC, Igor. Geometrically and materially non-linear analysis of planar composite structures with an interlayer slip. Comput. struct..[Print ed.], jan. 2013, letn. 114-115, str. 1-17, ilustr.,doi: 10.1016/j.compstruc.2012.09.012.
GAMS, Matija, PLANINC, Igor, SAJE, Miran. Energy conserving time integration scheme for geometrically exact beam. Comput. methods appl. mech. eng.. [Print ed.], 2007.
BRATINA, Sebastjan, SAJE, Miran, PLANINC, Igor. The effects of different strain contributions on the response of RC beams in fire. Eng. struct..[Print ed.], marec 2007.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Hidromehanika
Course title:	Hydromechanics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	3
Civil Engineering – first cycle academic		2	3

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer: Matjaž Četina

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Predavanja Lastnosti tekočin, primerjava hidromehanike in mehanike trdnih teles (razlike). Osnovne enačbe: kontinuitetna, dinamična, energijska, enačba stanja. Princip reševanja hidrodinamičnih problemov. Hidrostatika: tlaki in sile na ravne in krive ploskve, vzgon, stabilnost plavanja. Kinematika idealne nestisljive tekočine: tokovnice, trajektorije, sledi. Rotor hitrosti, primeri vrtinčnega toka, potencialni tok in primeri iz gradbene prakse. Dinamika idealne nestisljive tekočine: energijska, Bernoullijeva, Cauchyjeva enačba. Teorem o gibalni tekočini. Tok podtalnice, Darcyjev zakon. Tok realne tekočine: dinamična podobnost, laminarni in turbulentni tok, mejna plast, upor teles. Konvekcijsko difuzijska enačba za transport snovi v vodi. Laboratorijske vaje Izračun sil in prijemališč na ravne in krive ploskve, stabilnosti in kota nagiba plavačev in pontonskih mostov. Potencialni tok – tok v kotu in kolenu, izvor in potencialni vrtinec, izvor in paralelni tok.	Lectures Fluid properties, comparison of hydromechanics and solid mechanics (differences). Basic equations: continuity, momentum, energy, equation of state. Principles of solving hydrodynamic problems. Hydrostatics: pressures and forces on flat and curved planes, buoyancy, stability of floating bodies. Kinematics of ideal incompressible fluid: streamlines, path lines, streak lines. Velocity curl, examples of rotational flow, irrotational (potential) flow and examples from civil engineering practice. Dynamics of ideal incompressible fluid: energy, Bernoulli, Cauchy equations. Momentum theorem. Groundwater flow, Darcy's law. Flow of real fluid: dynamic similarity, laminar and turbulent flow, boundary layer, fluid drag. Convective-diffusion equation for mass turbulent transport in water. Laboratory exercises Computation of forces and their points of application on flat and curved planes, stability and angles of inclination of floating bodies and pontoon bridges. Potential flow – flow in the corner and

Uporaba za podtalnico. Uporaba Bernoullijeve enačbe za tok v cevovodih. Črpalke in turbine v hidravličnih sistemih. Uporaba impulznega stavka za račun sil na kolena cevovodov ter lopatice turbin. Realna tekočina: upor teles, padalec, letalsko krilo, steber. Eksperimentalne vaje na fizičnih modelih in primerjava meritev z računskimi rezultati.	bend, source and potential vortex, source and parallel flow. The use for groundwater flow. The use of Bernoulli's equation for flow in pipelines. Pumps and turbines in hydraulic systems. The use of momentum theorem for the computation of forces on pipeline bends and turbine shoulder-blades. Real fluid: fluid drag, parachute, air foil, pier. Experimental exercises on physical models and the comparison of measurements with computational results.

Temeljni literatura in viri / Readings:

Rajar, R. 1997. Hidromehanika, učbenik. Ljubljana, UL FGG, 236 str.
Četina, M. 1997. Zbirka rešenih nalog iz hidromehanike, študijsko gradivo na mreži, Ljubljana, UL FGG, 245 str.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Študent dobi osnovno znanje mehanike tekočin, ki mu omogoča reševanje mnogih problemov gradbene prakse. - Študent se nauči splošnega načina reševanja inženirskih tehničnih problemov – od zbiranja podatkov, izbire ustreznih enačb, presoje njihove točnosti itd. do verifikacije rezultatov. - S pomočjo teoretičnih in laboratorijskih vaj ter terenskih ogledov študentje utrdijo pridobljeno teoretično znanje in spoznajo njegovo uporabnost za reševanje praktičnih problemov. Kompetence - Študent zna uporabljati poenostavljene enačbe mehanike tekočin, ki izhajajo iz splošnih enačb v prostoru ter razume, da so poenostavljene enačbe le njihovi posebni primeri. - Študent zna uporabljati osnovne enačbe hidrostatike za določanje tlakov, sil in njihovih prijemališč na ravne in krive ploskve. - Študent razume teorijo potencialnega toka za določanje toka podtalnice in rešuje enostavne probleme. - Študent zna uporabiti Bernoullijevo oz. energijsko enačbo za določanje toka idealne nestisljive tekočine v cevovodih. - Študent za realne tekočine razume principe laminarnega in turbulentnega toka ter modelne podobnosti; zna praktično uporabiti enačbo za račun upora teles v toku.	Objectives - Student gets basic knowledge about fluid mechanics which enables him to solve several problems from civil engineering practice. - Student learns the general way of solving engineering technical problems – from collecting data, choosing adequate equations, assessment of their accuracy, etc., to verification of results. - With the help of theoretical and laboratory tutorials as well as with field work students consolidate the acquired theoretical knowledge and recognize its applicability to solve practical problems. Competences - Student knows how to use simplified equations of fluid mechanics arising from general equations in space and understands that simplified equations are only special cases. - Student knows how to use basic equations of hydrostatics to determine pressures, forces and their points of application on flat and curved planes. - Student understands the theory of potential flow to determine groundwater flow and can solve simple problems. - Student knows how to use Bernoulli or energy equation to determine the flow of ideal incompressible fluid in pipes. For real fluids student understands the principles of laminar and turbulent flow as well as model similarity; he is able to use the equation of fluid drag for practical purposes.

Predvideni študijski rezultati:	Intended learning outcomes:
- Študent razume lastnosti in razvrstitev tekočin ter njihove posebnosti v primerjavi s trdnimi snovmi. - Študent pozna osnovne principe izpeljave osnovnih enačb: kontinuitetne (princip ohranitve mase), dinamične (princip ravnovesja sil) in enačbe stanja. - Poenostavljene enačbe študent zna uporabiti za praktične probleme določanja sil in prijemališč zaradi hidrostatičnega pritiska na zapornice, pregrade in nasipe. - S pomočjo teorije potencialnega toka študent zna preračunati tok podtalnice pri enostavnejših primerih toka proti vodnjaku. - Zelo dobro zna študent uporabiti Bernoullijevo enačbo za račun toka v kratkih cevovodih, kjer je možna predpostavka o idealni tekočini. - Pri modelni podobnosti študent zna preračunati izmerjene vrednosti iz modela v naravo. - S pomočjo enačbe upora in ustreznih tabel v priročnikih študent zna izračunati silo na telesa v toku. - Tekom študija predmeta se študent navaja na uporabo literature ter internetnih virov in se z oddajo pisnih izdelkov ter njihovim zagovorom navaja na pisno in ustno poročanje.	- Student understands properties and classification of fluids and their specifics in comparison with solids. - Student knows the basic principles of the derivation of equations: continuity (the principle of mass conservation), dynamic (the principle of forces equilibrium) and equation of state. - Student is able to use simplified equations for practical problems of determining forces and their points of application on gates, dams and dykes. - With the use of potential flow theory he knows how to compute groundwater flow in simpler cases of flow against wells. - Student is well prepared to use Bernoulli equation for flow calculation in short pipelines where the supposition of ideal fluid is possible. - Regarding the model similarity student can calculate measured values from a model to nature. - With the use of the fluid drag equation and appropriate tables in manuals student is able to compute the body force in fluid flow. - During the study of the subject student becomes familiar with the use of literature and internet sources and with the delivery of written course work and its defence gets used to written and oral reporting.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja bodo potekala kot kombinacija klasičnih predavanj, kjer bodo glavne izpeljave, pomembne za razumevanje snovi, podane na tablo. Teoretične vsebine bodo popestrene s prikazi praktičnih primerov preko računalniških projekcij in DVD filmov. Zelo pomembno je tudi, da si študentje predstavljajo, kako voda teče, zato bodo imeli študentje laboratorijske vaje v manjših skupinah. Predvidena je tudi enodnevna ekskurzija z ogledom delovanja čistilne naprave, strojnice in pregrade HE ter primer sanacije alpskega jezera.	Lectures will be held as a combination of classical lessons with main derivations, important to understand study topics, given on the blackboard. Theoretical contents will be variegated by presentations of practical examples with computer projections and DVD movies. Because it is also very important for the students to imagine how water flows, they will have laboratory tutorials in small groups. It is also foreseen that they will attend a one day excursion including the visit of a purification station, power house and a dam site of a hydro-power plant and a site of the remediation of an alpine lake.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Domače računske naloge	**20 %**	Homework
Računski del izpita (pisni)	**40 %**	Computational part of the exam (exercises, written)
Teoretični del izpita (pisni)	**40 %**	Theoretical part of the exam (written)

Reference nosilca / Lecturer's references:

DŽEBO, Elvira, ŽAGAR, Dušan, ČETINA, Matjaž, PETKOVŠEK, Gregor. Reducing the computational time of the SPH method with a coupled 2-D/3-D approach. Stroj. vestn., Oct. 2013, vol. 59, no. 10, str. 575-584.
KRZYK, Mario, GABRIJELČIČ, Primož, ČETINA, Matjaž. Modelling of flow in a kayak channel. V: ZHAOYIN, Wang (ur.). Proceedings of the 35th IAHR World Congress, September 8-13, Chengdu, China. The wise find pleasure in water : meandering through water science and engineering. Chengdu: IAHR, 2013, str. 1-8.
KRZYK, Mario, KLASINC, Roman, ČETINA, Matjaž. Two-dimensional mathematical modelling of a dam-break wave in a narrow steep stream. Stroj. Vestn., 2012, vol. 58, no. 4, str. 255-262.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Urejanje prostora
Course title:	Spatial development

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	3
Civil Engineering – first cycle academic		2	3

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			60	4

Nosilec predmeta / Lecturer: Maruška Šubic Kovač

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Temeljni pojmi na področju urejanja prostora; življenjski ciklus nepremičninskega projekta in faze v urejanju prostora; urbanizacija: pojem in razvojne faze; pričakovane demografske in strukturne spremembe; razvoj brez rasti; razvoj dejavnosti v prostoru; napovedovanje in kvantifikacija potreb po zemljiščih; prostorski akti: vrsta, vsebina, postopek sprejemanja, prostorski akti kot pravna podlaga za predpisovanje lokacijskih pogojev, prostorski izvedbeni pogoji in njihov vpliv na uspešnost investicije; prostorski akti in projekt za pridobitev gradbenega dovoljenja; ukrepi za realizacijo prostorskih aktov: parcelacija zemljišč, lastninske in druge stvarne pravice ter pridobitev lastninske pravice, pridobitev lastninske pravice v javno korist, opremljanje zemljišč za gradnjo.	Basic definitions in the field of spatial development; life cycle of real estate project and phases in spatial development; urbanization: concept and development phases; expected demographical and structural changes, development without growth; development of activity in space; predictions and quantification of needs according to types of land; spatial acts: type, contents, procedure of adoption, spatial acts as legal base for the regulation of site conditions; the spatial implementation conditions and their influence on the success of the investment; spatial planning documentation and project for obtaining building permit; measures for the realization of spatial acts (land allotment, acquisition of ownership rights, developing land for construction).

Temeljni literatura in viri / Readings:

Šubic Kovač, M. 2013. Urejanja prostora: študijsko gradivo. Ljubljana, UL FGG, 146 strani.
Polajnar, M. 2013. Urejanja prostora: študijsko gradivo za vaje. Ljubljana, UL FGG, 70 strani.
Tratnik, M. 202. Stvarnopravni zakonik. Ljubljana, Uradni list RS,izbrana poglavja, 44 strani.
Aktualna zakonodaja na spletni strani Uradni list RS.
Primeri odlokov na spletnih straneh lokalnih skupnosti.

Cilji in kompetence:

Cilj predmeta je
- Seznaniti študenta s področjem urejanja prostora ter z zakonodajo, ki je pomembna za področje gradbeništva.

Predmetnospecifične kompetence, ki jih študent pridobi, so:
- Poznavanje in razumevanje procesa urbanizacije ter njegove ekonomske, sociološke in prostorske komponente
- Poznavanje in razumevanje vloge zemljišč v procesu urbanizacije ter razloge za njihovo varovanje in racionalno izrabo
- Poznavanje in obvladovanje metod planiranja in razvoja posameznih dejavnosti v prostoru
- Poznavanje vrste in vsebine prostorskih aktov, postopek njihovega sprejemanja ter njihov pomen pri predpisovanju lokacijskih pogojev poznavanje potrebnih ukrepov za realizacijo prostorskih aktov.

Objectives and competences:

Objectives
- To familiarise student with spatial development and with legislation connected to civil engineering.

Competences
- To know and understand the process of urbanization including its economic, social and spatial aspect to understand the role of land in the process of urbanization and the reasons for protection and rational use of land
- To know and understand the methods used in spatial planning
- To be familiar with types and content of spatial planning documents, with the procedure of adoption and with the role of spatial planning documents as legal base for the regulation of site conditions.

Predvideni študijski rezultati:

- Študent pridobi znanje s področja planiranja razvoja posameznih dejavnosti v prostoru, razume in obvlada postopke izdelave in sprejemanja prostorskih planov ter instrumente za realizacijo prostorskih aktov.
- Študent bo svoje znanje uporabil pri pripravi strokovnih podlag za izdelavo prostorskih aktov, pri pripravi programa in sami izdelavi prostorskih aktov ter pri izvajanju ukrepov za njegovo realizacijo.
- Študent bo na osnovi pridobljenih znanj in spoznanj pri tem predmetu lahko kritično presojal nerealne zahteve dnevne politike glede bodočega razvoja dejavnosti, zahteve po sodelovanju kvalificirane in laične javnosti pri sprejemanju prostorskih aktov, posamezne zahteve investitorjev in lastnikov nepremičnin v procesu realizacije prostorskih aktov, prav tako pa tudi poskuse uvajanja pogodbenih odnosov v odločanje o javno-pravnih zadevah urejanja prostora.
- Študent bo na osnovi pridobljenih znanj lahko uporabljal domačo in tujo literaturo s področja

Intended learning outcomes:

- Student acquires knowledge how to plan future spatial development and is familiar with procedures and steps in the process of making spatial planning documents.
- The acquired knowledge can be used when making expert basis for the spatial planning documents, in the process of making spatial planning documents and in the process of proposed spatial planning documents and regarding the process of implementation of spatial planning documents.
- The acquired knowledge allows the student to critically consider current spatial politics and future development in the field of spatial politics; student is able to form an opinion regarding the proposed spatial planning documents and regarding the process of implementation of spatial planning documents.
- Student will be able to use the national and international professional literature in the field of spatial planning and Spatial development - acquire, analyse and present data connected to space and spatial planning and development, prepare and

planiranja in urejanja prostora; sposoben bo zbirati, statistično obdelati in prikazovati posamezne podatke, ki so vezani na prostor; sposoben bo javno predstaviti in zagotavljati osnutke in predloge prostorskih aktov ter sodelovati v interdisciplinarno sestavljenih teamih s področja urejanja prostora.	present drafts of spatial planning documents and the ability to cooperate with other experts in multidisciplinary teams.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Študenti dobijo aktualizirano študijsko gradivo v spletni učilnici pred predavanji in vajami. Predavanja in vaje potekajo s pomočjo uporabe IKT tehnologije.	Lectures are given using visual aids and materials/literature available through E- classroom or using other publicly available data.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Ocena je pozitivna, če sta ocenjena pozitivno oba dela kolokvija. Končna ocena izpita:		Two partial written exams (colloquium). Each exam must be graded positively.
Kolokvij 1 (teoretični del)	**50 %**	1st colloquium (Theoretical part)
Kolokvij 2 (računski del)	**50 %**	2nd colloquium (Calculation exercises)
Kdor ne opravi uspešno kolokvija, piše izpit, ki je sestavljen iz		or
teoretičnega dela in	**50 %**	written exam Theoretical part
računskega dela.	**50 %**	Calculation exercises

Reference nosilca / Lecturer's references:

ŠUBIC KOVAČ, Maruška. Land Development Potential under Conditions of Sustainable Development in the Republic of Slovenia. V: HEPPERLE, Erwin (ur.). Land Management : Potential, Problems and Stumbling Blocks. Zürich: VDF Hochschulverlag AG an der ETH, 2013, str. 177-185. http://www.vdf.ethz.ch/service/3479/3480_Landmanagement_OA.pdf.

ŠUBIC KOVAČ, Maruška, WEIß, Erich. Modeli urejanja stavbnih zemljišč v Zvezni republiki Nemčiji. Ljubljana: Fakulteta za gradbeništvo in geodezijo, Institut za komunalno gospodarstvo, 2008.159 str., ilustr. ISBN 978-961-6167-62-8.

RAKAR, Albin, MESNER, Andrej, MLINAR, Jurij, ŠARLAH, Nikolaj, ŠUBIC KOVAČ, Maruška. Zaščita in ohranjanje vrednosti gospodarske javne infrastrukture. Geod. vestn.. [T iskana izd.], 2010, letn. 54, št. 2, str. 242-252, ilustr. Http://www.geodetski-vestnik.com/54/2/gv54-2_242-252.pdf.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Geodezija
Course title:	Geodetic engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	4
Civil Engineering – first cycle academic		2	4

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Dušan Kogoj

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Definicija geodezije, področja geodezije, naloge geodezije. Oblika in dimenzije Zemlje. Koordinatni sistemi, koordinate, kartografske projekcije. Geodetske mreže. Teorija geodetskih meritev (mere, osnovni pojmi teorije pogreškov in izravnave). Geodetske terestrične meritve (geodetsko orodje, merjenje kotov, merjenje dolžin, merjenje višinskih razlik, relativne merske metode). Sodobne merske tehnike in metode (TPS sistemi, 3D skenerji, GPS meritve).
Osnovni principi določanja koordinat točk (merski in koordinatni prostor – izračun). Detajlna izmera (zajem prostorskih podatkov). Načrti in karte (značilnosti, načini izdelave, vrste, uporabnost). Geodetske evidence (zemljiški kataster, kataster stavb, DMR, GIS). Splošno o geodeziji pri gradnji objektov in drugih posegih v prostor (raba prostora, pridobivanje dovoljenj za posege, izvedba posega). Osnovne metode zakoličevanja. Geodetska dela pri visokih gradnjah (zakoličba, spremljanje gradnje, ugotavljanje stabilnosti

Content (Syllabus outline):

Definition of geodesy, fields of geodesy (geodetic engineering), tasks of geodetic engineering. Shape and dimensions of the Earth. Coordinate systems, coordinates, cartographic projections. Geodetic networks. Theory of geodetic surveying (measuring, basic principles of theory of errors and adjustment). Terrestrial surveying (tools, angle measurements, distance measurements, height difference measurements, relative measurement techniques). Modern measurement systems and methods (TPS systems, 3D scanners, GNSS measurements). Basic principles of point coordinate determination (observation and coordinate space – calculation). Detail surveying (spatial data acquisition). Plans and maps (characteristics, manufacturing methods, types, usability). Geodetic records (land cadastre, building cadastre, DTM, GIS). General about surveying in building construction and other spatial planning methods (land use, obtaining land use permits, implementation of intervention). Basic stakeout

objekta – primeri iz prakse). Geodetska dela pri nizkih gradnjah (geodetske podlage, zakoličba, spremljanje gradnje, merjenja ob obremenilnih preizkušnjah, ugotavljanje stabilnosti in deformacij objekta – primeri iz prakse). Hidrografska merjenja.	methods. Geodetic works for infrastructural engineering (stakeout, construction monitoring, determination of the stability of the building – practical examples). Geodetic work for infrastructural engineering (geodetic layers, stakeout, construction monitoring, measuring the load tests, determination of stability and deformation of a structure – practical examples). Hydrographic measurements.

Temeljni literatura in viri / Readings:

Juvančič, I. 2000. Geodezija za gozdarje in krajinske arhitekte. Ljubljana, UL BF, Ljubljana.
Witte, B., Schmidt, H. 2006. Vermessungskunde und Grundlagen der Statistik für das Bauwesen. Heidelberg, Herbert Wichmann Verlag.
Kogoj, D. 2013. Geodezija za gradbenike in vodarje, FGG .pdf kopija. Ljubljana,
Učna gradiva v spletni učilnici.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Študenti se seznanijo z osnovnimi geodetskimi metodami izmere in geodetskimi proizvodi s poudarkom na praktičnih primerih uporabe geodezije v gradbeništvu in - Možnostmi sodelovanja z geodeti, za naročanje in prevzemanje geodetskih produktov. Kompetence - Poznavanje in razumevanje osnovnega izrazoslovja s področja geodezije, - Poznavanje nalog in družbene pomembnosti geodezije, - Obvladovanje praktičnih primerov uporabe geodezije v gradbeništvu.	Objectives - Students are acquainted with basic geodetic surveying methods and geodetic products with the main stress on the practical examples on application in geodetic engineering – planning, design, construction and - The possibilities of cooperation with geodetic experts, to order and to accept geodetic products. Competences - Skills and understanding of basic geodetic terminology, - Knowledge about social importance of geodesy in society, - To master practical use of geodetic services in civil engineering.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje geodezije kot vede in stroke, njenih področij, nalog in družbene pomembnosti. - Razumevanje osnovnih geodetskih postopkov meritev in obdelave merskih vrednosti s poudarkom na razumevanju rezultatov geodetskih meritev in načini interpretacije le teh. - Seznanitev s celotnim spektrom geodetskih proizvodov in razumevanje njihove uporabnosti v vodarstvu in okoljskem inženirstvu. - Pridobljeno znanje je uporabno v smislu racionalne uporabe geodezije tako s stališča investitorja kot s stališča izvajalca, predvsem v smislu zagotavljanja visoke kvalitete opravljenih del.	- Skills on geodesy and surveying as science and profession, its field of work, geodetic tasks and importance for modern society. - Understanding of basic geodetic measurements and computations with the main stress on understanding the results of geodetic measurements and their interpretation. - Getting acquainted with the whole spectrum of geodetic products and understanding of their applicability in water management and environmental engineering. - Acquired knowledge is useful for rational use of geodetic products from the investors' points of view and in the process of project realization.

- Razumevanje geodetskih postopkov in izdelkov omogoča kritično presojo kvalitete ter objektivno ovrednotenje skladnosti teoretičnih načel in praktičnega ravnanja.	- Special stress is on the understanding of geodetic products which give an opportunity for critical view (judgment) of their quality and objective valuation of accordance between theoretical principles and practical proceedings.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja: prosojnice, grafične prezentacije, demonstracije, praktični primeri Laboratorijske vaje: računalniška učilnica, uporaba terestričnih geodetskih instrumentov pri terenski izmeri. Konzultacije, spletna učilnica, internet.	Lectures: slides, graphical presentations, demonstrations, practical examples. Practical exercises: computer classroom, use of terrestrial geodetic instruments (total stations, GPS, levels) in field use. Consultations, E-classroom, internet.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit	**50 %**	Examination
Vaje	**50 %**	Tutorial

Reference nosilca / Lecturer's references:

MARJETIČ, Aleš, KREGAR, Klemen, AMBROŽIČ, Tomaž, KOGOJ, Dušan. An Alternative Approach to Control Measurements of Crane Rails. Sensors, 2012, letn. 12, št. 5, str. 5906-5918.
KREGAR, Klemen, TURK, Goran, KOGOJ, Dušan. Statistical testing of directions observations independence. Surv. rev. - Dir. Overseas Surv., 2013, letn. 45, št. 329, str. 117-125.
MARJETIČ, Aleš, KREGAR, Klemen, KOGOJ, Dušan. Geodetsko merjenje dolžin v atletiki = Geodetic measurement of distances in athletics. *Geodetski vestnik*, 2014, letn. 58, št. 2, str. 243-253.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Mehanika tal in inženirska geologija
Course title:	Soil mechanics and engineering geology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	4
Civil Engineering – first cycle academic		2	4

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
60			40	5	105	7

Nosilec predmeta / Lecturer: Boštjan Pulko, Ana Petkovšek

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljen izpit iz predmetov Fizika, Matematika I in II ter Gradiva oziroma sorodni predmeti na drugih študijih.

Prerequisites:

Passed exams in Introduction to statics and dynamics, Physics, Mathematics I and II, Construction and building materials.

Vsebina:

Pomen geologije v gradbeništvu. Zgradba Zemlje, tektonika plošč, endogeni in eksogeni procesi, osnove geološke karte in geoloških profilov. Kamnine: razdelitev kamnin po nastanku, mineralna sestava kamnin, klasifikacija kamnin v gradbeništvu, kamnine na slovenskem ozemlju. Geološka starost, tektonska dogajanja, geološka okolja, pomembna za gradbeništvo. Osnove hidrogeologije. Pobočni procesi. IG lastnosti kamnin in načini določanja. Geološke raziskave za potrebe gradbeništva. Osnovne fizikalne in mehanske lastnosti zemljin in kamnin, osnove obnašanja zemljin, laboratorijske preiskave zemljin. Klasifikacija zemljin. Standardi v geotehniki. Prvotne in dodatne napetosti v tleh. Deformacije/posedki tal. Voda v tleh, pojem pornega tlaka, efektivnih in totalnih napetosti, strujanje vode. Konsolidacija tal. Osnove stabilnosti tal in pobočij.

Content (Syllabus outline):

The role of geology in civil engineering. Earth structure, plate tectonics, endogenous and exogenous. Classification of rocks based on origin and minerals. Rocks of the Slovenian territory. Geological time scale, tectonic events, geological environments that are important for civil engineering. The basics of hydrogeology. Slope processes. Rock properties and their determination Geological survey. Basic physical and mechanical properties of soils and rocks. Laboratory soil tests. Classification of soils. Standards in geotechnical engineering. Stress in soil. Ground deformations and settlements. Water in the soil, the concept of pore pressure, effective and total stress, water seepage. Consolidation. Soil shear strength and basics of soil slope stability.

Temeljni literatura in viri / Readings:

Petkovšek, A. 2006. Skripta za predmet Inženirska geologija, Ljubljana, UL FGG.
Majes, B. 2006. Skripta za predmet Mehanika tal, Ljubljana, UL FGG.
Ribičič, M. 2002. Inženirska geologija I in Inženirska geologija II, skripta, Ljubljana, UL FNT.
Šuklje, L. 1984. Mehanika tal. Ljubljana, Univerza v Ljubljani, Fakulteta za arhitekturo, gradbeništvo in geodezijo.
Nonveiller, E. 1990. Mehanika tla i temeljenje građevina. Školska knjiga, Zagreb, str. 13-309 in 401- 455.

Cilji in kompetence:

Cilj predmeta je:
- Spoznati osnove geologije z namenom razumevanja sestave tal in procesov na površini, spoznati osnovne mineralogije in petrologije, bistvene fizikalne lastnosti kamnin in postopke njihovega preiskovanja, osnove tektonike in inženirske geologije s hidrogeologijo ter
- Osvojiti osnove mehanike tal in razumeti bistvene posebnosti v primerjavi z ostalimi področji gradbeništva (odvisnost od preiskav tal, večfaznost in nelinearnost zemljin, 3D prostor).

Kompetence:
- Sposobnost komunikacije med gradbenikom in geologom,
- Razumevanje geološke karte in geoloških elaboratov,
- Izvedba preprostih laboratorijskih preiskav,
- Razumevanje preprostih geotehničnih poročil o preiskavah tal,
- Računi napetosti, posedkov in stabilnosti tal pod preprostimi objekti in nasipi,
- Sposobnost razumevanja in kritične presoje rezultatov.

Objectives and competences:

Objectives:
- To understand the basics of geology in order to understand the ground structure and processes on the surface, to learn the basics of mineralogy and petrology, fundamental physical properties of rocks, basics of tectonics and geology engineering, hydrogeology,
- To assimilate the basics of soil mechanics and to understand the essential peculiarities of geotechnical engineering in comparison to other areas of civil engineering (dependence on ground investigations, multi-phase and non-linearity of soils, 3D space).

Competences:
- Ability to communicate with geologist,
- Conducting of simple rock and soil laboratory tests,
- Understanding simple geotechnical reports based on ground investigations.
- Calculations of stresses, settlements and the stability of the ground under engineering structures and embankments.
- Ability to understand and critically assess the results.

Predvideni študijski rezultati:

- Prepoznavanje zemljin in kamnin, pomembnih za slovenski prostor in opisovanje njihovih osnovnih lastnosti, terminologija, osnovni pojmi geologije, postopki preskušanja vzorcev zemljin v laboratoriju in na terenu.
- Razumevanje nastanka zemeljskega površja, destruktivnih procesov na površju, odnosa med starostjo kamnin, tektoniko, mineralogijo ter lastnostmi geo-materialov, razumevanje bistvenih osnovnih pojmov mehanike tal (napetosti v tleh – totalne, efektivne, porni tlaki; konsolidacija, togost, trdnost, stabilnost), razumevanje pomena preiskav tal v gradbeništvu.

Intended learning outcomes:

- Identification/recognition of soils and rocks important for the Slovenian territory, and their basic engineering properties, terminology, basic concepts of geology, laboratory and field/in-situ testing of soil and rocks.
- The formation of the earth's surface, erosion processes, the relationship between the age of rocks, tectonics, mineralogy and properties of geo-materials, basic concepts of soil mechanics (stresses in soil, total and effective stress, pore pressure, consolidation, stiffness, shear strength, slope stability), the importance of ground investigations in civil engineering.

- Komunikacija med gradbeniki in geologi, osnovno klasificiranje zemljin in kamnin, prepoznavanje erozijskih pojavov, izvedba osnovnih laboratorijskih preiskav tal, sposobnost razumevanja geološko – geotehniške dokumentacije, uporaba enačb in postopkov za računske analize napetosti v tleh, posedkov, trajanja konsolidacije.	- Communication between civil engineer and geologists, basic classification of soils and rocks, identification of erosional phenomena, conducting basic laboratory tests in/on soils, ability to understand geotechnical documentation, use of equations and computational procedures for the analysis of stresses in soil, ground settlements and time of consolidation.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, laboratorijske, terenske in seminarske vaje na praktičnih primerih, motivacija za raziskovalno/projektno delo v skupinah ali individualno, simulacije na računalniških ali fizičnih modelih, ekskurzija.	Lectures, laboratory, field and numerical exercises on practical cases, the motivation for the research/project work in groups or individually, computer or physical model simulation, fieldwork.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (kolokviji oziroma pisni izpit, izdelava računskih vaj oziroma nalog):		Two midterm exams, written report on laboratory work and practical examples:
Izdelava računskih vaj in nalog	**20 %**	Laboratory work and practical examples
Pisni in/ali ustni izpit	**80 %**	Written exam (or midterm exams)

Reference nosilca / Lecturer's references:

MAČEK, Matej, MAUKO, Alenka, MLADENOVIČ, Ana, MAJES, Bojan, PETKOVŠEK, Ana.
A comparison of methods used to characterize the soil specific surface area of clays. Appl. clay sci.. [Print ed.], oktober 2013, letn. 83-84, str. 144-152.
PETKOVŠEK, Ana, MAČEK, Matej, PAVŠIČ, Primož, BOHAR, Feri. Fines characterization through the methylene blue and sand equivalent test: comparison with other experimental techniques and application of criteria to the aggregate quality assessment. Bulletin of engineering geology and the environment, 2010, vol. 69, no. 4, str. 561-574.
PETKOVŠEK, Ana, MAČEK, Matej, MAJES, Bojan. A laboratory characterization of soils and clay- bearing rocks using the Enslin-Neff water-adsorption test = Laboratorijska karakterizacija zemljin in kamnin, ki vsebujejo glino, s preiskavo adsorpcije vode po Enslin - Neffu. Acta geotech. Slov., 2009, letn. 6, št. 2, str. 4-13.

PULKO, Boštjan, MAJES, Bojan, MIKOŠ, Matjaž. Reinforced concrete shafts for the structural mitigation of large deep-seated landslides : an experience from the Macesnik and the Slano blato landslides (Slovenia). Landslides. [Print ed.], [v tisku] 2012.
PULKO, Boštjan, MAJES, Bojan, LOGAR, Janko. Geosynthetic-encased stone columns - analytical calculation model. Geotext. geomembr. [Print ed.], feb. 2011, letn. 29, št. 1, str. 29-39.
PULKO, Boštjan, MAJES, Bojan. Analytical Method for the Analysis of Stone-Columns According to the Rowe Dilatancy Theory = Analitična metoda za analizo gruščnatih kolov z upoštevanjem Rowove teorije razmikanja. Acta geotech. Slov., 2006, letn. 3, št. 1, str. 36-45.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Statika linijskih konstrukcij
Course title:	Structural analysis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	4
Civil Engineering – first cycle academic		2	4

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		45			90	6

Nosilec predmeta / Lecturer: Tatjana Isaković, Matej Fischinger

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljeni izpiti iz predmetov Matematika I in II, Fizika, Osnove statike in dinamike, Gradiva.

Prerequisites:

Passed exams in Mathematics I and II, Physics, Introduction to Statics and Dynamics, Construction and building materials.

Vsebina:

Inženirsko modeliranje osnovnih vplivov na konstrukcije v skladu z Evrokod standardi (lastna teža, spremenljiva obtežba, sneg, veter). Osnove inženirskega modeliranja stavb (konstrukcijski elementi, podpore, stiki med elementi, material). Osnovne predpostavke in pojmi, ki jih uporabljamo pri analizi (osnovne predpostavke linearne analize, reakcije, notranje sile, pomiki, zveze med napetostmi in notranjimi silami, osnovni dogovori, tipi konstrukcij). Analiza statično določenih linijskih konstrukcij, obremenjenih s statičnimi vplivi, s posebnim poudarkom na razumevanju fizikalnega pomena naslednjih pojmov in postopkov: račun reakcij in notranjih sil, račun premikov s pomočjo enačbe upogibnice in s pomočjo principa virtualnega dela. Analiza statično nedoločenih konstrukcij s pomočjo metode sil s posebnim poudarkom na fizikalnem razumevanju postopka in količin. Analiza premikov v statično nedoločenih konstrukcijah s pomočjo principa virtualnega dela.

Content (Syllabus outline):

Engineering modelling of basic actions on building structures according to Eurocode standards: self-weight, variable actions, snow, wind. Basics of the engineering modelling of building structures (structural elements, supports, connections between structural elements, materials). Basic concepts of structural analysis (basic assumptions of the linear elastic analysis, reactions, internal forces, displacements, relationships between stresses and internal forces, basic conventions, types of structures). Analysis of statically determinate structures (trusses, frames, grids) subjected to static actions with special emphasis on the understanding of the physical significance of all analysed issues: computation of reactions and internal forces, computation of displacements based on differential equation and virtual work method. Analysis of statically indeterminate structures using force based method with special emphasis on the understanding of the physical significance of all analysed issues.

Osnove metode končnih elementov za linijske konstrukcije (osnovne enačbe, togostne matrike, obtežni vektorji, račun premikov, reakcij in notranjih sil). Osnove računalniškega programa za analizo linijskih konstrukcij. Analiza linijskih konstrukcij z računalniškim programom.	Analysis of displacements in statically indeterminate structures based on the virtual work method. Basics of the finite element analysis for trusses and frames (basic equations, stiffness matrices, load vectors, calculation of displacements, reactions and internal forces). Basics of the computer programme for the analysis of trusses, frames and grids. Analysis of trusses, frames and grids using the computer programme.

Temeljni literatura in viri / Readings:

J. Duhovnik. 2005. Statika linijskih konstrukcij I. Univerza v Ljubljani, FGG, str. 1- 66 in 103-146.
B. Lutar, J. Duhovnik. 2004. Metoda končnih elementov za linijske konstrukcije. Univerza v Mariboru, Fakulteta za gradbeništvo.
SAP 2000, Linear and Nonlinear Static and Dynamic Analysis and Design of Three-Dimensional Structures, Basic Analysis Reference Manual, Computers and Structures, 2012–izbrana poglavja, ki se nanašajo na osnovno uporabo programa.
Standardi Evrokod (SIST EN 1990, SIST EN 1991-1-1, SIST EN 1991-1-3, SIST EN 1991-1-4)
Hibbeler, R.C., Structural Analysis, Prentice-Hall International, 1999 – izbrana poglavja 1-4 in 7-11, 13-15.
Kassimali, A. 1999. Structural Analysis, PWS Publishing - ITP, izbrana poglavja 1, 3-7,11-13, 17.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Študent pridobi osnovno znanje o inženirskem modeliranju statičnih vplivov in gradbenih konstrukcij v skladu z veljavnimi standardi. - Spozna metode, na katerih temeljijo sodobni računalniški programi za analizo konstrukcij in pridobi osnovno znanje za uporabo računalniških programov za analizo enostavnih gradbenih konstrukcij. Kompetence - Študent je sposoben samostojno modelirati in analizirati enostavne gradbene konstrukcije, ki jih v celoti ali po posameznih delih lahko analiziramo kot linijske ravninske konstrukcije. - Pozna sodobne metode za analizo konstrukcij in zna uporabljati računalniške programe za analizo enostavnih gradbenih konstrukcij.	Objectives - Students gain basic knowledge about the engineering modelling of actions on building structures and about the modelling of building structures according to relevant standards. - They gain fundamental knowledge about the procedures, which are the basis for computer programmes for the analysis of structures. They obtain the basic skills for the use of these programmes. Competences - Students obtain sufficient level of skills and confidence in analysing basic types of structures from the engineering perspective. They are able to model and analyse the basic types of structures (frames, trusses and grids). - Students understand the fundamentals of the procedures, which are the basis for computer programmes for the analysis of structures. They are able to use these programmes and to control and analyse the results of these programmes.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje - principov inženirskega modeliranja statičnih vplivov (ali vplivov, ki jih običajno modeliramo kot statične), ki delujejo na enostavne gradbene konstrukcije - principov inženirskega modeliranja enostavnih gradbenih konstrukcij - poenostavitev pri modeliranju konstrukcij in vplivov na konstrukcije - metod za račun učinkov statičnih vplivov v tipičnih enostavnih ravninskih linijskih konstrukcijah - hitrih postopkov za račun učinkov vplivov v tipičnih enostavnih ravninskih linijskih konstrukcijah - teorije, na kateri temeljijo računalniški programi za račun gradbenih konstrukcij (zlasti metode končnih elementov za linijske konstrukcije). - fizikalnega pomena podatkov in rezultatov analiz enostavnih linijskih ravninskih gradbenih konstrukcij - kontrole smiselnosti rezultatov analiz enostavnih gradbenih konstrukcij z računalniškimi programi. - odziva enostavnih gradbenih konstrukcij pri različnih vrstah statičnih vplivov. - Spretnost uporabe računalniških programov za analizo enostavnih gradbenih konstrukcij, obremenjenih s statičnimi vplivi. - Spretnost samostojne uporabe standardov, domače in tuje literature.	Knowledge and understanding of: - basic principles of engineering modelling of static actions on buildings and building structures. - simplifications that are typically applied during the engineering modelling of actions and structures. - procedures for the calculations of effects (reactions, internal forces, displacements, …) of actions on frames, trusses and grids. - fast and confident calculations of effects (reactions, internal forces) of actions on basic statically determinate structures (simply supported beams, cantilever beams, etc.). - procedures, which are the basis for computer programmes for the analysis of structures. - physical significance of quantities and procedures, which are used for the analysis of buildings. - methods for the control of analyses and the results of the analyses with computer programmes with special emphasis on the physical significance. - Use of the computer programmes for the analysis of structures. - Ability to analyse building structures using computer programmes and ability to control and analyse the output data. - Independent use of standards and literature in Slovene and foreign language.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje	Lectures and tutorials

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Kolokvij	**40 %**	Mid-term exam
Pisni izpit	**60 %**	Exam
Obe oceni morata biti pozitivni		Both parts should be positive
Če kolokvij ni opravljen s pozitivno oceno:		If mid-term exam is negative, then
Pisni izpit	**100 %**	the exam

Reference nosilca / Lecturer's references:

VIDRIH, Zlatko, FISCHINGER, Matej, ISAKOVIĆ, Tatjana. Numerical investigation on smart magnetically controlled elastomeric bearings. J. vib. Control, nov. 2012, letn. 18, št. 13, str. 2073-2084, ilustr., doi: 10.1177/1077546311429060.

ISAKOVIĆ, Tatjana, FISCHINGER, Matej. Pojednostavnjene nelinearne metode proračuna betonskih mostova = Simplified nonlinear method for the analysis of concrete bridges. Građevinar (Tisak), 2009, letn. 61, št. 7, str. 625-633, ilustr.
FISCHINGER, Matej, KRAMAR, Miha, ISAKOVIĆ, Tatjana. Cyclic response of slender RC columns typical of precast industrial buildings. Bulletin of earthquake engineering, avgust 2008, letn. 6, št. 3, str. 519-534, graf. Prikazi.

ISAKOVIĆ, Tatjana, FISCHINGER, Matej, ZEVNIK, Jaka. Response of structures isolated with elastomeric bearings subjected to low-intensity earthquakes. Int. J. eng. Model., 2006, št. 1-4, letn. 19, str. 55-61, ilustr.
ISAKOVIĆ, Tatjana, BEVC, Lojze, FISCHINGER, Matej. Modeling the Cyclic Flexural and Shear response of the R. C. Hollow Box Columns of an Existing Viaduct. Journal of earthquake engineering - JEE, 2008, št. 7, letn. 12, str. 1120-1138, ilustr., doi: 10.1080/13632460802003587.
FISCHINGER, Matej, ISAKOVIĆ, Tatjana, KANTE, Peter. Implementati on of a macro model to predict seismic response of RC structural walls. Comput. Concr. Int. J. (Print), 2004, vol.1, no. 2, str. 211-226, graf. prikazi.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Organizacija gradbenih del in poslovanje
Course title:	Organization and management of construction works

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	4
Civil Engineering – first cycle academic		2	4

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		45			90	6

Nosilec predmeta / Lecturer: Jana Šelih

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Temeljni pojmi s področja organizacije, zgodovina in razvoj organizacije; vloga, pomen in medsebojni odnosi posameznih udeležencev v procesu gradnje; osnovni viri za graditev; proizvodni faktorji, produktivnost in ekonomičnost gradnje; oblikovanje tehnološkega procesa osnove normiranja in plačevanja dela; osnove določanja cene gradbenega objekta (gradbene kalkulacije) in obračuna; študije dela in časa; osnove zagotavljanja kakovosti v gradbeni proizvodnji, industrializacija gradbeništva; projekt organizacije gradnje; predhodna preučevanja, pripravljalna dela, ureditev gradbišča; organizacija vzdrževanja in prenove gradbenih objektov; proces graditve objekta od zasnove do konca življenjske dobe, spremljajoča zakonodaja; načela planiranja in vodenja, predstavitev metod planiranja; metoda mrežnega planiranja; izdelava spremljajočih planov virov in stroškov.	Fundamental concepts from the field of organisation; role, importance and relationships among construction project stakeholders; resources for construction process; production factors, productivity, economics of construction; design of technology process; fundamentals of work productivity and payment of work; fundamentals of building/structure price determination and payment options; time and motion studies. Fundamentals of quality assurance in construction industry, industrialisation of construction. Organisation of construction project; preliminary investigation, preparation works, construction site organisation building/structure maintenance and refurbishment management life cycle of building/structure; relevant legislature fundamentals of planning and management, scheduling and planning techniques; critical path method resource and cost planning.

Temeljni literatura in viri / Readings:

E. Rodošek. 1988. Osnove organizacije v gradbeništvu. Ljubljana, UL FGG.
E. Rodošek. 1984. Operativno planiranje. Ljubljana, UL FGG.
M. Pšunder. 2009. Operativno planiranje. Maribor, UM FG.

Cilji in kompetence:

Cilji
- Seznaniti študente z osnovami organizacijske vede kot izhodišče za uspešno delovanje gradbenega podjetja.
- Študentje se seznanijo s posebnostmi gradbene proizvodnje ter s procesnim pogledom na proizvodnjo, spoznajo povezavo in razmejitev tehnoloških in organizacijskih ukrepov, pomen organizacije v procesu graditve objektov.
- Študentje spoznajo metode za oblikovanje in spremljanje dela (osnove študija časa in dela, normiranja in plačevanja dela) ter osnove določanja cene gradbenih objektov.
- Osvojijo osnove planiranja in vodenja projektov.

Kompetence
- Sposobnost povezovanja znanja s področja organizacije in tehnologije
- Študent zna uporabiti osvojeno znanje pri vodenju del od zasnove do uporabe objekta
- Zna praktično uporabiti osnovna znanja o planiranju in vodenju gradbenega projekta ter ta znanja ustrezno nadgraditi.

Objectives and competences:

Objectives
- To familiarize students with fundamentals of organisation theory, as the starting point for successful operation of a construction enterprise.
- Students get acquainted with specific features of construction production and process considering production, get to know links and divisions of technological and organisational actions, and the importance of organisation within construction process.
- To make students familiar with methods for the design and monitoring of work (fundamentals of motion and time studies, norms and payment of work), and basics of the determination of price for structure as a whole.
- Fundamental knowledge from the field of project planning and management needs to be acquired.

Competences
- Student is able to link the knowledge from the field of organisation and technology
- Is able to use the acquired knowledge in management of works, from the conception stage to the use of the structure
- Is able to use the fundamental knowledge from the field of project management in practice, and is able to upgrade this knowledge in an appropriate manner

Predvideni študijski rezultati:

- Poznavanje organizacije gradbenega podjetja in faz gradbenega projekta
- Poznavanje metod študija dela in časa,
- Poznavanje osnov normiranja in plačevanja del ter določanja cene gradbenega objekta,
- Poznavanje osnovnih tehnik terminskega in finančnega planiranja projektov v gradbeništvu ter metod nadzora in spremljanja njihove realizacije.
- Sposobnost povezovanja pridobljenega znanja z gradbeno prakso
- Uporaba pridobljenega znanja v nadaljevanju študija na 2. stopnji.
- Refleksija o razmerju med organizacijo in tehnologijo gradbenih del in o razmerju med pridobljenim znanjem in prakso.

Intended learning outcomes:

- Knowledge of a construction company organisation
- Knowledge of motion and time studies
- Knowledge of work norms and payment options and determination of price of a total building/ structure
- Knowledge of fundamentals of project scheduling and financial planning in construction, and surveying and following–up the execution of a project.
- Ability to combine the acquired knowledge with practice in construction field;
- Use of acquired knowledge on the graduate (2nd cycle) studies level.
- Reflexion on the relationship between organisation and technology of construction works and on the

- Študent se pri predmetu nauči povezovati vsebine iz različnih področij v celoto (sinteza znanja).	relationship between acquired knowledge and practical experience - Student learns to link and combine acquired knowledge from various scientific disciplines into a whole (knowledge synthesis).

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in seminarske vaje.	Lectures and seminar tutorial.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Računski del izpita	**50 %**	Computational part of exam
Teoretični del izpita	**50 %**	Theoretical part of exam

Reference nosilca / Lecturer's references:

ŠIJANEC-ZAVRL, Marjana, ŽARNIĆ, Roko, ŠELIH, Jana. Multicriterial sustainability assessment of residential buildings. Ukio technol. ekon. vystym. (Spausd.). Print ed., 2009, letn. 15, št. 4, str. 612-630, ilustr. Dostopno na : http://www.tede.vgtu.lt/en/lt/3/NR/PUB/20453.

ŠELIH, Jana, KNE, Anžej, SRDIČ, Aleksander, ŽURA, Marijan. Multiple-criteria decision support system in highway infrastructure management. Transport (Vilnius (Spausd.)). [Print ed.], 2008, letn. 23, št. 4, str. 299-305, ilustr. Dostopno na: http://www.transport.vgtu.lt./upload/tif_zur/2008-4- selih_kne_srdic_zura.pdf, doi: 10.3846/1648-4142.2008.23.299-305.

ŠELIH, Jana. Environmental management systems and construction SMEs : a case study for Slovenia. J. civ. eng. manag.. Tiskana izdaja, 2007, letn. 13, št. 3, str. 217-226.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Stavbarstvo II
Course title:	Buildings II

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2	4
Civil Engineering – first cycle academic		2	4

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			15		45	90

Nosilec predmeta / Lecturer: Mitja Košir

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljen izpit iz predmeta Stavbarstvo I oz. osvojena ustrezna primerljiva znanja.

Prerequisites:

Passed exam in Buildings I or a similar comparable course.

Vsebina:

Geneza iz funkcionalnih shem, sistemov in križanj do načrta in opisa za izvedbo. Splošno fasadni pas – vertikalni in horizontalni, po vrstah stavb, iteracijski postopek do merila 1:20. Križanja: zunanja stena – streha, zunanja stena – medetažna konstrukcija, zunanja stena – tla na terenu, streha – notranja delitev, notranja delitev – medetažna konstrukcija, tla na terenu – notranja delitev, neprozorni – prozorni konstrukcijski sklop, preboji, dimniki, zračniki. Linijske toplotne izgube (kondukcija). Prenos izbranih sistemov iz križanj konstrukcijskih sklopov iz merila 1:20 na merilo 1:5 do 1:1. Izračun prehoda toplote in difuzije vodne pare (stacionarno). Dimenzioniranje TI in parne ovire.

Content (Syllabus outline):

Genesis of building envelope from the functional schemes, systems, and constructional complexes contacts to the description for execution. Façade section - vertical and horizontal, according to building types, iterative design process to the scale of 1:20. Constructional complexes contacts (crossings), by type: external wall - roof, external wall – internal floor, external wall – ground floor, roof – internal wall, internal wall – internal floor, ground floor – internal wall, opaque elements – transparent elements (windows, doors,…), chimneys, vents … Linear heat losses (conduction). Detailed treatment of selected parts of the façade section. Transfer from 1:20 scale to 1:5 and/or 1:1 scale – detailing. Calculation of heat transfer and water vapour diffusion using appropriate computer software (1D, steady state method). Dimensioning of thermal insulation and water vapour barrier.

Temeljni literatura in viri / Readings:

Krainer, A. Strehe. 2002. Modul 1, Konstrukcijski sklopi 4. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Krainer, A. Sistem. 2002. Modul 1, Konstrukcijski sklopi 1. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Neufert, E. 2002. Projektiranje v stavbarstvu : osnove, standardi, predpisi za konstrukcije, gradnja, oblikovanje, potrebni prostor, namembnost prostorov, mere zgradb, prostorov in opreme – s človekom kot merilom in ciljem : priročnik za projektante, izvajalce in študente. Ljubljana, Tehniška založba Slovenije.
Deplazes Andrea, Constructional architecture: materials, processes, structures: a handbook. 2nd ed. Birkhauser. 2008. Področna zakonodaja
Gradivo dostopno tudi na : http://kske.fgg.uni-lj.si/
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

- Namen predmeta je z uporabo analize identificiranih funkcij bivalnega in delovnega prostora doseči razumevanje principov delovanja posameznih konstrukcijskih sklopov in stavbe kot celote.
- Razumevanje osnovnih principov študenta vpne v proces inženirskega načrtovanja, konkretizacija abstraktnih konceptov pa oblikuje povezavo s prakso.

Kompetence:
- Sposobnost uporabiti iz metodologije izpeljani iteracijski postopek od abstraktnega h konkretnemu in obratno, 1. na splošno zasnovanih modelih in 2. na konkretnem izbranem primeru
- Obvladanje znanja, tehničnih spretnosti in inovacijske sposobnosti za dvig kakovosti projektov na ravni grafičnega predpisa za izvedbo
- Študent pozna konstitutivne elemente in procese, ki definirajo položaj umetnega okolja v naravnem okolju z upoštevanjem principa kontinuuma prostora in časa
- Sposoben je oblikovati kontekstne sheme na ravni identifikacije problemov, ki izhajajo iz funkcionalne analize aktivnih prostorov in ki so osnova za zasnovo in oblikovanje funkcionalnih con: konstrukcijskih sklopov
- Razume pojem "projekt" v okviru proizvodno potrošnega kroga
- Obvlada specifikacijo zahtev za posamezen KS, oblikovanje KS od koncepta do recepta za izvedbo in dimenzioniranje zaščitnega ovoja.

Objectives and competences:

- The purpose of this course is to use the functional analysis of living and working environment to achieve an understanding of the principles of functioning of individual constructional complexes (and the building as a whole).
- Understanding of the basic principles engages student with the process of engineering design. Concretization of abstract concepts forms a link with practice.

Competences:
- Ability to use a methodology derived from the iterative process from the abstract to the concrete, and vice versa; firstly on generally based models and secondly on selected specific cases,
- Mastery of the profession specific knowledge, technical skills and innovative capabilities to improve the quality of projects at the level of project design specifications.
- Student is acquainted with the constituent elements and processes that define the relation of the built environment to the natural environment, taking into account the principle of the continuum of space and time
- Student is able to create a contextual scheme for identifying the problems arising from the functional analysis of active spaces, which are the basis for the design and creation of functional zones – constructional complexes
- Student understands the concept of "project" in the framework of the greater socio-economic context
- Student is able to independently design and specify the structure of specific constructional complexes from design concept to final description for execution.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Sposobnost načrtovanja, dimenzioniranja in analize zaščitnih funkcij v fasadnem pasu v odvisnosti od zahtev notranjega bivalnega in delovnega okolja ter razmer v zunanjem, naravnem okolju. - Razumevanje iteracijskega procesa inženirskega načrtovanja kot virtualne simulacije izvedbe v naravi na poti od abstraktnega do konkretnega. - Uporaba predstavljenih postopkov pri načrtovanju celovitega stavbnega ovoja. Kritična ocena izdelanih projektov in proizvodov. - Osnovno izhodišče za doseganje posamičnih ciljev in končnega cilja v naravi optimalno delujočega stavbnega sistema v okviru obravnave fasadnega pasu je, da študent na vsaki stopnji reševanja problema, kjer sta funkcionalno povezana morfologija (od abstraktnega h konkretnemu) in postopek (iteracijski), obvlada potek načrtovanja.	- Ability to design, analyse and specify functions of the entire building envelope as well as of the specific constructional complexes in relation to the requirements of the internal living and working environment as well as to the climatic conditions in the external environment. - Understanding the iteration process of engineering design as a virtual simulation of building from abstract towards concrete solutions. - Using the outlined procedures in the design of building envelope. Critical assessment of projects and building products. - The starting point of achieving the intermediate targets as well as the final goal of an optimally functioning building system in the context of constructional complex design is that at each stage of problem solving, which are functionally related to morphology (from the abstract to the concrete) and process (iterative) students know where they are, what are they doing and what to do.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, laboratorijske vaje.	Lectures, tutorial work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Laboratorijske vaje	**70 %**	Tutorial work
Pisni izpit:	**30 %**	Written exam

Reference nosilca / Lecturer's references:

KOŠIR, Mitja, KRAINER, Aleš, KRISTL, Živa. Integral control sistem of indoor environment in continuously occupied spaces. Autom. constr.. [Print ed.], 2012, letn. 21, št. 1, str. 199-209, ilustr., doi: 10.1016/j.autcon.2011.06.004.

KOŠIR, Mitja, KRAINER, Aleš, DOVJAK, Mateja, KRISTL, Živa. Automatically controlled daylighting for visual and nonvisual effects. Light. res. technol. (2001, Print). [Print ed.], 2011, letn. 43, št. 4, str. 439- 455, ilustr., doi: 10.1177/1477153511406520.

KRAINER, Aleš, KOŠIR, Mitja, KRISTL, Živa, DOVJAK, Mateja. Pasivna hiša proti bioklimatski hiši = Passive house versus bioclimatic house. Gradb. vestn., marec 2008, letn. 57, št. 3, str. 58-68, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Geotehnika
Course title:	Geotechnical engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	5
Civil Engineering – first cycle academic		3	5

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45	10		30	5	90	6

Nosilec predmeta / Lecturer: Janko Logar

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Opravljeni izpiti iz predmetov Trdnost, Mehanika tal in inženirska geologija.	Passed exams in Soil mechanics and engineering geology, Strength of materials.

Vsebina:	**Content (Syllabus outline):**
Zemeljski pritiski; mejna napetostna stanja v tleh – nosilnost tal; terenske raziskave tal; plitvo temeljenje objektov (potrebne raziskave, načrtovanje, tehnologije); gradnja objektov v odprti gradbeni jami, oporne konstrukcije za zaščito gradbene jame; globoko temeljenje objektov (tehnologije, nosilnost in posedki pilotov); kdaj temeljimo objekte plitvo, kdaj globoko; težnostne podporne konstrukcije; priprava temeljnih tal; načrtovanje in gradnja nasipov; načrtovanje in gradnja vkopov; masna bilanca zemeljskih del; osnove uporabe geosintetikov.	Earth pressures; limit stress states in the ground – bearing capacity; shallow foundations (ground investigations, design and technologies); in-situ ground investigations; construction pit, retaining structures in deep cuts; deep foundations (technologies, bearing capacity, settlements); criteria for the choice of foundation type; retaining structures; ground treatment and fundamentals of soil improvement; design and construction of embankments; design and construction of cuts; balance of soil masses in earthworks; basic concepts of the use of geosynthetics.

Temeljni literatura in viri / Readings:

Majes, B., J. Logar. 2012. Skripta za predmet Geotehnika. Ljubljana.
Šuklje, L. 1984. Mehanika tal. Ljubljana, Univerza v Ljubljani, Fakulteta za arhitekturo, gradbeništvo in geodezijo, str. 212-235 in 268-312.
Nonveiller, E. 1990. Mehanika tla i temeljenje građevina. Zagreb, Školska knjiga, str. 309-400 in 495-768.
SIST EN 1997-1, Geotehnično projektiranje – 1. del: Splošna pravila (2006)
SIST EN 1997-2, Geotehnično projektiranje – 2. del: Geotehnično preiskovanje in preskušanje (2007)
Tomlinson, M.J. 2001. Foundation design and construction. Prentice Hall, 569 str.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

- Cilj predmeta je nadgraditi osnove mehanike tal in jih uporabiti za aplikacije pri načrtovanju in izvedbi temeljev, zemeljskih del ter geotehničnih gradenj.

Kompetence

- Zna izračunati nosilnost in posedek temelja v homogenih tleh pod preprostimi objekti
- Zna geotehnično načrtovati manj zahtevne nasipe, vkope, podporne konstrukcije in rutinske temelje konstrukcij.

Objectives and competences:

- The theoretical knowledge on soil mechanics will be upgraded and used in engineering applications for the design of foundations of structures, earthworks and geotechnical works.

Competences

- Ability to assess bearing capacity and settlement in homogeneous ground under simple structures,
- Ability to perform geotechnical design of embankments, cuts, retaining structures and routine foundations.

Predvideni študijski rezultati:

- Poznavanje načel projektiranja in gradnje nasipov, vkopov, odvodnje, priprave temeljnih tal in uporabe geosintetikov; tehnologije gradnje plitvih in globokih temeljev, tehnologije izvedbe gradbene jame, podpornih konstrukcij.
- Razumevanje pojmov nosilnost tal, zemeljski pritiski.
- Razumevanje procesa geotehničnega projektiranja od raziskav preko načrtovanja, izvedbe in opazovanja izvedenih del.
- Razumevanje varnosti pri različnih geotehničnih delih, razločevanje bistvenih pogojev, ko je mogoče plitvo temeljenje oziroma je potrebno globoko temeljenje objektov.
- Razumevanje principov varovanja gradbene jame in njenega zaledja.
- Sposobnost razumevanja geotehniške dokumentacije, uporaba enačb in postopkov za računske analize vkopov, nasipov, temeljenja, načrtovanja gradbene jame, podpornih konstrukcij, uporaba računalniških programov za analize posedkov in globalne stabilnosti tal.

Intended learning outcomes:

- Student is acquainted with the principles of the design and construction of embankments, cuts, drainage, ground treatment and use of geosynthetics; construction technology of shallow and deep foundations and retaining structures.
- Understanding of bearing capacity, earth pressures
- Understanding of the process of geotechnical design from ground investigation, design calculations, execution of geotechnical works and monitoring
- Understanding of safety concept in geotechnical design. Distinguishing the main reasons for the choice of deep or shallow foundations.
- Understanding the principles of design of deep cuts for construction pits.
- Ability to read and understand geotechnical reports, to use equations and procedures for the analyses of cuts, embankments, construction pits, foundations and retaining structures. Ability to use software for the calculation of settlements and slope stability.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminar, terenski dan, računske vaje, domače delo preko spletne učilnice.	Lectures, seminar, field work, tutorials, homework using e-classroom.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Domače naloge	**10 %**	Homework
in		and
dva kolokvija	**90 %**	two midterm tests
ali		or
računski izpit	**45 %**	written exam
teoretični (ustni) izpit	**45 %**	theoretical (oral) exam

Reference nosilca / Lecturer's references:

PULKO, Boštjan, MAJES, Bojan, LOGAR, Janko. Geosynthetic-encased stone columns - analytical calculation model. Geotext. geomembr.. [Print ed.], feb. 2011, letn. 29, št. 1, str. 29-39.
KUDER, Sebastjan, LOGAR, Janko. Numerični model za analizo obnašanja tlačno obremenjenih, vtisnjenih jeklenih pilotov v Luki Koper = Numerical model for the prediction of behaviour of driven steel piles under axial compression loading in the Port of Koper. Gradb. vestn., avgust 2008, letn. 57, št. 8, str. 207-214.
ŠTRUKELJ, Andrej, ŠKRABL, Stanislav, ŠTERN, Ksenija, LOGAR, Janko. The assesment of pile shaft resistance based on axial strain measurements during the loading test. Acta geotech. Slov., 2005, letn. 2, št. 2, str. 12-23.
LOGAR, Janko, FIFER BIZJAK, Karmen, KOČEVAR, Marko, MIKOŠ, Matjaž, RIBIČIČ, Mihael, MAJES, Bojan. History and present state of the Slano Blato landslide. Nat. hazards earth syst. sci. (Print), 2005, 5, str. [447]-457.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Inženirska hidrotehnika
Course title:	Engineering hydraulics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	5
Civil Engineering – first cycle academic		3	5

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45	15	30			90	6

Nosilec predmeta / Lecturer: Andrej Kryžanowski, Matjaž Mikoš

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljen izpit iz predmetov Fizika, Matematika I in II oziroma sorodnih predmetov na drugih študijih.

Prerequisites:

Passed exams in Physics, Mathematics I and II or related courses in other study programmes.

Vsebina:

Padavine in odtok; odtok površinskih voda; vodna bilanca. Osnove rečne hidravlike; erozijske sile; pretočne hitrosti. Analiza nalivov za odvodnjo; odtočne razmere; koincidenca pojavov visokih voda v recipientih in sistemih odvodnje; zadrževanje in razbremenjevanje voda.
Visoke vode; protipoplavni ukrepi; protipoplavna gradnja objektov; presoja primerne poplavne varnosti urbaniziranih površin pred lastnimi in zalednimi padavinskimi vodami. Zajem zalednih voda: dimenzioniranje in izvedba različnih drenaž; urejanje površinskih voda: dimenzioniranje in izvedba (obcestni jarki; kanalete; prepusti); urejanje površinskih voda na zemeljskih plazovih (površinska zajetja; odprti jarki; hudourniške struge); protierozijska zaščita površin (ob cestah, ob manjših vodotokih; na gradbiščih). Osnove pregradnega inženirstva: zadrževalniki, jezovi in pregrade – zgodovinski razvoj, splošne delitve objektov po konstrukciji, prenosu obtežbe in materialu, statično-stabilitetne analize pregrad,

Content (Syllabus outline):

Precipitation and runoff: surface runoff, water balance. Fundamentals of river hydraulics; erosional forces; flow velocities. Storm analysis for drainage; runoff conditions; coincidence of floods in recipients and drainage systems; water retention and relief. Floods: flood mitigation; flood-proofing structures; assessment of adequate flood safety of urban areas against urban and catchment meteoric water. Capture of catchment water: dimensioning and execution of various drainage works; surface water management: dimensioning and execution (gutters; drain flumes; culverts); surface water management on landslides (surface abstractions; open ditches; gullies); anti-erosion surface protection (along roads, small streams; on construction sites). Fundamentals of dam engineering: reservoirs, weirs and dams – historical background, general classification of structures in terms of construction, load and material, static stability analyses of dams, gates, dam and weir structures and their function; site selection and placement of dams and weirs.

gibljivi jezovi, objekti na pregradah in jezovih ter njihova funkcija, umeščanje pregrad in jezov v okolje in prostor. Osnove izrabe vodnih sil: vloga hidroenergije v energetskem sistemu Slovenije, izračun energetske proizvodnje, objekti in oprema za hidroenergetsko izrabo, dimenzioniranje objektov male hidroelektrarne.	Fundamentals of water power exploitation: role of water power in the Slovenian power system; calculation of power generation; structures and equipment for water power use, dimensioning of small HPP structures.

Temeljni literatura in viri / Readings:

Brilly, M., Mikoš, M., Šraj, M. 1999. Vodne ujme – varstvo pred poplavami, erozijo in plazovi – univerzitetni učbenik. UL FGG, 186 str.
Brilly, M., Šraj, M. 2005. Osnove hidrologije – univerzitetni učbenik. UL FGG, 309 str. (pogl.10 "Odtok površinskih voda" str. 156-176; pogl.12 "Vodna bilanca" str. 204-217; pogl.16 "Osnove rečne hidravlike" str.284-280).
Pemič, A., Mikoš, M. 2005. Inženirska hidrotehnika – univerzitetni učbenik. UL FGG, 283 str.
Kryžanowski, A. 2012. Inženirska hidrotehnika –predstavitve s predavanj. UL FGG, 182 str.

Cilji in kompetence:	**Objectives and competences:**
Cilj - Pri predmetu se študentje seznanijo z osnovami inženirske hidravlike, inženirske hidrologije, različnimi načini odvodnjavanja površin v grajenem okolju (mestne površine, avtoceste, prometnice) in v naravni krajini (zemeljski plazovi, zaledne vode; visoke vode), osnovami pregradnega inženirstva, (načrtovanje pregrad, dimenzioniranje objektov, umeščanje v okolje in prostor) ter osnove izrabe vodnih sil. - Študentje spoznajo teoretično ozadje praktičnega reševanja s poudarkom na različnosti in posebnostih posameznih ukrepov odvodnjavanja, protipoplavne gradnje in dimenzioniranje objektov vodne infrastrukture. Kompetence - Umestitev manj zahtevnih sistemov, objektov odvodnjavanja in zajeznih objektov v prostor, - Dimenzioniranje teh objektov po enostavnejših metodah, ocena njihove stabilnosti pri vgrajevanju, ocena statične obremenjenosti in ocena nevarnosti.	Objectives - In the course the students learn about the fundamentals of hydraulic engineering, engineering hydrology, various ways of surface drainage in built-up areas (urban areas, motorways, thoroughfares) and in the natural landscape (landslides, catchments, floods), fundamentals of dam engineering (dam planning, dimensioning of structures, site selection and placement) and fundamentals of water power use. - Students learn about the theoretical background of practical problem solving, with an emphasis on the differences and specifics of measures of drainage, flood-proofing construction and dimensioning of water infrastructures. Competences - Placement of less demanding systems, drainage and dam structures - Dimensioning of such structures using simple methods, assessment of their stability in installation, assessment of static load, and risk assessment.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Iz osnov hidravlike in hidrologije izpeljano inženirsko znanje: - o možnostih izbire ustreznega načina površinske odvodnje raznih objektov in inženirskih gradenj, - o protipoplavni gradnji objektov, - za načrtovanje pregradnih konstrukcij in zadrževalnikov,	Engineering knowledge, based on the fundamental knowledge of hydraulics and hydrology - to select the adequate way of surface runoff in various structures and engineering works, - for flood proofing of structures, - for planning of dam structures and reservoirs, - for possibilities of energy potential utilisation of smaller streams.

- o možnostih izrabe energetskega potenciala manjših vodotokov.	

Metode poučevanja in učenja:	**Learning and teaching methods:**
Izdelava individualne seminarske naloge na izbrano temo z zagovorom. Izdelava računskih vaj s praktičnimi primeri iz prakse.	Elaboration of individual seminar work on a selected topic, including defence of the work. Elaboration of calculation exercises with cases from the practice.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
pisni izpit – splošni del	**40 %**	written examination – general part
seminar	**30 %**	seminar
kolokviji	**30 %**	midterm tests

Reference nosilca / Lecturer's references:

KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, UKRAINCZYK, Velimir, PLANINC, Igor. Testing of Concrete Abrasion Resistance in Hydraulic Structures on the Lower Sava River. Stroj. vestn., 2012, letn. 58, št. 4, str. 245-254, ilustr.
KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, PLANINC, Igor. Abrasion Resistance of Concrete in Hydraulic Structures. ACI mater. j., julij-avgust 2009, letn. 106, št. 4, str. 1-8, ilustr
KRYŽANOWSKI, Andrej, BRILLY, Mitja, PORENTA, Marijan, TOMŠIČ, Ladislav. Hydro potential and development opportunities in Slovenia. The international journal on hydropower & dams, 2008, letn. 15, št. 5, str. 41-46, ilustr.

SMOLAR-ŽVANUT, Nataša, MIKOŠ, Matjaž. The impact of flow regulation caused by hydropower dams on the periphyton community in the Soča River, Slovenia. Hydrological sciences journal, ISSN 0262-6667. [Print ed.], 2014, letn. 59, št. 5, str. 1032-1045.
KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, UKRAINCZYK, Velimir, PLANINC, Igor. Testing of Concrete Abrasion Resistance in Hydraulic Structures on the Lower Sava River. Stroj. vestn., 2012, letn. 58, št. 4, str. 245-254, ilustr.
KRYŽANOWSKI, Andrej, MIKOŠ, Matjaž, ŠUŠTERŠIČ, Jakob, PLANINC, Igor. Abrasion Resistance of Concrete in Hydraulic Structures. ACI mater. j., julij-avgust 2009, letn. 106, št. 4, str. 1-8, ilustr

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Jeklene konstrukcije
Course title:	Steel structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	5
Civil Engineering – first cycle academic		3	5

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		45			90	6

Nosilec predmeta / Lecturer: Primož Može , Jože Korelc

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljen izpit iz predmetov Gradiva, Trdnost, Statika linijskih konstrukcij.

Prerequisites:

Passed exams in Construction and building materials, Strength of Materials, Structural Analysis.

Vsebina:

Uvod: Kratek zgodovinski pregled izdelave jekla in razvoja jeklenih konstrukcij. Jeklo kot gradbeni material: postopki izdelave jekla, kemijska sestava, spreminjanje mehanskih lastnosti, mehanske lastnosti jekla, standardne kvalitete, označevanje in izbira kvalitete jekla.
Tehnološki postopki izdelave jeklenih konstrukcij: vrste, načini izdelave in standardni asortiman polizdelkov, tehnološki postopki obdelave jekla, varjenje, zaostale napetosti. Varnost in zanesljivost jeklenih konstrukcij: opredelitev mejnih stanj uporabnosti in mejnih stanj nosilnosti, delni varnostni faktorji.
Vezna sredstva: zvari, vijaki, zakovice, čepi.
Spoji osnovna načela projektiranja spojev, spoji v natezno in tlačno obremenjenih palicah, upogibno in torzijsko obremenjeni spoji, členkasti spoji.
Uvod v stabilnost konstrukcij: osnovna načela stabilnosti, uklon tlačenih palic, bočna zvrnitev upogibnih nosilcev, lokalno izbočenje pločevin.
Prečni prerezi jeklenih konstrukcij: razvrstitev

Content (Syllabus outline):

Introduction: A brief historical overview of steelmaking and development of steel structures. Steel as a building material: steelmaking processes, chemical composition of steel and its effect on the mechanical properties, mechanical properties of steel. Grades, labelling and choice of steel grade. Technological processes of manufacture of steel elements/structures: types and methods of manufacture and the standard assortment of semi-finished steel elements, technological processing of steel elements, welding, residual stress. Safety and reliability of steel structures: the definition of ultimate limit states and serviceability limit states, partial safety factors. Fasteners: welds, screws, rivets, studs. Connections: design of joints – basic principles, joints in elements subjected to tension / compression, moment resistance joints, hinged joints. Introduction to structural stability: basic principles of stability, flexural buckling of columns, lateral – torsional buckling of beams. Local buckling of slender plates. Cross-sections of

prečnih prerezov po kompaktnosti, posebnosti vitkih prerezov, nosilnost prečnih prerezov. Nosilni elementi jeklenih konstrukcij: tlačene palice, natezne palice in vrvi, upogibni nosilci, tlačno in upogibno obremenjene palice. Uvod v sovprežne konstrukcije: osnovna načela, elastična analiza sovprežnih nosilcev, vpliv postopnosti gradnje, plastična analiza sovprežnih nosilcev.	steel elements: cross section classification as a function of plate slenderness, specifics of slender cross-sections, bearing capacity of cross-sections. Bearing elements of steel structures: compression members, tension members, beams. Members in bending and axial compression. Introduction to composite structures: basic principles, elastic analysis of composite beams, the influence of construction phases. Plastic analysis of composite beams.

Temeljni literatura in viri / Readings:

D. Beg, A. Pogačnik. 2009. Priročnik za projektiranje gradbenih konstrukcij po evrokod standardih. Ljubljana, IZS.
ESDEP - The European Steel Design Education Programme, spletna učilnica UL FGG.
P Može, J Korelc, Študijsko gradivo - izbrane teme, spletna učilnica UL FGG.
NS Trahair, MA Bradford, David Nethercot, L Gardner, The Behaviour and Design of Steel Structures to EC3, Fourth Edition, 2008, 490 p.
F. Kržič. 1994. Jeklene konstrukcije I. Ljubljana, UL FGG, 208 str.

Cilji in kompetence:	**Objectives and competences:**
Študent bo pridobil teoretična in praktična znanja, ki mu bodo omogočila: - projektiranje enostavnih jeklenih konstrukcij, predvsem stavb - projektiranje običajnih vijačenih in varjenih spojev - opravljanje nadzora pri gradnji jeklenih konstrukcij Kompetence - Dimenzioniranje posameznih konstrukcijskih elementov jeklenih konstrukcij - Osnovna znanja s področja izdelave jeklenih konstrukcij.	Students should gain theoretical and practical knowledge, which will allow them to: - design of simple steel structures, especially buildings, - design of basic bolted and welded joints, - carry out construction supervision of steel structures Competences - Design of individual structural elements of steel structures. - Basic knowledge on the manufacturing of steel structures.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spoznati mehanske lastnosti jekla in razumeti njihov vpliv na obnašanje konstrukcij v različnih pogojih obratovanja, - Spoznati osnove tehnoloških postopkov izdelave jeklenih konstrukcij s poudarkom na varjenju, - Spoznati in razumeti obnašanje veznih sredstev in spojev, - Spoznati in razumeti obnašanje osnovnih konstrukcijskih elementov jeklenih konstrukcij, - Spoznati zasnovo jeklenih stavb in osnove tehnoloških postopkov gradnje - Poznavanje konstruiranja in dimenzioniranja vseh običajnih vrst vijačnih in varjenih spojev	- To learn about the mechanical properties of steel and to understand their impact on the behaviour of structures under different operating conditions. - To learn the basics of technological processes for the production of steel structures with emphasis on welding. - To learn and understand the behaviour of fasteners and joints. - To learn and understand the behaviour of basic structural elements of steel structures. - To learn about the design and construction of steel buildings. - Student will be able to construct and design all types of steel joints.

- Poznavanje osnov konstruiranja in dimenzioniranja konstrukcijskih elementov jeklenih konstrukcij - Ena glavnih značilnosti projektiranja konstrukcij je sprejemanje velikega števila odločitev v nizu. Na osnovi pridobljenega teoretičnega in praktičnega znanja bo študent sposoben kritične presoje posameznega problema, izločitve neustreznih rešitev in utemeljene izbire ene od ustreznih rešitev.	- Student will be able to understand, construct and design steel elements. - One of the main features of structural design is decision making. Based on acquired theoretical and practical knowledge student should be able to critically judge the individual problem, to eliminate inappropriate solutions and to justify the choice of possible solution.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predmet se izvaja v obliki predavanj in računskih vaj.	The course will consist of lectures and computational exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pravilno izdelane in urejene vaje in dva kolokvija teoretični del računski del ali Izpit: teoretični del računski del	**10 %** **50 %** **40 %** **50 %** **40 %**	Properly made exercises and two midterm exams Theoretical Practical part or exam: Theoretical part Practical part

Reference nosilca / Lecturer's references:

Može, P., Beg, D. 2014. A complete study of bearing stress in single bolt connections. Journal of Constructional Steel Research, 95: 126-140.
MOŽE, Primož, BEG, Darko, LOPATIČ, Jože. Net cross-section design resistance and local ductility of elements made of high strength steel. Journal of Constructional Steel Research, ISSN 0143-974X. [Print ed.], 2007, letn. 63, št. 11, str. 1431-1441.
KORELC, Jože, STUPKIEWICZ, Stanisław. Closed-form matrix exponential and its application in finite-strain plasticity. International journal for numerical methods in engineering, ISSN 0029-5981, 2014, letn. 98, št. 13, str. 960-987, ilustr., doi: 10.1002/nme.4653.
MELINK, Teja, KORELC, Jože. Stability of Karhunen- Loève expansion for the simulation of Gaussian stochastic fields using Galerkin scheme. Probabilistic Engineering Mechanics, ISSN 0266-8920. [Print ed.], jul. 2014, letn. 37, str. 7-15, ilustr., doi: 10.1016/j.probengmech.2014.03.006.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Osnove potresnega inženirstva
Course title:	Fundamental concepts of earthquake engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	5
Civil Engineering – first cycle academic		3	5

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			60	4

Nosilec predmeta / Lecturer: Matjaž Dolšek

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Opravljen izpit iz predmetov Trdnost, Statika linijskih konstrukcij I.	Passed exams in Strength of Materials, Structural Analysis.

Vsebina:	**Content (Syllabus outline):**
Uvod v dinamiko gradbenih konstrukcij. Dinamični odziv sistemov z eno prostostno stopnjo pri potresni obtežbi (računski model in enačbe gibanja, lastno nihanje, vsiljeno nihanje, spektri odziva). Poenostavljen način računa sistemov z več prostostnimi stopnjami pri potresni obtežbi (metoda z ekvivalentno statično obtežbo). Osnovni pojmi o potresih in potresni obtežbi (uvod, splošno o potresih, jakost potresa, potresi v prostoru in času, značilnosti gibanja tal na lokaciji, princip redukcije potresnih sil, projektni spektri). Osnovni pojmi in načela potresnoodpornega projektiranja (splošno, nosilnost in duktilnost, togost, dušenje, zasnova konstrukcij). Obnašanje gradbenih objektov med minulimi potresi (geotehnični objekti, hidrotehnični objekti, mostovi in viadukti, stavbe, industrijski objekti). Individualna seminarska naloga: Analiza enostavnega potresnoodpornega objekta.	Introduction to dynamics of structures. The dynamic response of the single-degree-of-freedom system under seismic action (computational model, equation of motion, free vibration, response under dynamic loading, response spectra). Simplified seismic analysis for multi-degree- of-freedom systems (Lateral force method). Basic terminology associated with earthquakes and seismic action (introduction, causes for earthquakes, intensity measures, earthquakes in space and time, characteristics of seismic ground motion, concept of reduction of seismic forces, the design spectrum). Basic concepts and principles of earthquake-resistant design (strength, ductility, stiffness, damping, basics for preliminary design). Behaviour of structures during past earthquakes (geotechnical and hydrotechnical structures, bridges and viaducts, buildings, precast structures. Individual seminar: Seismic analysis of a simple structure.

Temeljni literatura in viri / Readings:

P. Fajfar. 1995. Fundamentals of earthquake engineering (in Slovenian). FGG UL, 83 pp.
P. Fajfar. 1984. Dynamics of structures (in Slovenian). FGG UL, str.1-20, 27-88, 109-119, 132-144, 325-338.
M. Dolšek. 2007. Seismic analysis of simple buildings using ETABS (in Slovenian).
P. Fajfar, M. Fischinger, D. Beg, M. Dolšek, T. Isaković, M. Kreslin, M. Rozman, Z. Vidrih, B. Čermelj. 2009. Eurocode 8: Design of earthquake-resistant structures (in Slovenian). In Manual for design of structures using Eurocode 8, Eds. D. Beg and A. Pogačnik (selected chapters).
Foreign students can use literature in English after consultation with the Lecturer.
Web references EASY (Earthquake Engineering Slide Information System), IKPIR FGG, CD or www.ikpir.fgg.uni-lj.si/EASY

Cilji in kompetence:

Cilji
- Spoznati osnove dinamike gradbenih konstrukcij
- Spoznati osnovne pojme o potresih, potresni obtežbi in potresnoodpornem projektiranju.

Kompetence
- Študent pridobi občutek o posledicah potresov in se seznani z načini zaščite pred njimi.
- Pozna osnovne značilnosti dinamičnega odziva konstrukcij.
- Sposoben je grobo oceniti potresno odpornost enostavnih objektov in identificirati potresno neodporne objekte.
- Zna uporabljati enostavne postopke za račun najenostavnejših potresnoodpornih objektov.

Objectives and competences:

Objectives
- To understand the basics of structural dynamics
- To understand basic terminology about earthquakes, basic concepts of seismic action and earthquake-resistant design.

Competences
- Students will acquire a sense of the consequences of earthquakes and will be informed with the methods of earthquake mitigation.
- Student can compute dynamic response of simple structures.
- Student is able to roughly assess the seismic resistance of simple structures and identify earthquake-resistant buildings.
- Student is also capable of applying simple procedures for the seismic analysis of simple buildings.

Predvideni študijski rezultati:

- Študent se seznani s potresi in njihovimi posledicami ter z ukrepi za preprečevanje oziroma zmanjševanje posledic.
- Zave se pomembnosti problemov v zvezi s potresi in odgovornosti gradbenikov na vseh področjih njihovega delovanja.
- Razume osnovne značilnosti dinamičnega odziva konstrukcij in inženirskega modeliranja konstrukcij.
- Razume potres kot naravni pojav, nihanje tal med potresi in obnašanje raznih tipov gradbenih objektov med potresi.
- Razume nujnost sodelovanja gradbenika v začetni fazi načrtovanja objektov.
- Spozna osnovna načela zasnove potresnoodpornih objektov.
- Študent je sposoben grobo oceniti potresno odpornost enostavnih objektov in identificirati potresno neodporne objekte.

Intended learning outcomes:

- Student learns about earthquakes, their consequences on structures and the measures for preventing seismic losses.
- Student becomes aware about the problems related to earthquakes and the responsibility of engineer in the area of his work.
- Understand basic features of dynamic response of structures and engineering modelling of structures.
- Awarenes about the earthquakes as a natural phenomena and understand basics of ground motions due to earthquakes and seismic behaviour of various types of structures.
- Student understands the importance of the cooperation of structural engineer in the initial phase of design of a structure.
- Student learns the basic principles of earthquake-resistant design of structures.

- Uporablja enostavne postopke za račun najenostavnejših potresnoodpornih objektov. - Uporaba enostavnih metod analize dinamičnih problemov. - Identifikacija očitno potresno neodpornih objektov.	- Student is able to approximately assess the seismic resistance of simple buildings and identify earthquake-resistant structures. - Student can use simple methods for seismic analysis of structures. - Use of simple methods and tools for the analysis of dynamic problems. - Identification of inadequate existing buildings, which are located in earthquake prone regions.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja (na tablo, Power point, računski primeri), vaje (individualno delo).	Lectures on blackboard (theory and practical examples. Lectures using PowerPoint. Exercises in computer lab.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Vaje	**30 %**	Exercises during year
Računski del izpita	**30 %**	Written exam: Practical part
Teoretičen del izpita	**40 %**	Written exam: Theoretical part

Reference nosilca / Lecturer's references:

CELAREC, Daniel, DOLŠEK, Matjaž. Practice-oriented probabilistic seismic performance assessment of infilled frames with consideration of shear failure of columns. Earthquake eng. Struct. Dyn.. [Print ed.], jul. 2013, letn. 42, št. 9, str. 1339-1360, ilustr., doi: 10.1002/eqe.2275.

BROZOVIČ, Marko, DOLŠEK, Matjaž. Envelope-based pushover analysis procedure for the approximate seismic response analysis of buildings. Earthquake eng. Struct. Dyn.. [Print ed.] [v tisku] 2013, letn. XX, št. X, str. 1-10, ilustr., doi: 10.1002/eqe.2333.

CELAREC, Daniel, DOLŠEK, Matjaž. The impact of modelling uncertainties on the seismic performance assessment of reinforced concrete frame buildings. Eng. Struct.. [Print ed.], jul. 2013, letn. 52, št. , str. 340-354, ilustr., doi:10.1016/j.engstruct.2013.02.036.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Betonske konstrukcije
Course title:	Concrete structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	5
Civil Engineering – first cycle academic		3	5

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
60		60			120	8

Nosilec predmeta / Lecturer: Jože Lopatič

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Opravljen izpit iz predmetov Trdnost in Statika linijskih konstrukcij.

Prerequisites:

Passed exams in Strength of materials and Structural Analysis.

Vsebina:

Vrste in značilnosti betonskih konstrukcij. Mehanske in reološke lastnosti betona, mehke in prednapete armature. Izhodišča analize in dimenzioniranja elementov betonskih konstrukcij. Metoda mejnih stanj betonskih konstrukcij. Mejna nosilnost in dimenzioniranje armiranobetonskih prerezov na upogibno-osno obremenitev: enojni upogib armiranobetonskega prereza v kombinaciji z osno silo v območju velike ekscentričnosti; enojni upogib armiranobetonskega prereza v kombinaciji z osno silo v območju male ekscentričnosti. Izdelava pomožnih tabel in interakcijskih diagramov za dimenzioniranje; teoretične podlage za račun mejne nosilnosti armiranobetonskih prerezov pri dvojnem upogibu z osno silo; dimenzioniranje pravokotnih prerezov na dvojno ekscentrični tlak. Mejna nosilnost in dimenzioniranje armiranobetonskih elementov na strižno obremenitev: račun mejne nosilnosti armiranobetonskih elementov glede na prečno silo, na torzijsko obremenitev in pri preboju.

Content (Syllabus outline):

Types and characteristics of concrete structures. Mechanical and rheological properties of concrete, reinforcing steel and prestressing steel. Starting points for the analysis and design of elements of concrete structures. Limit state design of concrete structures. Ultimate resistance and design of reinforced concrete cross-sections with respect to bending moment and axial force: combined uniaxial bending and axial force with large eccentricity; combined uniaxial bending and axial force with small eccentricity. Elaboration of tables and interaction diagrams for the design of reinforced concrete cross-sections. Theoretical bases for the calculation of ultimate resistance of reinforced concrete cross-section at biaxial bending with axial compressive force. Design of rectangular cross-sections subjected to biaxial bending in combination with axial compressive force. Ultimate resistance and design of reinforced concrete elements exposed to shear, torsion and punching shear. Serviceability limit states of concrete structures. Mechanism of

Mejna stanja uporabnosti betonskih konstrukcij. Modeliranje in račun razpok armiranih in delno prednapetih betonskih konstrukcij v mejnem stanju uporabnosti. Račun pomikov armiranih in prednapetih betonskih konstrukcij z upoštevanjem vpliva razpok in reologije materialov. Načela delovanja in obnašanja prednapetih konstrukcij ter sistemi prednapenjanja. Vpliv stopnje prednapetja na obnašanje betonskih konstrukcij. Dimenzioniranje prednapetih betonskih prerezov na upogibno-osno in strižno obremenitev. Modeliranje in račun mejne nosilnosti elementov betonskih konstrukcij na podlagi nosilnih mehanizmov s tlačnimi razporami in nateznimi vezmi. Načela računa elementov nearmiranih betonskih konstrukcij. Račun mejne nosilnosti in dimenzioniranje nearmiranih betonskih elementov na upogibno-osno obremenitev. Račun mejne nosilnosti in dimenzioniranje nearmiranih betonskih elementov na strižno obremenitev. Načela armiranja elementov armiranobetonskih konstrukcij. Izvedba armiranja in detajlov armiranobetonskih konstrukcij. Izdelava opažnih in armaturnih načrtov betonskih konstrukcij.	cracking and calculation of crack widths and crack spacing in reinforced and partially prestressed concrete structures in serviceability conditions. Calculation of deflections of reinforced and prestressed concrete structures taking into account the influence of cracks and material rheology. Principles of prestressing and behaviour of prestressed structures. Prestressing systems. Influence of the level of prestressing on the behaviour of concrete structures. Design of prestressed concrete elements for bending in combination with axial force. Design of prestressed concrete elements for shear. Modelling and calculation of ultimate resistance of elements of concrete structures using strut and tie method. Principles of calculating elements of plain concrete structures. Calculation of ultimate resistance and design of plain concrete elements subjected to combined bending and axial force. Calculation of ultimate resistance and design of plain concrete elements subjected to shear force. Principles of reinforcing typical structural elements of reinforced concrete structures. Reinforcement design and detailing. Preparation of construction and reinforcement drawings for concrete structures.

Temeljni literatura in viri / Readings:

J. Lopatič, Študijsko gradivo - Betonske konstrukcije, 250 strani.
Priročnik za projektiranje gradbenih konstrukcij, IZS, 2009 (SIST EN 1990, SIST EN 1992-1-1, SIST EN 1992-1-2, SIST EN 1998-1)
Structural Concrete, Vol. 1. 1999, str. 1-109, fib (CEB-FIP).
Ustrezni deli standardov za gradbene konstrukcije Evrokod 0, Evrokod 2, Evrokod 8 (SIST EN 1990, SIST EN 1992-1-1, SIST EN 1992-1-2, SIST EN 1998-1)
G. Rombach. 2002. Spannbetonbau. John Wiley & Sons , str.127-194, 335-445.

Cilji in kompetence:	**Objectives and competences:**
Cilj - Študentje spoznajo mehanske in reološke lastnosti osnovnih materialov, nosilne mehanizme in načine računskega modeliranja obnašanja armiranih in prednapetih betonskih konstrukcij pod vplivom kratkotrajne in dolgotrajne obtežbe. - Študentje spoznajo kriterije za zagotavljanje trajnosti in uporabnosti betonskih konstrukcij ter računske modele za račun razpok in pomikov razpokanih betonskih konstrukcij. Kompetence - Študent pozna principe računskega modeliranja in dokazovanja varnosti proti porušitvi,	The objective of the course is to introduce students into mechanical and rheological properties of basic materials, load-bearing mechanisms and principles of computational modelling of the behaviour of reinforced and prestressed concrete structures under the influence of short-term and long-term loading. Students also learn the criteria for assuring durability and serviceability of concrete structures as well as computational models to calculate crack widths, crack spacing and deflections of cracked concrete structures. Competences: - Student learns the principles of computational modelling and verification of structural safety (ULS),

- Zna dimenzionirati armiranobetonske prereze na upogibno, osno in kombinirano obremenitev, na obremenitev s prečno silo, torzijo ali njuno kombinacijo ter glede preboja, - Pozna osnove dimenzioniranja prednapetega betona in nearmiranega betona, - Sposoben je izračunati širino in medsebojno oddaljenost razpok armiranih in prednapetih betonskih elementov, - Sposoben je računsko določiti pomike armiranih in prednapetih betonskih konstrukcij z upoštevanjem vpliva razpok in reologije materiala. - Pozna osnovne principe učinkovitega konstruiranja armature in izdelati armaturni načrt enostavnih konstrukcijskih elementov.	- Student learns to design reinforced concrete cross-sections to combined bending and axial force, loaded by shear force, torsion or the combination of both, and for punching, - Student knows the basics of the design of prestressed concrete and plain concrete, - Student is capable to calculate the width and spacing of cracks in reinforced and prestressed concrete elements, - Student is capable to calculate the deflections of reinforced and prestressed concrete structures considering the influence of cracks and material rheology, - Student knows the basic principles and rules of effective reinforcing and detailing of concrete structures and is able to create reinforcement drawings for simple structural elements.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje mehanskih in reoloških lastnosti osnovnih materialov betonskih konstrukcij. - Poznavanje tehnične regulative s področja betonskih konstrukcij. - Razumevanje možnih načinov zagotavljanja potrebne varnosti betonskih konstrukcij. - Razumevanje računskih modelov za določitev nosilnosti oziroma dimenzioniranje prečnih prerezov in elementov armiranobetonskih konstrukcij. - Razumevanje vpliva duktilnosti konstrukcijskih elementov na varnost konstrukcije kot celote. - Razumevanje vzrokov pojava razpok ter poznavanje ukrepov za zmanjšanje širine razpok. - Razumevanje možnih načinov zagotavljanja potrebne trajnosti in uporabnosti betonskih konstrukcij. - Razumevanje temeljnih načel prednapetega betona. - Razumevanje nosilnih mehanizmov elementov iz nearmiranega betona. - Razumevanje osnovnega postopka dimenzioniranja prednapetih betonskih prerezov. - Uporaba postopkov za račun širine in medsebojne razdalje razpok. - Uporaba postopkov za račun pomikov armiranobetonskih konstrukcij z upoštevanjem vpliva reologije materiala in razpok. - Uporaba postopkov dimenzioniranja nearmiranih betonskih elementov. - Razumevanje in poznavanje temeljnih načel za armiranje.	- Knowledge of mechanical and rheological properties of basic materials of concrete structures. - Knowledge of the technical regulations from the area of concrete structures. - Understanding the possible methods for providing the safety of concrete structures. - Understanding the computational models to define the ultimate resistance or design of cross-sections and elements of reinforced concrete structures. - Understanding of the influence of ductility of structural elements on the safety of structure as a whole. - Understanding of the cracking mechanisms and knowledge of the measures to reduce crack width. - Understanding of the possible ways how to provide the necessary durability and serviceability of concrete structures. - Understanding of the basic principles of prestressed concrete. - Understanding of loading mechanisms of elements made of plain concrete. - Understanding of the basic procedure for the design of prestressed concrete cross-sections. - Application of the procedures for the calculation of crack widths and spacing. - Application of the procedures to calculate deflections of reinforced concrete structures by considering the influence of material rheology and cracks. - Application of procedures for the design of plain concrete elements.

	- Understanding and knowledge about the basic principles of reinforcing.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in seminarske vaje v klasični učilnici.	Lectures and seminar tutorials in classical lecture room.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Vaje	**20 %**	Tutorials
Računski del izpita	**40 %**	Computational part of exam
Teoretični del izpita	**40 %**	Theoretical part of exam

Reference nosilca / Lecturer's references:

SAJE, Franc, LOPATIČ, Jože. A Time-Dependent Analysis of Reinforced Prestressed and Composite Concrete Structures, Int. j. eng. model., 1997, vol. 10, str. 17-24.
LOPATIČ, Jože. Vpliv dolgotrajnih visokih nivojev napetosti na tlačno trdnost betona, Gradbeni vestnik, Ljubljana, ISSN 0017-2774, April 2003, letn. 52, strani 74-80, 2003.
SAJE, Drago, LOPATIČ, Jože. The effect of constituent materials on the time development of the compressive strength of high-strength concrete. Mag. Concr. Res., 2010, letn. 62, št. 4, str. 291-300, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Praktično usposabljanje
Course title:	Practical training

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Obvezni strokovni / Obligatory professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
6				80	34	4

Nosilec predmeta / Lecturer: Andreja Istenič Starčič

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Študent se seznani in opravlja delo, ki ga opravlja diplomant tega študija v praksi. Še predvsem se: seznani z organizacijsko strukturo gradbenega podjetja; seznani se z aktualnim dogajanjem v gradbenem podjetju; dela na terenu – aktualnem gradbišču, oziroma v pisarni; opravi manj zahtevna dela na aktualnem projektu.

Content (Syllabus outline):

Student is introduced to performance of work done by graduate in practice, especially:
learning about the organizational structure of a construction company; getting familiar with current developments in a construction company;
on-site field work, or in the office - less demanding work on current project.

Temeljni literatura in viri / Readings:

Viri so izbrani v sodelovanju z mentorjem praktičnega usposabljanja glede na vsebine, ki so predpisane in z njimi razpolaga organizacija, ki izvaja praktično usposabljanje. /
Resources are selected in collaboration with the supervisor of practical training in relation to the contents prescribed and disposed of by the organization conducting the practical training.
Interna in druga gradiva v delovni organizaciji.
Smernice za praktično usposabljanje na Univerzi v Ljubljani, Ljubljana, september 2007, dostopno na spletu.
Govekar, Okoliš et.al. 2010. Praktično usposabljanje študentov v delovnih organizacijah in primeri dobrih praks. Ljubljana, UL FF, Center za pedagoško izobraževanje.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Motivacija ter spoznavanje dela gradbenega inženirja v praksi ter prenos in uporaba znanj v praksi. - Spoznati delovno okolje, opremo in se aktivno vključi v posamezne delovne procese. - Študentu se omogoči samoevalvacijo kompetenc in dejavnikov, ki podpirajo procese poklicne identifikacije v povezavi akademskega okolja in delovnih okolij. - Študent spozna značilnosti učenja na delovnem mestu in značilnosti delovnih okolij ter značilnosti opazovanja in registriranja delovnih procesov. Kompetence, ki si jih študent pridobi s strokovno prakso, so pogojene z delovnim okoljem in so lahko s področij: - projektiranja gradbenih konstrukcij, - izvedbe gradbenih del, - kontrole kakovosti, nadzora, - urejanja stavbnih zemljišč, - inženiringa idr.	Objective - Motivation and learning about the work of civil engineer in practice, transfer and application of knowledge in practice - Students learn about the work environment, equipment and actively participate in certain working processes. - Students are facilitated to do self-evaluation of competences and factors that support the processes of professional identification in relation to the academic and work environments. - Students learn about the characteristics of learning on the job site and the characteristics of working environments and features of observation and registration of workflows. Competences depend on the working environment and may be in the areas of: - design of building structures, - construction - quality control, supervision, - building land management, - engineering, etc.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent pridobi praktična znanja in izkušnje na področju nalog in storitev gradbene stroke. - Prenos in uporaba znanj študijskih predmetov v delovnem okolju praktičnega usposabljanja. - Lažje in hitrejše uvajanje v delo po končanem študiju, razumevanje različnih subjektov v gradbeništvu in njihove vloge v družbi. - Sinteza pridobljenih znanj tekom študija z aktualnimi delovnimi nalogami oz. raba aktualnih znanj in pripomočkov pri izpolnjevanju nalog, ki jih opravlja organizacija, v kateri poteka praktično usposabljanje. - Pridobljena znanja mu koristijo tudi pri izdelavi diplomske naloge. - Omogočena je sinteza znanj, razvijanje komunikacijskih spretnosti in timskega dela. - Študent zna ovrednotiti svoje delo glede na zastavljene in dosežene cilje. Strokovno delo reflektira na osnovi zbranih informacij. - Študent razvija kompetence za načrtovanje lastne kariere in samoevalvacijo znanja in kompetenc.	- Students acquire practical knowledge and experience in the field of tasks and services of the profession. - Transfer and application of knowledge from courses in the study programme to the workplace of practical training. - Efficient introduction after graduation, understanding of different entities in the field and their role in society. - Synthesis of knowledge acquired during the course of the current work tasks and application of current knowledge and tools in fulfilling the tasks carried out by the organization where training is being conducted. - Obtained knowledge is useful in the preparation of the final thesis. - Practical work enables the synthesis of knowledge, communication skills and teamwork. - Student is able to evaluate own work against the objectives and targets achieved. - Professional work reflects on the basis of the information collected. - Student develops skills for planning his/her career and self-assessment of skills and competencies.

Metode poučevanja in učenja:	Learning and teaching methods:
Terensko delo, mentorstvo, demonstracije, konzultacije, pisanje in vodenje dnevnika in portfolia prakse.	Field work, mentoring, demonstrations, consultations, writing and managing diary and portfolio practices.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Dnevnik prakse	**40 %**	Log book
Portfolio	**30 %**	Portfolio
Ustni zagovor	**30 %**	Oral presentation
Predmet se ocenjuje z "opravil" / "ni opravil".		The course is assessed with "passed" / "failed ".

Reference nosilca / Lecturer's references:

ISTENIČ STARČIČ, Andreja. Students' perception of field placement in professional competency and identity construction : transdisciplinary study in education, health and engineering. V: MILLWATER, Jan (ur.), EHRICH, Lisa Catherine (ur.), BEUTEL, Denise (ur.). Practical experiences in professional education : a transdisciplinary approach. Mt Gravatt: Post Pressed, 2011, str. 155-170, tabele.
FOUCHAL, Farid, HASSAN, Tarek M., BLEICHER, David, ISTENIČ STARČIČ, Andreja. Industrialised, Integrated, Intelligent Construction Training Concept. V: WALLIS, Ian (ur.). Industrialised, Integrated, Intelligent Construction : I3con, Handbook 1. Berkshire: Bsria: I3con, 2009, str. 184-193.
MIKOŠ, Matjaž, JAKLJIČ, Samo, ISTENIČ STARČIČ, Andreja. Statistično-demografska analiza praktikantov študentov geodezije v Sloveniji v obdobju 2008-2011 = Statistical and for planning his/her career and self-assessment of skills and competencies.demographic analysis of geodesy students apprentices in Slovenia in the period from 2008 to 2011. Geod. vestn.. [Tiskana izd.], sep. 2012, letn. 56, št. 3, str. 513-556, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Diplomsko delo
Course title:	Diploma work

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type:	Obvezni strokovni / Obligatory professional
Univerzitetna koda predmeta / University course code:	

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
				75	75	5

Nosilec predmeta / Lecturer:	učitelj na študijskem programu / teacher at the study programme

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Odobrena tema in mentor s strani Študijskega odbora Oddelka za gradbeništvo skladno s Pravilnikom o študiju na I. in II. stopnji.	Approved topic and supervisor by the Study Board of the Department of Civil Engineering according to the Rules of 1st and 2nd cycle studies.

Vsebina:	**Content (Syllabus outline):**
Diplomsko delo se izdela pod mentorstvom izbranega učitelja. Delo se javno predstavi ob zaključku študija. Vsebovati mora: - Uvod - Delovno hipotezo - Pregled virov - Material in metode - Rezultate - Razpravo - Povzetek Praviloma se v nalogi obravnavajo praktični strokovni problemi ali raziskovalne in razvojne teme s področja gradbeništva ter podajajo rešitve, do katerih pridejo s pomočjo študija in izsledkov lastnega raziskovalnega dela.	Thesis is made under the supervision of a selected teacher. The work is presented in public at the end of the study. It must include: - Introduction - The working hypothesis - Overview of sources - Material and methods - Results - Discussion - Summary The diploma will ordinarily deal with practical professional problems or research and development themes from the area of civil engineering that provide further solutions which come out from the study and from the results of students' own work.

Temeljni literatura in viri / Readings:

Literatura s področja vsebine diplomskega dela.
T. Koler-Povh, G. Turk: Navodila za oblikovanje visokošolskih del na FGG in navajanje virov, FGG UL, Ljubljana, 2011, 39 strani, priloge. Dostopno na:
http://www3.fgg.uni-lj.si/fileadmin/user_upload/UL_FGG_-_Pr_10_Navodila_za_oblikovanje_visokosolskih_del_na_UL_FGG_2011_07.pdf.
Literature from the field of the contents of the thesis.
Instructions for creating higher part of the Faculty of Civil and Geodetic Engineering and citation of sources.

Cilji in kompetence:

- Študent uporabi pridobljena znanja v širši strokovni ali razvojni nalogi, skladni z odobreno temo diplomske naloge.
- Pod mentorstvom izdela koncept naloge, v kateri so opredeljeni namen, cilji, metode in viri za izdelavo naloge.
- Pokaže sposobnost pisnega izražanja v slovenskem jeziku s smiselno uporabo strokovne terminologije.
- Razvijanje samostojnega, kritičnega in etičnega načina dela ter sinteza v okviru študija pridobljenih znanj.
- Z javno predstavitvijo naloge pridobi komunikacijske spretnosti in sposobnosti.

Objectives and competences:

- Students use the knowledge gained in an in-depth study on the topic of the thesis.
- Under supervision student prepares a concept, where the purposes, goals, methods and references for the thesis are presented.
- Student shows the ability of written expression in Slovenian language with sensible use of professional terminology.
- The aim is to develop independent, critical and ethical way of working and a synthesis of knowledge obtained during the study.
- From public presentation student obtains communication skills.

Predvideni študijski rezultati:

- Poglobitev znanj na področju teme diplomske naloge.
- Razumevanje in izkušnje z uporabo teoretičnih znanj pri konkretnih strokovnih ali razvojnih nalogah.
- Prenos znanj iz teoretičnega dela šolanja v reševanje konkretnih problemov.
- Povezovanje znanj in spretnosti pri strokovnem ali razvojnem delu.
- Sinteza znanj, komunikacijske spretnosti, samostojna nadgradnja znanj.

Intended learning outcomes:

- Obtaining in-depth knowledge from the area of the diploma work.
- Understanding and experiences of using theoretical knowledge in concrete professional or development tasks.
- Transfer of knowledge from theoretical part of education to solving concrete problems.
- Connecting knowledge and skills in professional or development work.
- Synthesis of knowledge, communication skills, independent upgrading of knowledge.

Metode poučevanja in učenja:

Mentorsko vodeno samostojno delo.

Learning and teaching methods:

Independent work under supervision.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izdelek	**50 %**	Written product
Zagovor	**50 %**	Defence

Reference nosilca / Lecturer's references:

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Ploskovne konstrukcije
Course title:	Plates and shells

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer: Boštjan Brank

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Predmet je del modula Konstrukcije. Opravljen izpit iz predmetaTrdnosti.	The course is part of module Structures. Passed exam in Strength of Materials.

Vsebina:	**Content (Syllabus outline):**
Motiv za študij ploskovnih konstrukcij. Konstrukcije v ravninskem napetostnem in deformacijskem stanju in osnosimetrične konstrukcije. Teorija (osnovne enačbe). Kriteriji porušitve in plastifikacije materiala. Analitično reševanje enostavnejših primerov. Numerično reševanje zahtevnejših primerov (metoda končnih elementov). Plošče. Mehanizem obnašanja plošč. Teorija (Kirchhoffova in Reissner-Mindlinova teorija plošč). Analitično reševanje enostavnejših problemov upogiba plošč. Tabele za plošče. Numerično reševanje upogiba plošč z metodo končnih elementov. Vrednotenje numeričnih rezultatov. Armiranobetonske plošče. Pogosti tipi armiranobetonskih plošč. Modeliranje armiranobetonskih plošč za analizo s končnimi elementi. Dimenzioniranje armiranobetonskih plošč. Jeklene in kompozitne plošče. Zaključek in povzetek predavanj in vaj.	Motivation for studying plate structures. Plane stress and plane strain structures. Theory (basic equations): yield and failure criteria, analytical solutions of equations, numerical solutions of equations by the finite element method. Plates; understanding behaviour of plates; Kirchoff theory of plates; Reissner-Mindlin theory of plates; analytical solutions for bending of rectangular and circular plates; design tables for reinforced concrete plates; numerical (finite element method) solutions for plate bending; reading and evaluating numerical results. Reinforced concrete plates; types of reinforced concrete plates; design of reinforced concrete plates by using results of the finite element method; reinforcement in simply supported plate, clamped plate and in a free edge plate; eurocode 2 and analyses of reinforced concrete plates and walls. Steel and composite plates; their use in civil engineering, Eurocode 3 and analysis of steel plates and walls. Conclusions.

Temeljni literatura in viri / Readings:

B. Brank, Plošče, skripta UL FGG, 2013.
A. C. Ugural, Stresses in plates and shells, second edition, McGraw-Hill,1999, od strani 71 do 185.
E. Hake, K. Meskouris, Statik der Flaechentragwerke, Springer, 2001, od strani 11 do 155.
J. Reflak, Osnove plošč, skripta, UL FGG, 2000.

Cilji in kompetence:

Cilji
- Spoznati tehniški teoriji sten in plošč
- Razumeti obnašanje sten in plošč
- Spoznati analitične in numerične postopke za analizo ploskovnih konstrukcij
- Naučiti se kritično oceniti rezultate numerične analize
- Naučiti se dimenzionirati armiranobetonske plošče
- Povezati znanje, pridobljeno pri temeljnih predmetih, s problemi stroke

Pridobljene kompetence
- Zna rešiti enostavnejši inženirski problem
- Pozna postopke za analizo sten in plošč
- Zna izračunati notranje sile v stenah in ploščah
- Zna ovrednotiti rezultate numeričnih analiz
- Zna dimenzionirati armiranobetonsko ploščo
- Razume obnašanje plošč

Objectives and competences:

Objectives
- To understand behaviour of plates and walls
- To learn plate theories
- To learn about analytical and numerical procedures for calculating plate and wall structures
- To learn how to evaluate results of numerical analysis
- To learn how to design a reinforced concrete plate

Competences
- Understanding behaviour of plates and walls
- To be able to solve a plate/wall problem
- To be able to evaluate results of plate/wall numerical analysis
- To be able to design a reinforced concrete plate

Predvideni študijski rezultati:

- Razumevanje obnašanja ploskovnih konstrukcij
- Razumevanje teorije plošč
- Pridobljeno znanje o analizi notranjih sil, deformacij in pomikov v ploskovnih konstrukcijah
- Pridobljeno znanje o dimenzioniranju armiranobetonskih plošč

Intended learning outcomes:

- To understand plate/wall behaviour
- To understand theory of plate structures
- To get knowledge about internal forces, deformations and displacements in plate structures
- To know how to design a reinforced concrete plate

Metode poučevanja in učenja:

Predavanja v klasični učilnici. Samostojno, nadzorovano delo v računalniški učilnici. Samostojno, nadzorovano reševanje enostavnejših primerov.

Learning and teaching methods:

Lectures are carried out in a classroom. Students solve basic plate and wall problems on computers (in computer room) under teacher supervision.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Samostojno reševanje primera s pomočjo računalnika	**45 %**	Solving a plate problem and a wall problem
Teoretično znanje	**45 %**	

Ocena oddanih vaj	**10 %**	Theoretical knowledge on the subject Project work

Reference nosilca / Lecturer's references:

BRANK, Boštjan. On boundary layer in the Mindlin plate model : Levy plates. Thin-walled struct.. [Print ed.], maj 2008, letn. 46, št. 5, str. 451-465, ilustr.
DUJC, Jaka, BRANK, Boštjan. On stress resultant plasticity and viscoplasticity for metal plates. Finite elem. anal. des.. [Print ed.], 2008, letn. 44, št. 4, str. 174-185, graf. prikazi.
BOHINC, Uroš, IBRAHIMBEGOVIĆ, Adnan, BRANK, Boštjan. Model adaptivity for finite element analysis of thin or thick plates based on equilibrated boundary stress resultants. Eng. comput., 2009, letn. 26, št. 1/2, str. 69-99, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Masivne konstrukcije
Course title:	Concrete and masonry structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Sebastjan Bratina, Drago Saje

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Konstrukcije.
Opravljen izpit iz predmetov Gradiva, Trdnost, Statika linijskih konstrukcij in udeležba pri predmetu Betonske konstrukcije.

Prerequisites:

The course is part of the module Structures.
Passed exams in Construction and Building Materials, Strength of Materials, Structural Analysis and participation at the course Concrete Structures.

Vsebina:

Mehanske in reološke lastnosti jekla za prednapenjanje. Načini in sistemi prednapenjanja konstrukcij. Načela in računski modeli za dimenzioniranje elementov prednapetih betonskih konstrukcij. Izguba sile prednapetja. Izbira stopnje prednapetja. Določitev dimenzij betonskega prereza in prereza kablov. Določitev težiščne linije kablov. Določitev potrebne vzdolžne in prečne mehke armature. Račun širine in medsebojne razdalje razpok delno prednapetih betonskih konstrukcij. Računski dokazi in konstrukcijska izvedba sidrišč. Zagotavljanje protikorozijske zaščite prednapete armature. Izvedba armiranja in detajlov prednapetih betonskih konstrukcij. Računalniško podprta izdelava opažnih in armaturnih načrtov prednapetih betonskih konstrukcij. Mehanske lastnosti zidakov, malte in zidovja. Nosilni mehanizmi in dimenzioniranje

Content (Syllabus outline):

Mechanical and rheological properties of prestressing steel. Methods and systems for prestressing of structures. Principles and verification models for the design of prestressed structural members. Losses of prestress. Selection of the level of prestressing. Definition of the dimensions of concrete cross-section and tendons cross-section. Tendon profile design. Calculation of the necessary longitudinal and transverse reinforcement. Calculation of crack widths and crack spacing in partially prestressed concrete structures. Calculation and design of anchorage zones. Providing corrosion protection of prestressing steel. Reinforcing and detailing of prestressed concrete structures. Computer-aided preparation of construction documents (shop and reinforcement drawings) for prestressed concrete structures. Mechanical properties of bricks, mortar and

nearmiranih zidanih konstrukcij na osno-upogibno in strižno obremenitev. Nosilni mehanizmi in dimenzioniranje armiranih zidanih konstrukcij na osno-upogibno in strižno obremenitev. Projektiranje in izvedba potresnovarnih zidanih konstrukcij. Interakcija zidanih in betonskih elementov konstrukcije.	masonry. Load-bearing mechanisms and design of unreinforced masonry structures subjected to bending, axial and shear loading. Load-bearing mechanisms and design of reinforced masonry structures subjected to bending, axial and shear loading. Design and execution of earthquake resistant masonry structures. Interaction of masonry and concrete components of structures.

Temeljni literatura in viri / Readings:

Structural Concrete, Vol. 3. 1999. Strani 93-203, fib (CEB-FIP).
G. Rombach. 2002. Spannbetonbau. Strani 195-333, 447-514, Ernst & Sohn.
C.R. Hendy, D.A. Smith, 2007. Designer's Guide to EN 1992-2, Part 2: Concrete Bridges, Thomas Telford.
H. Nilson, D. Darwin, C.W. Dolan. 2003. Design of concrete structures-thirteenth edition. Str. 634-733, McGraw-Hill.
W.G. Curtin, G. Shaw, J.K. Beck, W. A. Bray. 2006 Structural Masonry Designers. Manual-third edition. Str. 1-72 in 124-177, Blackwell Science.
M. Tomaževič. 2009. Potresno odporne zidane stavbe. Ljubljana, Tehnis.
Ustrezni deli standardov za gradbene konstrukcije Evrokod 0, Evrokod 2, Evrokod 6, Evrokod 8 (SIST EN 1990, SIST EN 1992-1-1, SIST EN 1992-1-2, SIST EN 1996-1-1, SIST EN 1996-1-2, SIST EN 1996-2, SIST EN 1996-3, SIST EN 1998-1).

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati filozofijo obnašanja elementov linijskih prednapetih betonskih konstrukcij in zidanih konstrukcij. - Naučiti se dimenzioniranja prednapetih betonskih in zidanih konstrukcij na osno-upogibno in strižno obremenitev. - Pridobiti potrebna znanja glede konstruiranja in armiranja ter detajliranja prednapetih betonskih konstrukcij. - Spoznati učinkovite konstruktivne izvedbe potresno odpornih zidanih konstrukcij in različne metode utrditve zidov. Kompetence: - Študentje so sposobni dimenzionirati prednapete betonske elemente, - Sposobni so dimenzionirati zidane konstrukcije na osno-upogibno in strižno obremenitev, - Poznajo temeljna pravila konstruiranja in armiranja ter detajliranja prednapetih betonskih konstrukcij, - Poznajo učinkovite konstruktivne izvedbe potresno odpornih zidanih konstrukcij, - Poznajo različne metode utrditve zidov.	Objectives - Understand the philosophy of the behaviour of prestressed concrete structures and masonry structures. - Ability to design prestressed concrete and masonry structures subjected to bending, axial and shear loading. - To acquire the necessary knowledge on the design and reinforcing as well as detailing of prestressed concrete structures. - They learn efficient constructive execution of earthquake resistant masonry structures and different methods of wall strengthening. Competences: - Students are capable to design prestressed concrete elements, - Students are capable to design masonry structures subjected to bending, axial and shear loading, - Students know the basic principles and rules of reinforcing and detailing of prestressed concrete structures, - Students know effective constructive execution of earthquake resistant masonry structures, - Students know different methods for strengthening of masonry walls.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje obstoječih sistemov prednapenjanja. - Poznavanje mehanskih in reoloških lastnosti jekla za prednapenjanje in zidakov, malte ter zidovja. - Poznavanje načinov utrditve obstoječih zidov. - Razumevanje kritičnih napetostno-deformacijskih stanj prednapetih elementov betonskih konstrukcij. - Razumevanje mehanizmov vnosa sile prednapetja v beton. - Razumevanje vpliva stopnje prednapetja na obnašanje elementov prednapetih konstrukcij. - Razumevanje teoretičnih podlag dimenzioniranja prednapetih elementov betonskih konstrukcij. - Razumevanje nosilnih mehanizmov elementov zidanih konstrukcij. - Uporaba metod učinkovitega detajliranja sidrišč prednapete armature. - Sposobnost uporabe domače in tuje strokovne literature ter programske opreme za nelinearno analizo napetostno-deformacijskega stanja prednapetih betonskih konstrukcij. - Sposobnost sinteze znanja pridobljenega pri predhodnih predmetih.	- Knowledge of existing prestressing systems. - Knowledge of mechanical and rheological properties of prestressing steel and bricks, mortar and masonry. - Knowledge of methods for strengthening existing masonry walls. - Understanding of the critical stress-strain states of prestressed structural members. - Understanding the mechanism for the transmission of prestressing force to the concrete. - Understanding of the influence of the level of prestressing on the behaviour of prestressed structures. - Understanding of theoretical bases for the design of prestressed structural members. - Understanding of load-bearing mechanisms of masonry members. - Application of methods for efficient design of anchorage zones. - Ability to use national and international literature and software for the nonlinear analysis of stress-strain state of prestressed concrete structures. - Ability of synthesis of the knowledge acquired in previous courses.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje potekajo vzporedno preko celega semestra.	Lectures and tutorials run through the whole semester.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Študentje morajo izdelati predpisane vaje ter jih pravočasno oddati:	**20 %**	Students need to do the prescribed tutorials and submit them in time.
Računski del izpita (možno opraviti tudi z dvema kolokvijema):	**40 %**	Computational part of exam (they may also pass the exam with two mid-term exams).
Teoretični del izpita	**40 %**	Theoretical part of exam

Reference nosilca / Lecturer's references:

KRAUBERGER, Nana, BRATINA, Sebastjan, SAJE, Miran, SCHNABL, Simon, PLANINC, Igor, Inelastic buckling load of a locally weakened reinforced concrete column, Engineering Structures, letn. 34, št. 1, str. 278-288, 2012.
MARKOVIČ, Mojca, SAJE, Miran, PLANINC, Igor,BRATINA, Sebastjan, On strain softening in finite element analysis of RC planar frames subjected to fire, Engineering Structures, letn. 45, str. 349-361, 2012.
MARKOVIČ, Mojca, KRAUBERGER, Nana, SAJE, Miran, PLANINC, Igor,BRATINA, Sebastjan, Non-linear

analysis of pre-tensioned concrete planar beams, Engineering Structures, letn. 46, str. 279-293, 2013.

SAJE, Drago, BANDELJ, Branko, ŠUŠTERŠIČ, Jakob, LOPATIČ, Jože, SAJE, Franc, Autogenous and Drying Shrinkage of Fibre Reinforced High- Performance Concrete, Journal of Advanced Concrete Tehnology, letn. 10, št. 2, str. 59-73, 2012.
SAJE, Drago, BANDELJ, Branko, ŠUŠTERŠIČ, Jakob, LOPATIČ, Jože, SAJE, Franc. Shrink
age of polypropylene fibrereinforced high performance concrete. J. mater. civ. eng., 2011,vol. 23, iss. 7, str. 941-952, ilustr., doi: 10.1061/(ASCE)MT.1943-5533.0000258.
SAJE, Drago, LOPATIČ, Jože. The effect of constituent materials on the time development of the compressive strength of high-strength concrete. Mag. Concr. Res., 2010, letn. 62, št. 4, st
r. 291-300, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Lesene konstrukcije
Course title:	Timber structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Jože Lopatič

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Konstrukcije.
Opravljen izpit iz predmetov Trdnost, Statika linijskih konstrukcij, Gradiva.

Prerequisites:

The course is part of the module Structures.
Passed exams in Strength of Materials, Structural Analysis, Construction and Building Materials.

Vsebina:

Prednosti in slabosti lesenih konstrukcij. Fizikalne, mehanske in reološke lastnosti lesa in gradbenih lesnih proizvodov v odvisnosti od pogojev okolja. Tehnologija izdelave osnovnih gradbenih lesnih proizvodov. Razvrščanje masivnega lesa v trdnostne razrede. Izhodišča za analizo napetostno-deformacijskega stanja in dimenzioniranje elementov lesenih konstrukcij. Metoda mejnih stanj lesenih konstrukcij. Mejna nosilnost in dimenzioniranje elementov lesenih konstrukcij iz masivnega lesa pri osni, osno-upogibni in strižni obremenitvi. Stabilnost vitkih elementov lesenih konstrukcij. Posebnosti dokazovanja varnosti lameliranih lepljenih konstrukcij proti porušitvi. Odpornost in podajnost veznih sredstev in priključkov. Račun in omejitve pomikov lesenih konstrukcij. Teoretične podlage in izpeljani računski dokazi sestavljenih upogibnih in tlačnih nosilnih elementov lesenih konstrukcij. Zagotavljanje lokalne in globalne stabilnosti lesenih

Content (Syllabus outline):

Advantages and disadvantages of timber structures. Physical, mechanical and rheological properties of solid timber and engineered wood products for structural purposes depending on the environmental conditions. Bases of manufacturing technology of engineered wood products for structural purposes. Strength classes and strength grading of timber. Basic assumptions for the analysis of stress-strain state and the design of elements of timber structures. Limit state design of timber structures. Ultimate resistance and design of timber structural elements at axial, combined bending-axial and shear loading. Stability of slender elements of timber structures. Specifics of the proof of safety of glulam structures against failure. Resistance and stiffness of fasteners and joints. Calculation and limitations of deflections of timber structures. Mechanical behaviour and design of composite bending and compressive load-bearing timber elements. Local and global stability of timber

konstrukcij z zavarovalnimi konstrukcijami. Zaščita lesenih konstrukcij pred vplivi okolja in požarom. Temeljna pravila izvedbe priključkov, vozlišč in detajlov lesenih konstrukcij.	structures; bracing systems. Protection of timber structures against the impacts of environment and fire. Basic rules for the execution of joints, nodes and details of timber structures.

Temeljni literatura in viri / Readings:

J. Lopatič, Študijsko gradivo v obsegu 140 strani.
S. Thelanderson, H. J. Larsen (urednika). 2003. Timber Engineering. John Wiley & Sons, str. 1-22, 81-102, 131-152, 171-177, 301-332, 365-382, 409-428.
F. Colling. 2004. Holzbau-Beispiele. Vieweg, str 1-116.
P. Dobrila. 1997. Lesene konstrukcije-rešeni primeri z uporabo in razlago EC5. Univerza v Mariboru, Fakulteta za gradbeništvo, 133 str.
Ustrezni deli standardov za gradbene konstrukcije Evrokod 0, Evrokod 1, Evrokod 5 (SIST EN 1990, SIST EN 1991-1, SIST EN 1991-1-3, SIST EN 1991-1-4, SIST EN 1995-1-1, SIST EN1995-1-2).

Cilji in kompetence:	**Objectives and competences:**
Cilji - Podrobneje spoznati fizikalne, mehanske in reološke lastnosti lesa in lesnih proizvodov ter - Spoznati principe in postopke zagotavljanja varnosti, trajnosti in uporabnosti nosilnih elementov lesenih konstrukcij. Kompetence - Študentje so sposobni dimenzionirati elemente lesenih konstrukcij iz masivnega in lepljenega lesa glede na pogoje mejnih stanj nosilnosti in mejnih stanj uporabnosti. - Poznajo vezna sredstva in temeljna pravila dimenzioniranja in konstruiranja priključkov. - Sposobni so dimenzionirati vezna sredstva oziroma priključke lesenih elementov. - Poznajo pogoje in ukrepe za zagotavljanje zaščite lesenih konstrukcij pred vplivi okolja in požarom. - Poznajo možne načine zagotavljanja lokalne in globalne stabilnost lesenih konstrukcij; sposobni so zasnovati in dimenzionirati zavarovalno konstrukcijo - Znajo izdelati projektno dokumentacijo za konstrukcijske elemente in enostavne sklope nosilnih lesenih elementov.	The objective of the course is to - introduce students into detailed physical, mechanical and rheological properties of timber and engineered wood-based products as well as - the principles and procedures of assuring safety, durability and serviceability of timber load-bearing structures. Competences: - Students are capable to design elements of structures made of solid timber and glulam, considering the conditions of ultimate limit states and serviceability limit states, - Students learn about fasteners and the basic rules for the design of joints, - Students are capable to design fasteners or joints of timber elements, - Students know the conditions and measures to assure protection of timber structures against impacts of the environment and fire, - Students know the possible methods for assuring local and global stability of timber structures; they are able to design bracing elements, - Students are capable to creating technical documentation for timber structural elements and simple assemblies of timber load-bearing elements.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje fizikalnih, mehanskih in reoloških lastnosti lesa in gradbenih lesnih proizvodov. - Poznavanje tehnologij izdelave gradbenih lesnih proizvodov. - Poznavanje tehnične regulative s področja lesenih konstrukcij. - Razumevanje meril za razvrščanje lesa v trdnostne	- Knowledge of physical, mechanical and rheological properties of solid timber and engineered wood-based products. - Basic knowledge of manufacturing technologies of engineered wood products for structural purposes. - Knowledge of technical regulation from the area of timber structures.

razrede. - Razumevanje vpliva pogojev okolja na ključne lastnosti lesa. - Razumevanje načel in računskih modelov dokazovanja varnosti in uporabnosti lesenih konstrukcij. - Razumevanje vpliva podajnosti veznih sredstev na obnašanje lesenih konstrukcij. - Razumevanje vloge zavarovalnih konstrukcij. -Zmožnost uporabe postopkov, pripomočkov in programske opreme za analizo in dimenzioniranje lesenih konstrukcij.	- Understanding of the criteria for the grading of timber with respect to mechanical properties. - Understanding of the environmental influence on key properties of timber. - Understanding of the principles and computational methods for the verification of safety and serviceability of timber structures. - Understanding of the influence of fasteners stiffness on the behaviour of timber structures. - Understanding of the role of bracing structures. - Capability to use standard procedures and software for the analysis and design of timber structures.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in laboratorijske vaje v računalniški učilnici.	Lectures and seminar tutorials in classical lecture room.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Vaje	**30 %**	Tutorials
Računski del izpita	**30 %**	Computational part of exam Theoretical
Teoretični del izpita	**40 %**	part of exam

Reference nosilca / Lecturer's references:

LOPATIČ, Jože, Preiskave kompozitnih nosilcev iz lesa in stiropora. Les (Ljublj.), oktober 1993, 45, št. 10, str. 281-288.
SAJE, Franc, LOPATIČ, Jože, WALLNER, Edo, Behaviour of glued laminated timber structures,1st International Conference on Mechanics of Time Dependent Materials, Ljubljana, 11-13 September 1995. Proceedings. Bethel (Connecticut): Society for Experimental Mechanics; Ljubljana: [Center za eksperimentalno mehaniko], 1995, str. 213-217, graf. Prikazi.
ČAS, Bojan, LOPATIČ, Jože, SAJE, Miran, SCHNABL, Simon, PLANINC, Igor. Experimental and numerical analysis of composite wood beams : paper 199.Proceedings of the Tenth International Conference on Civil, Structural and Environmental Engineering Computing. Rome, Italy, 30 August-2 September 2005. Stirling [Scotland]: Civil-Comp Press, 2005.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Hidravlika
Course title:	Hydraulics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30	15		30		75	5

Nosilec predmeta / Lecturer: Franci Steinman

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula hidrotehnika.
Opravljen izpit iz predmetov Matematika I in Fizika.

Prerequisites:

The course is part of the module Hydraulics.
Passed exams in Mathematics I and Physics.

Vsebina:

Predavanja
Uporaba enačb realne tekočine za razumevanje hidravličnih sistemov in robnih pogojev za hidravlično analizo običajnih objektov. Hidravlično dimenzioniranje objektov, ureditev in naprav, ki jih študentje spoznavajo po tehnološki in izvedbeni plati pri drugih predmetih z vodnogospodarskega področja. Značilnosti in dinamika realne tekočine (režimi toka).Tok v cevovodih (linijske in lokalne izgube, enostavni cevovodi, črpalke, sistemi cevovodov, programska oprema). Iztok iz odprtin in izenačevanje gladin (stalni in nestalni tok). Odtok čez prelive, pragove in jezove. Tok v odprtih vodotokih (normalni tok, sestavljeni prerezi, hidravlično najugodnejši prerez, lokalne motnje). Stabilni odseki vodotokov (obložena in neobložena korita). Stalni neenakomerni tok (gladinske krivulje, račun gladin, programska oprema).

Vaje

Content (Syllabus outline):

Lectures
Use of real fluid equations for the understanding of hydraulic systems and hydraulic boundary conditions for the analysis of conventional hydraulic structures. Hydraulic design of structures, watercourses and facilities that students learn about from the technological and operational aspects in other subjects within the water management area. Characteristics and dynamics of real fluids (flow regimes). Flow in conduits (local and linear losses, simple pipe problems, pumps, pipe systems, simulation software). Orifice flow and water level balancing in two vessels (steady and unsteady flow). Flow over weirs, sills and dams. Flow in open channels (normal flow, combined profiles, hydraulically efficient channel section, and local disturbances). Stable river sections (coated and uncoated water courses). Steady non-uniform flow (gradually varied flow profiles, calculation of water levels, simulation software).

Inženirska zasnova računskih primerov, računski postopki, inženirske poenostavitve z osnovami presoje računske negotovosti, primeri izračunov za cevovode, tok s prosto gladino, odprtine in prelivi. Prikaz tokovnih razmer v hidravličnem laboratoriju. Seminar Izdelava samostojne seminarske naloge za določen primer toka. Uporaba prosto dostopne programske opreme za hidravlične izračune. Izdelava poročila z interpretacijo rezultatov izračunov.	Tutorials Engineering design of hydraulic calculations, calculation procedures. Engineering simplifications with basics of uncertainty assessment. Examples of calculations for pipe flow, flow in open channels, flow through orifices and over weirs. Visit of the hydraulic laboratory. Seminar Elaboration of individual seminar papers for a selected flow type. The use of freely available software for hydraulic calculations. Elaboration of reports with interpretation of the results of hydraulic calculations.

Temeljni literatura in viri / Readings:

Steinman, F. 2010. Hidravlika. učbenik, 2. ponatis. Ljubljana, UL FGG, 310 str.
Rossert R. 2000. Hydraulik im Wasserbau. Oldenbourg, 184 str.
Alluri C., Feattherstone, R. E., 2001. Civil engineering hydraulics: essential theory with worked examples. Blackwell, 80 str. od 430 str.
US Army Corps of Engineers: HEC-RAS 4.0
Dostopno na: http://www.hec.usace.army.mil/software/hec-ras
US Environmental Protection Agency: EPANET 2.0
Dostopno na: http://www.epa.gov/nrmrl/wswrd/dw/epanet.html

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati osnovne fizikalne zakonitosti energijskih pretvorb in specifičnosti ter hidrodinamske pojave pri različnih vrstah toka vode. - Predstaviti področja uporabe hidravličnih izračunov ter povezanost inženirske zasnove primerov vodnega toka z okoljem preko hidravličnih robnih pogojev. - Spoznati način hidravličnega dimenzioniranja elementov in enostavnih sistemov. Kompetence - Sposobnost pravilne definicije tokovnih razmer, njim primerne izbire ustreznih osnovnih enačb in robnih pogojev. - Uporaba v stroki običajnih, prosto dostopnih računalniških programov za določanje merodajnih količin pri različnih vrstah tokov.	Objectives - To understand of the basic physical principles of energy conversion, flow specificity and hydrodynamic phenomena in various types of water flow. - To present the scope of the hydraulic calculations and integration of engineering design cases of water flow in the environment through the use of hydraulic boundary conditions. - To understand the hydraulic design of components and simple systems. Competences - To be able to correctly identify specific flow types, appropriate selection of hydraulic equations and boundary conditions, - To use of state-of-the-art and freely available simulation software for flow and energy determination of different types of flows.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Pridobljeno znanje za obravnavo enostavnejših primerov toka v cevovodih in v vodotokih. - Razumevanje in sposobnost analize vejičastih cevovodnih sistemov ter analize črpalke v sistemu. - Razumevanje in sposobnost analize enostavnih hidrotehničnih posegov v vodotoke. - Uporaba hidravličnega dimenzioniranja na primerih, ki se obravnavajo pri drugih predmetih (vodovod, urejanje vodotokov idr.)	- Acquire knowledge to deal with simple cases of flow in pipes and in open channels. - Understanding of and ability to analyze meshed pipe systems and the analysis of pumps in the system. - Understanding of and ability to analyze simple hydro-technical interventions in open channels. - The use of hydraulic design in cases that are treated in other courses (water supply, river regulation, etc.).

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar in laboratorijske vaje.	Lectures, seminar and laboratory tutorials.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt):		Type (written and/or oral examination, exercises, projects):
Seminarska naloga	**30 %**	Seminar work
Računski del izpita (pisno)	**30 %**	Calculation assignments (written)
Teoretični del izpita (pisno ali ustno)	**40 %**	Theoretical part of the exam (written or oral)

Reference nosilca / Lecturer's references:

NOVAK, Gorazd, KOZELJ, Daniel, STEINMAN, Franci, BAJCAR, Tom. Study of flow at side weir in narrow flume using visualization techniques. Flow meas. instrum. [Print ed.], 2013, letn. 29, str. 45-51.
BAJCAR, Tom, STEINMAN, Franci, ŠIROK, Brane, PREŠEREN, Tanja. Sedimentation efficiency of two continuously operating circular settling tanks with different inlet- and outlet arrangements. Chem. eng. j. 1996. [Print ed.], 2011, vol. 178, str. 217-224.
GOSAR, Leon, PREŠEREN, Tanja, KOZELJ, Daniel, STEINMAN, Franci. Alpreserv Database: Sharing Information on Reservoirs. Wasser, Energ., Luft, 2006, št. 3, str. 198-206.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Hidrologija
Course title:	Hydrology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Mojca Šraj

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Hidrotehnika.

Prerequisites:

The course is a part of the module Hydraulics.

Vsebina:

Predavanja
Pregled razvoja hidrologije kot znanosti doma in v svetu; Fizikalne in kemijske lastnosti vode; Kroženje vode, energije in snovi v naravi; Uporaba teorije verjetnosti in statistike v hidrologiji (osnove verjetnostnega računa, teoretične in empirične porazdelitve, faktor frekvence in verjetnostne mreže, povratna doba, regresija in korelacija); Lastnosti atmosfere in njihova meritev; Padavine (meritve, napake pri meritvah padavin, obdelava padavinskih podatkov, prestrežene padavine, sneg); Daljinsko zaznavanje v hidrologiji; Evapotranspiracija (merjenje, metode izračuna, Penman-Monteithova enačba); Odtok površinskih voda (krivulja trajanja); Lastnosti tal; Različne oblike vode v tleh (vlaga v tleh, izviri, podtalnica, infiltracija, Darcy); Vodna bilanca; Podnebne spremembe in podnebna spremenljivost; Hidrometrija (meritve globin, gladin in hitrosti vode, meritve pretokov, pretočna krivulja); Negotovost hidrometričnih meritev in analiz (teorija pogreška); Osnove rečne hidravlike.

Content (Syllabus outline):

Lectures
The overview of the development of the hydrological science in Slovenia and in the world; Physical and chemical characteristics of the water; Water and energy cycle; The use of probability theory and statistics in hydrology (basics of the probability, theoretical and empirical distributions, frequency factor and probability papers, return period, regression and correlation); Characteristics of the atmosphere and their measurement; Precipitation (measurements, errors, analyses, intercepted precipitation, snow); Remote sensing in hydrology; Evapotranspiration (measurements, calculation methods, Penman-Monteith equation); Runoff (flow duration curve); Soil characteristics; Different types of water in the soil (soil moisture, springs, groundwater, infiltration, Darcy's law); Water balance; Climate change and climate variability; Hydrometry (measurements of water depth, water level and velocity, measurement of discharge, stage – discharge relationship;

Vaje Kroženje energije in vode na Zemlji, izračun vodne bilance. Hidrološki in meteorološki podatki. Verjetnostni račun v hidrologiji. Teoretične porazdelitve in njihova praktična uporaba v hidrologiji, povratna doba. Verjetnostne mreže. Testiranje hidroloških vzorcev. Empirične porazdelitve, krivulja trajanja. Uporaba korelacije v hidrologiji. Padavine, popravek padavin, ITP krivulje. Porečje, razvodnica, površinski odtok, racionalna enačba. Obdelava hidrometričnih podatkov, pretočna krivulja. Model podzemnega toka (GWF). Obisk klimatološke postaje in Agencije za okolje RS. Meritve hitrosti na naravnem vodotoku in izračun pretoka.	Uncertainty of hydrometric measurements and analyses (theory of error); Basics of river hydraulics. Exercises Energy and water cycle of the Earth, water balance calculation. Hydrological and meteorological data; Probability in hydrology; Theoretical distributions and their practical implementation in hydrology, return period. Probability papers. Testing of hydrological samples. Empirical distributions, flow duration curve. The use of correlation in hydrology. Precipitation, precipitation correction, IDF curves. Catchment, delineation, runoff, rational equation. Analysis of hydrometric data, rating curve. Groundwater flow model (GWF). Visit of the climatological station of the Slovenian Environmental Agency. Measurements of the velocity of the natural stream and discharge calculation.

Temeljni literatura in viri / Readings:

Brilly, M., Šraj, M. 2005. Osnove hidrologije, univerzitetni učbenik. 1. izd. Ljubljana, UL FGG, 309 str.
Šraj, M. 2010. Model podzemnega toka = Ground water flow model. Ljubljana, UL FGG, 22 str.
Mikoš, M., Kranjc, A., Matičič, B., Muller, J., Rakovec, J., Roš, M., Veselič, M., Brilly, M. 2002. Hidrološko izrazje = Terminology in hydrology. Acta hydrotechnica, vol. 20, št. 32, str. 3-324.
Učna gradiva v spletni učilnici.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Seznanitev z osnovami hidrologije, hidrometrije in uporabo analitičnih metod v hidrologiji - Pridobitev poglobljenega znanja o posameznih komponentah hidrološkega kroga in njihovim merjenjem s poudarkom na hidrometriji Kompetence - Pridobitev spretnosti zbiranja, interpretacije in obdelave podatkov ter osnovne spretnosti terenskega dela in ravnanja z merilnimi instrumenti - Z znanjem o kakovosti merjenih podatkov in njihovi interpretaciji zna uporabljati hidrološke podatke pri inženirskem odločanju in dimenzioniranju objektov.	Objectives - To learn about the basics of hydrology, hydrometry and the use of the analytical methods in hydrology, - To get a thorough knowledge about the components of the hydrological cycle and their measurement with a focus on hydrometry. Gained competences - To get skills of collecting, interpreting and analyzing the data and the basic skills of the field work and handling with measuring instruments - With the knowledge of the quality of the measured data and their interpretation student uses hydrological data for engineering decision- making and designing the structures.

Predvideni študijski rezultati:	Intended learning outcomes:
- Študent pridobi znanje o zakonitostih gibanja vode v hidrološkem krogu. - Študent spozna pomembnost hidroloških podatkov in njihovo uporabo pri analizi in vodarskem odločanju. - Razumevanje pomena podatkov pri izvajanju analiz ter spoznanje celovitosti in kompleksnosti procesov v okolju - Spretnosti zbiranja, interpretiranja in obdelave podatkov - Uporaba računalniških orodij za izdelavo tabel, grafov ter osnovnih statističnih izračunov (npr. Excel), uporaba IKT - Spretnosti uporabe domače in tuje literature ter drugih virov, poznavanje strokovnih izrazov - Uporaba različnih statističnih metod, identifikacija in reševanje problemov, kritična analiza, sinteza - Poročanje (ustno in pisno)	- Student gains knowledge about principles of the water movement in the hydrological cycle. - Student learns about the importance of the hydrological data and their application in analysis and decision-making in water management. - Understanding the importance of the data in analyses and getting the knowledge of the integrity and complexity of processes in the environment - Skills of collecting, interpreting and processing of the data - The use of software for creating tables, graphs and basic statistical calculations (e.g. Excel), use of ICT - Skills in using national and world literature and other sources, knowledge of professional terms - The use of different statistical methods, identification and problem solving, critical analysis, synthesis - Reporting (oral and written)

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, seminar, laboratorijske vaje, terenske meritve, uporaba IKT, skupinsko in problemsko zasnovano delo, interaktivno delo preko spletne učilnice oz. e-učenje (forumi, klepetalnice, kvizi, lekcije, dnevniki, individualno reševanje nalog, Wiki).	Lectures, seminar, lab exercises, field measurements, use of ICT, group and problem-based work, interactive work through e-classroom. e-learning (forums, chats, quizzes, lessons, blogs, individual exercises, Wiki).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Oddane računske vaje	**40 %**	Coursework/lab exercises
Dva kolokvija ali izpit:		Two mid-term exams or final exam: p
računski del	**40 %**	ractical part
teoretični del	**20 %**	theoretical part

Reference nosilca / Lecturer's references:

BEZAK, Nejc, BRILLY, Mitja, ŠRAJ, Mojca. Comparison between the peaks over treshold method and the annual maximum method for flood frequency analyses. Hydrological sciences journal, ISSN 0262-6667. [Print ed.], 2014, letn. 59, št. 5, str. 959-977.
ŠRAJ, Mojca, MIKOŠ, Matjaž, BRILLY, Mitja. Rainfall interception by deciduous mediterranean forests in Slovenia, Europe. V: DANIELS, Justin A. (ur.). Advances in environmental research, (Advances in Environmental Research, 14). New York: Nova Science Publishers, cop. 2011, str. 153-182.
ŠRAJ, Mojca, RUSJAN, Simon, PETAN, Sašo, VIDMAR, Andrej, MIKOŠ, Matjaž, GLOBEVNIK, Lidija, BRILLY, Mitja. The experimental watersheds in Slovenia. V: BRILLY, Mitja (ur.). XXIVth Conference of the Danubian Countries on the Hydrological Forecasting and Hydrological Bases of Water Management, IOP Conference Series, vol. 4. London: Institute of Physics, 2008, str. 1- 13.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Osnove zdravstvene hidrotehnike
Course title:	Introduction to sanitary engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Panjan Jože, Boris Kompare

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula hidrotehnika.

Prerequisites:

The course is a part of the module Hydraulics.

Vsebina:

Zgodovinski razvoj zdravstvene hidrotehnike. Izhodišča za vodooskrbo in čiščenje pitnih voda: izbira virov pitne vode, poraba in kakovost vode, vodovodni sistemi in objekti, priprava, tehnološke metode in tehnike priprave čiščenja pitnih voda. Izhodišča za odvod in čiščenje onesnaženih voda iz naselij: vrste in količine onesnaženih voda, zasnove sistemov za odvodnjo v urbanih naseljih in avtocestah in njihovo dimenzioniranje,osnovne tehnološke metode in tehnike čiščenja odpadnih voda, objekti na kanalizacijskih sistemih in komunalnih čistilnih napravah, osnove varstva pred naravnimi in drugimi nesrečami.

Content (Syllabus outline):

Historical development of sanitary engineering.

A platform for water supply and treatment of drinking water: selection of drinking water sources, consumption and quality of water, water supply systems and facilities,preparation, technological methods and techniques of treatment of drinking water. A platform for extraction and purification of polluted water from settlements: types and quantities of contaminated water, design of drainage systems in urban areas and highways and their dimensioning, basic technological methods and techniques for wastewater treatment, facilities for sewage water systems and waste water treatment plants, basics of protection against natural and other disasters.

Temeljni literatura in viri / Readings:

Panjan, J. 2005. Osnove zdravstveno hidrotehnične infrastrukture. Ljubljana, UL FGG, 289 str.
Panjan, J. 1999. Odvodnjavanje onesnaženih voda, Skripta, 103 str.
Izbrana poglavja iz:
Degremont, I. 1991. Water Tretment Handbook. Paris, Lavoisier Publishing, 1459 str.
Imhoff, K., Klaus, K. 1999. Taschenbuch der Stadtenwasserung, 29 Auflage. Olden- bourg, 472 str.
Hosang, W., Bischof, W. 1998. Abwassertechnik. Leipzig, B.G. Teubner Stuttgart, 724 str.

Cilji in kompetence:

Cilji
- Osvojiti osnovna znanja, ki so potrebna za zasnovo, projektiranje, gradnjo in vzdrževanje objektov in naprav na sistemih za oskrbo z zdravo pitno vodo in čiščenje pitnih voda ter odvodu in čiščenju onesnaženih voda.

kompetence
- Razumeti pomen oskrbe z vodo in odvoda voda
- Pozna ekološki vidik varstva voda, pozna osnove tehnologije in tehniko izvedbe objektov za čiščenje pitnih in odpadnih voda.

Objectives and competences:

Objectives
- To master the basic knowledge that is necessary for the design, planning, construction and maintenance of facilities and equipment for the water supply systems and treatment of drinking water and draining of sewage water.

Competences
- To understand the importance of water supply and draining water,
- To know the ecological aspect of water protection, to knows the basics of technology and engineering execution facilities for the treatment of drinking and waste water.

Predvideni študijski rezultati:

Zdravstveno hidrotehnične osnove oskrbe z zdravo pitno vodo, odvodom in čiščenjem onesnaženih voda in zaščito voda. Študent bo spoznal in razumel:
- pomen oskrbe in odvoda voda za javno zdravje,
- ekološki vidik varstva voda,
- osnove tehnologije za pripravo pitnih in za čiščenje odpadnih voda,
- tehniko izvedbe objektov za oskrbo in odvod onesnaženih voda.
- Študent bo spoznal postopke zdravstvene hidrotehnike pri naravnih in drugih nesrečah.

Intended learning outcomes:

Basics of sanitary engineering providing healthy drinking water, drainage and treatment of polluted waters and protection of waters. Student will learn and understand:
- the importance of water supply and drainage for public health,
- ecological aspects of water protection,
- basic technologies for the preparation of drinking water and treatment of waste water,
- technical implementation of structures intended to water supply and drainage of polluted water.
- Student will learn procedures of sanitary hydraulics in case of natural and other disasters.

Metode poučevanja in učenja:

Predavanja, filmi, laboratorijske vaje, simulacije.

Learning and teaching methods:

Lectures, Power Point presentations, videos, laboratory tutorials, simulations.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit	**50 %**	Written exam
Seminarske vaje	**50 %**	Tutorials

Reference nosilca / Lecturer's references:

DREV, Darko, SLANE, Mitja, PANJAN, Jože. Untersuchungen über die ländlichen Badegewässer in Slowenien und Massnahmen zu deren Verbesserung. Wasserwirtschaft, 2008, letn. 98, št. 12, str. 36-40.
DREV, Darko, SLANE, Mitja, PANJAN, Jože. Die Bewertung der Belastungen des Sees Cerknica durch Stickstoff und Phosphor. Wasserwirtschaft, 2009, letn. 99, št. 12, str. 32-37, ilustr,
PANJAN, Jože, KRZYK, Mario, DREV, Darko, Self-purification processes of lake Cerknica as a combination of wetland and SBR reactor. Water environment. research, (v tisku dec. 2013, letn. 85, no. 12, str. 1-16,

KOSJEK, Tina, HEATH, Ester, KOMPARE, Boris. Removal of pharmaceutical residues in a pilot wastewater treatment plant. Anal. bioanal. chem., 2007, vol. 387, no. 4, str. 1379-1387
KOMPARE, Boris, LEVSTEK, Meta, ATANASOVA, Nataša. Dva pristopa k modeliranju čistilne naprave za odpadno vodo = Two approaches to wastewater treatment plant modelling. Acta hydrotech. (Online). [Spletna izd.], 2006, letn. 24, št. 40, str. 45-64.
ZUPANC, Mojca, KOSJEK, Tina, PETKOVŠEK, Martin, DULAR, Matevž, KOMPARE, Boris, ŠIROK, Brane, BLAŽEKA, Željko, HEATH, Ester. Removal of pharmaceuticals from wastewater by biological processes, hydrodynamic cavitation and UV treatment. *Ultrason. sonochem.*. [Print ed.], 2013, vol. 20, no. 4, str. 1104-1112.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Železnice
Course title:	Railways

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer: Bogdan Zgonc

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Promet.

Prerequisites:

The course is part of the module Traffic.

Vsebina:

Osnovno znanje s področja železniške infrastrukture in sicer: železniški sistem in njegovi podsistemi (definicije, vrste in temeljne značilnosti, elementi železniškega tira ...); tir brez tirne grede na čvrsti podlagi; kretnice (sestavni deli kretnice, kot kretnice, projektiranje kretnic, višinski načrti krivinskih kretnic, hitrosti preko kretnic...); projektiranje železniških prog (krožni lok, nadvišanje, primanjkljaj in višek nadvišanja, bočni pospešek, prehodnice in prehodne klančine...); projektiranje in gradnja vozlišč; interoperabilnosti železniške infrastrukture (seznanitev z direktivami ES 2001/16 in 96/48, 2004/50, Zakonom o varnosti v železniškem prometu, ter tehničnimi specifikaciji za interoperabilnost – TSI); tehnologija železniškega prometa.

Content (Syllabus outline):

Basic knowledge on railway infrastructure, namely: railway system and its subsystems (definitions, types and basic elements and characteristics of railway track); slab track; switches (major parts of switches, crossing angle, design of switches, switch calculation, speed on the switches); design of railway infrastructure (curve, cant, cant deficiency, lateral acceleration, transitional curves and cross level transition …); design and construction of railway nodes; interoperability of railway infrastructure (introduction to Directives ES 2001/16 in 96/48, 2004/50 and Slovenian legislation “Zakon o varnosti v železniškem prometu”, and Technical specifications for interoperability – TSI); railway traffic management.

Temeljni literatura in viri / Readings:

B. Zgonc. 1996. Železnice I. projektiranje, gradnja in vzdrževanje prog. Ljubljana, Univerza v Ljubljani FGG, 225 str.
B. Zgonc. 2003. Železniški promet. Portorož, Univerza v Ljubljani, Fakulteta za pomorstvo in promet, str. 3-42, 105-130.
Predpisi in standardi s področja železniške infrastrukture (spletna stran Ministrstva za promet RS, Javne agencije za železniški promet RS in Holdinga Slovenske železnice).

Cilji in kompetence:

Cilj predmeta je razumevanje osnovnih značilnosti železniške infrastrukture, njenih podsistemov in komponent.

Kompetence:
- Opravljanje neposrednih delovnih nalog v družbah in ustanovah, ki se ukvarjajo z dejavnostmi na področju železniške infrastrukture.
- Reševanje osnovnih tehničnih, tehnoloških, organizacijskih in drugih problemov v procesih povezanih z železniškimi prometnimi storitvami in javno železniško infrastrukturo na konvencionalnih železniških progah,
- Obvladovanje osnovnih postopkov v tehnologiji projektiranja, gradnje in vzdrževanja javne železniške infrastrukture konvencionalnih železniških prog,
- Uporabljanje osnovnih aplikacij in informacijske tehnologije na področju železniške infrastrukture.

Objectives and competences:

The objective of the course is to understand the basic railway infrastructure characteristics, its subsystems and components.

Competences:
- Qualified for tasks in companies and institutions engaged in railway infrastructure
- Qualified for solving technical, technological, organizational and other problems related to railway services
- Qualified for basic design, construction and maintenance of railway infrastructure
- Qualified for using applications and information technology designed for railway infrastructure.

Predvideni študijski rezultati:

- Študent pridobi temeljna znanja o projektiranju, gradnji in vzdrževanju infrastrukturnih podsistemov na področju spodnjega in zgornjega ustroja konvencionalnih železniških prog.
- Seznani se z geometrijskimi elementi prog ter z ukrepi za zagotovitev interoperabilnosti železniških podsistemov.
- Znanje pridobljeno na predavanjih se povezuje z izdelavo praktičnih primerov reševanja problemov iz vsakodnevne prakse pri vajah in se poglablja z ogledom praktičnih primerov na terenu.
- Študent pri svojem delu obvlada spretnosti uporabe domače in tuje literature in drugih virov, zbiranja in interpretiranja podatkov, uporabo didaktičnih pripomočkov, uporabo različnih postopkov, poročanje (ustno in pisno), nauči se identificirati in reševati probleme, izdelovati kritične analize, sinteze, pisati članke s tega področja ipd.

Intended learning outcomes:

- Students acquire basic knowledge about design, construction and maintenance of railway infrastructure subsystems (substructure and superstructure) for conventional railway lines.
- Students acquire knowledge about geometrical elements and measures to ensure railway interoperability.
- The knowledge acquired in the class is backed-up with practical examples of solving problems and upgraded with field trips to actual construction sites.
- Students in their work learn to use national and international literature and other sources, collect and critically interpret the data, the use of didactic instruments, reporting (oral and written), learn to identify and solve problems to produce critical analysis, synthesis, write articles etc.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje v računalniški učilnici.	Lectures and tutorials in laboratory.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teorija	**60 %**	Theory
Vaje	**40 %**	Tutorial

Reference nosilca / Lecturer's references:

ZGONC, Bogdan. Železniška infrastruktura. Portorož: Fakulteta za pomorstvo in promet, 2012. XVI, 222 str., ilustr.
ZGONC, Bogdan. Napetosti v železniških tirnicah zaradi temperaturnih sprememb= Stresses in the railway rails caused by temperature fluctuations. Gradb. Vestn., dec.2010, letn. 59, str. 291-302.
ZGONC, Bogdan, VERLIČ, Peter. Teoretične osnove za projektiranje in gradnjo konvencionalnih prog in prog za visoke hitrosti : 1. del. Ljubljana: DDC svetovanje inženiring d.o.o, 2007.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Prometno inženirstvo
Course title:	Transportation engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Tomaž Maher, Marijan Žura

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Promet.

Prerequisites:

The course is part of the module Traffic.

Vsebina:

Enciklopedično spoznavanje prometnega inženirstva; osnove teorije prometnega toka; osnove o meritvah prometnih parametrov; osnove metode prometnega planiranja; analiza kapacitivnosti posameznih projektnih rešitev (vse vrste križišč); osnove upravljanja prometnih tokov s sodobnimi inteligentnimi transportnimi sistemi; osnove prometne varnosti; osnove prometne ekologije.

Content (Syllabus outline):

Encyclopaedic learning about traffic engineering. Basics of the theory of traffic flow. Basics of measuring traffic parameters. Basic methods of traffic planning. Capacity analysis of individual project solutions (all types of junctions). Basics of design. Basics of construction and maintenance of road infrastructure. Basics of traffic flow management with contemporary intelligent transport systems. Basics of traffic safety. Basics of traffic ecology.

Temeljni literatura in viri / Readings:

T. Maher. 2007. Prometno inženirstvo, skripta. Ljubljana, UL FGG, 278 str.
Dostopno na: http://www.pti.fgg.uni-lj.si.
James H. Banks. Introduction to Transportation Engineering. McGraw Hill.

Cilji in kompetence:

Cilj prometnega inženirstva je
- spoznati se z inženirskimi metodami na področju cestnega prometa v smislu zagotovitve dovolj

Objectives and competences:

The objective of Transportation Engineering is to
- obtain knowledge about engineering methods in the field of road transport in terms of sufficient,

zmogljive, varne in okolju prijazne infrastrukture, ki mora ustrezati optimalnemu transportu ljudi in blaga. Kompetence - Opravljanje neposrednih delovnih nalog v družbah in ustanovah, ki se ukvarjajo z dejavnostmi na področju cestne infrastrukture. - reševanje osnovnih tehničnih, tehnoloških, organizacijskih in drugih problemov v procesih povezanih s cestnim prometom in cestno infrastrukturo, - uporabljanje osnovnih aplikacij in informacijske tehnologije na področju cestne infrastrukture.	efficient, safe and environmentally friendly infrastructure, which must correspond to the optimal transportation of people and goods. Competencies - Carry out direct work tasks in companies and institutions that are engaged in activities in the field of road infrastructure. - Solve basic technical, technological, organizational and other problems in the processes related to road transport and road infrastructure, - Use of basic applications and information technology in the field of road infrastructure.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Pridobljena znanja so podlaga za planiranje, dimenzioniranje, načrtovanje, vzdrževanje in upravljanje s prometno infrastrukturo. - Uporaba pridobljenih znanj pri nadaljnjem študiju, v projektivi, operativi in vodenju podjetij. - Pridobljena znanja bo študent uporabil v projektu z identifikacijo in reševanjem problemov.	- The acquired knowledge is a basis for transportation planning, roadway design, infrastructure maintenance and transport management. - Use of acquired knowledge in further studies, in the Design, Operations and Management of companies - The acquired knowledge will be used by student in a project identifying and solving problems.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in laboratorijske vaje.	Lectures, tutorials and laboratory work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
pisni in/ali ustni izpit - teorija priprava samostojne naloge in zagovor - vaje	**50 %** **50 %**	written and / or oral exam - theory preparation of separate seminary work and defense of exercises

Reference nosilca / Lecturer's references:

MAHER, Tomaž, STRNAD, Irena, ŽURA, Marijan. Estimation of EVA mode choice model parameters with diferent types of ulity functions. Promet (Zagreb), 2011, vol. 23, no. 3, str. 169-175.
LIPAR, Peter, LAKNER, Mitja, MAHER, Tomaž, ŽURA, Marijan. Estimation of road centerline curvature from raw GPS data. The Balt. j. road bridge eng., 2011, letn. 6, št. 3, str. 163-168
VELJANOVSKA, Kostandina, BOMBOL, Kristi M., MAHER, Tomaž. Reinforcement learning technique in multiple motorway access control strategy design. Promet, ISSN 0353-5320, 2010, letn. 21, št. 2, str. 117-123.

ŽURA, Marijan, SRDIČ, Aleksander. Design and Plan of Travel Time Surveys on Slovene Road Network. WSEAS transactions on systems and control, december 2006, letn. 1,št. 2, str. 200-206

ŽURA, Marijan, STRAH, Bojan. Toll as an instrument of traffic policy for environmental protection. Modern traffic. [English ed.], 2002, vol. 22, spec. issue, str. 20-26.
STRAH, Bojan, ŽURA, Marijan.Integrated transport demand management. Suvremeni promet, rujan-listopad 2003, vol. 23, n. 5, str. 356-361.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Geografski informacijski sistemi
Course title:	Geographic information systems

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Marijan Žura

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Predmet je del modula Promet.	The course is part of the module Traffic.

Vsebina:	**Content (Syllabus outline):**
Izrazoslovje in literatura, pomen prostorskih (geografskih) podatkov in vloga informacij stvarnem prostoru pri odločanju; Sistem, informacijski sistem (IS) in prostorski informacijski sistemi (PIS/GIS in LIS); Geoinformatika in tehnologija GIS, sestavine, zgodovina in razvoj; Razvojni modeli IS, sistemsko inženirstvo, strateško planiranje razvoja, UML in geoinformatika; Modeliranje in podatkovni modeli, koncept stvarnega prostora in časa ter njuna abstrakcija, modeliranje izbranega dela stvarnosti (kartografsko in objektno usmerjeno) v bazah podatkov; Analogni in digitalni prostorski podatki - viri in značilnosti, vektorske, rastrske grafične baze podatkov,značilnosti časovnih podatkov; Mednarodna, regionalna in nacionalna standardizacija in vrste standardov, industrijska standardizacija, de facto standardi; BCP.	Overview of the subject content (introduction, purpose, terminology, literature, etc.), spatial data structure, graphical and descriptive attributes, acquisition techniques, system, information system and GIS, geoinformation and GIS technology, history and development, modeling of reality, UML and conceptual modeling of problem domain analog and digital spatial data, sources and acquisition techniques, realization of models and data in relational DBMS, standardization and types of standards in the geoinformation domain, formal, de facto and open industrial standards; RDB (Road Data Base).

Temeljni literatura in viri / Readings:

Kvame, Oštir, Stančič, Šumrada: Geografski informacijski sistemi, ZRC SAZU, Ljubljana, 1997, 476 str.
Šumrada, Strukture podatkov in prostorske analize, FGG, 2005, 284 strani
Šumrada, Tehnologija GIS, FGG, 2005, 330 strani

Cilji in kompetence:

Cilji
- Spoznati se s tehnologijo geografskih informacijskih sistemov in z bazami prostorskih podatkov

Kompetence
- Študent bo sposoben uporabljati GIS tehnologijo za vnos, ažuriranje in obdelavo prostorskih podatkov.
- Sposoben bo izdelati prostorske analize ter rezultate analiz prikazati v obliki tematskih kart.

Objectives and competences:

Objectives
- To get acquainted with the technology of geographic information systems and spatial data bases.

Competences
- Students will be able to use GIS technology to enter, update and process spatial data.
- Students will be able to conduct spatial analyses and present results of the analyzes in the form of thematic maps.

Predvideni študijski rezultati:

- Poznavanje osnov GIS tehnologije, konkretnih GIS orodij (ArcGIS).
- Študent je sposoben uporabe GIS tehnologije za reševanje problemov pri načrtovanju infrastrukturnih objektov.
- Študent bo sposoben uporabiti GIS tehnologijo pri predmetih druge stopnje.

Intended learning outcomes:

- Knowing the basics of GIS technology, specific GIS tools (ArcGIS)
- Student is able to use GIS technology to solve problems in the planning of infrastructure
- Students will be able to use GIS technology at second cycle classes.

Metode poučevanja in učenja:

Predavanja, vaje v računalniški učilnici.

Learning and teaching methods:

Lectures and tutorials in computer room.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
teoretični del izpita	**50 %**	Theoretical exam
praktični del izpita	**50 %**	Computer assignment

Reference nosilca / Lecturer's references:

LIPAR, Peter, KOSTANJŠEK, Jure, ŽURA, Marijan. Uporaba prostorske statistike za določevanje zgostitev prometnih nesreč= Identification of road accident hot spots using spatial statistics. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 1, str. 61-69.
KASTELIC, Tomaž, ŽURA, Marijan. Možnosti uporabe teorije geografskih informacijskih sistemov za izboljšanje požarne varnosti. Ujma (Ljublj.), št. 6 (1992), str. 182-185.
ŽURA, Marijan. Integralni informacijski sistem cestnega gospodarstva. Gradb. vestn., 43, št. 9/10 (1994), str. 236-241.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Komunalno gospodarstvo
Course title:	Municipal economics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45			30		75	5

Nosilec predmeta / Lecturer: Maruška Šubic Kovač

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Predmet je del modula Komunala.	The course is part of the module Municipal engineering.

Vsebina:	**Content (Syllabus outline):**
Javne potrebe in javne gospodarske službe; pojem, pomen in vloga komunalnih dejavnosti v sistemu javnih financ, komunalna infrastruktura; stroškovni vidiki izvajanja komunalnih dejavnosti, načini obračunavanja amortizacije, pomen in vloga amortizacije na področju komunalnih dejavnosti; oblikovanje cen komunalnih proizvodov in storitev, struktura stroškovne cene, določitev posameznih elementov cene, vloga normativov pri oblikovanju cen komunalnih storitev; organiziranost in organizacijske oblike na področju komunalnih dejavnosti; sistem javnih financ na lokalni ravni; privatizacija komunalnih dejavnosti in zasebno javno partnerstvo; ekonomski instrumenti varstva okolja.	Public needs and public business entities; concept, meaning and role of municipal economics, public utility infrastructure; cost aspects of municipal economic activities, depreciation accounting methods, amortization and role in the field of municipal economics; pricing policies of communal products and services, cost structure, individula cost elements, role of standards in municipal service pricing; organization and organization forms in the field of municipal economic activities; system of public finances at the local level; privatisation of municipal activities and private-public partnership; economical instruments for environmental protection.

Temeljni literatura in viri / Readings:

Rakar, A. Komunalno gospodarstvo: študijsko gradivo. Ljubljana, UL FGG, 71 str.
Rakar, A. 2004. Komunalno gospodarstvo : učbenik. Ljubljana, UL FGG, 186 str.
Brede, H. 2001. Grundzüge der öffentlichen Betriebswirtschaftslehre. München, Oldenburg Verlag, 57 str.
Virant, G. 2002. Pravna ureditev javne uprave. Ljubljana, UL Visoka upravna šola, izbrana poglavja, 63 str.
Quaas, M. 1997. Kommunales Abgabenrecht. München, C.H.Beck Verlag, izbrana poglavja, 92 str.

Cilji in kompetence:

Cilj
- Seznaniti študenta s področjem komunalnega gospodarstva kot specifičnega gospodarstva

Kompetence
- Poznavanje in razumevanje temeljnih značilnosti javnih potreb in javnih gospodarskih služb.
- Poznavanje in razumevanje pomena in vloge komunalnih dejavnosti pri zagotavljanju temeljnih pogojev za življenje in delo v urbani sredini.
- Poznavanje in razumevanje stroškovnih vidikov izvajanja komunalnih dejavnosti in metodologijo za oblikovanje cen za komunalne proizvode in storitve
- Poznavanje in razumevanje sistema javnih financ na lokalni ravni.
- Poznavanje in razumevanje ekonomskih instrumentov varstva okolja.

Objectives and competences:

Objectives
- To familiarize student with municipal economics as specific part of economy.

Competences
- Understanding basic characteristics of public needs and public utilities;
- To understand the role of public service infrastructure (technical infrastructure) as an irreplaceable condition for the provision of basic material goods to live and work in the urban environment
- To know and understand cost aspects of public utilities and the methodology for price formation in the field of public utility services
- To know and understand the system of public finances on municipal level.

Predvideni študijski rezultati:

- Študent pridobi znanje in razume ekonomske in organizacijske vidike lokalnih gospodarskih javnih služb ter materialne pogoje za delovanje lokalne samouprave.
- Študent bo pridobljeno znanje uporabil pri opredelitvi normativov in standardov za izvajanje posamezne komunalne dejavnosti, pri določanju strokovnih podlag za določanje cen, prispevkov in nadomestil, pri pripravi občinskih odlokov o izvajanju posamezne komunalne dejavnosti, pri pripravi koncesijskih aktov, strokovnih podlag in odlokov, ki se nanašajo na obračunavanje in zajemanje nedavčnih prihodkov na lokalni ravni.
- Na podlagi pridobljenih znanj in spoznanj bo študent kritično preverjal seznam in strukturo javnih potreb in s tem v zvezi zahteve po privatizaciji komunalnih dejavnosti in poskuse uvajanja pogodbenih odnosov v odločanje o javno-pravnih zadevah.
- Študent bo pri nedavčnih prihodkih lokalne skupnosti sposoben kritično presojati poudarjanje fiskalne funkcije na račun zmanjševanja njihove usmerjevalne vloge.

Intended learning outcomes:

- Student is capable of understanding economic and organisational aspects of public utilities and has the knowledge regarding material conditions needed to ensure the functioning of local self-government.
- Acquired knowledge can be used when defining norms and standards for selected public services; it can be used as expert basis for the price formation in the field of public utility services or for the purpose of municipal documents in the field of public service infrastructure.
- Student is capable of critical judgment regarding the list and structure of public needs; can form opinion regarding privatization of public utilities.
- The insight into contractual relationships between stakeholders in the field of municipal economics is given as well.
- The use of Slovenian and foreign language literature in the field of municipal economics; the ability to acquire, analyse and present data in the field of municipal economics; the ability to prepare and present legal documents in the field of municipal economics and the ability to cooperate with other experts in multidisciplinary teams.

- Študent bo sposoben uporabljati domačo in tujo literaturo s področja komunalnega gospodarstva, zbirati, analizirati in prikazovati podatke s tega področja, pripravljati ter javno predstavljati odloke in druge splošne pravne akte s tega področja ter sodelovati v interdisciplinarno sestavljenih strokovnih teamih.	

Metode poučevanja in učenja:	**Learning and teaching methods:**
Študijsko gradivo za predavanje in vaje je dosegljivo v spletni učilnici. Pri poučevanju in učenju se uporablja IKT tehnologija.	Lectures are given using visual aids and materials/literature available through E- classroom or using other publicly available data.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretični del izpita	**50 %**	Written exam (theoretical part)
Računski del izpita	**50 %**	Written exam (calculation tasks)

Reference nosilca / Lecturer's references:

RAKAR, Albin, ŠUBIC KOVAČ, Maruška, PERGAR, Petra, POLAJNAR, Matija, ČERNE, Tomaž, MESNER, Andrej, ZAJC, Tomaž, PUHAR, Martin, FLIS, Lara. Vrednost gospodarske infrastrukture in problematika zagotavljanja sredstev za njeno ohranitev : CRP - V5-1087 : končno poročilo o rezultatih raziskav. Ljubljana: Univerza v Ljubljani, Fakulteta za gradbeništvo in geodezijo, 2011. 148 str., ilustr.
ŠUBIC KOVAČ, Maruška, RAKAR, Albin. Model vrednotenja zemljišč kategoriziranih cest za namene pravnega prometa. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 253-266, ilustr.
ŠUBIC KOVAČ, Maruška. Celovita prenova med ustavno zagotovljeno zasebno lastnino in paradigmo trajnostnega razvoja. V: BASSIN, Peter (ur.), ŠUBIC KOVAČ, Maruška (ur.). Urbana prenova. Ljubljana: Društvo urbanistov in prostorskih planerjev Slovenije, 2009, str. 128-134.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Upravljanje stavbnih zemljišč
Course title:	Building land management

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Maruška Šubic Kovač

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Komunala.

Prerequisites:

The course is part of the module Municipal engineering.

Vsebina:

Temeljne pojmovne opredelitve, vezane na stavbna zemljišča; razvojne stopnje zemljišča od kmetijskega do za gradnjo pripravljenega zemljišča, raba zemljišča, mobilizacija degradiranih območij; pridobivanje potrebnih zemljišč za gradnjo: pravni posel, odločbe državnega organa; opremljanje zemljišč za gradnjo; ekonomski in finančni vidiki urejanja in uporabe stavbnih zemljišč: nadomestila, prispevki, davki, odškodnine; zasebno-javno partnerstvo na področju urejanja stavbnih zemljišč.

Content (Syllabus outline):

Basic terminology related to building land; development stages of land (from agricultural land to building land, land use, mobilization of degraded areas); acquisition of the necessary building land for construction: legal transaction, decrees of state administrative body; equipping land with infrastructure for the purpose of construction; economic and financial aspects of organisation and use of building land: compensations, contributions, taxes, indemnities; private-public partnership in the area of building land management.

Temeljni literatura in viri / Readings:

Šubic Kovač, M. 2013. Upravljanje stavbnih zemljišč: študijsko gradivo,98 str.
Klemenčič, T. 1997. Komunalno gospodarstvo, izbrana poglavja. Ljubljana, Svetovalni center, 308 str.
Tratnik, M. 2002. Stvarnopravni zakonik. Ljubljana, Uradni list RS, izbrana poglavja, 44 strani. Driehaus, H.-J. 1991. Erschließungs und Ausbaubeiträge. München, C. H. Beck Verlag, izbrana poglavja, 71 str.

Cilji in kompetence:	**Objectives and competences:**
Cilj - Usposobiti študenta za obvladovanje postopkov, ki so potrebni od sprejetja prostorskega akta do vpisa nepremičnine v uradne evidence. Kompetence - Poznavanje in razumevanje izrazoslovja s področja upravljanja nepremičnin - Obvladovanje postopkov pridobivanja in opremljanja zemljišč za gradnjo - Obvladovanje povezovanja postopkov s področja prostorskega planiranja, stvarnega prava in gradnje inženirskih objektov - Razumevanje finančnih in ekonomskih vidikov urejanja in uporabe stavbnih zemljišč.	Objectives - The ability to manage procedures for the registration of real estate in official records (starting from adoption of spatial planning document). Competences - Knowledge and understanding of terminology in the field of real estate management - Mastering procedures regarding building land acquisition and building land development - The ability to connect various procedures in the field of spatial planning, property law and civil engineering - Understanding financial and economic aspects of building land development and building land use.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent spozna bistvene karakteristike pojma stavbno zemljišče in razlike, ki delijo stavbna od kmetijskih zemljišč. - Študent bo pridobljena znanja uporabil pri postopkih pridobivanja zemljišč za gradnjo objektov, pri opremljanju zemljišč za gradnjo in pri obračunavanju dajatev, ki so neposredno vezana na stavbna zemljišča. - Sinteza znanj s področja prava, geodezije, prostorskega planiranja in gradnje inženirskih objektov (tehnični in organizacijski vidik). - Uporaba domače in tuje strokovne literature s področja upravljanja zemljišč, uporaba ustrezne računalniške opreme in paketov, javna predstavitev in obramba izdelanih programov opremljanja zemljišč za gradnjo.	- Student acquires knowledge in the field of building land management and is familiarised with basic characteristics of the concept of building land with the emphasis on building land and its differences with regard to agricultural land. - Student has the ability to use the acquired knowledge in the field of building land acquisition, building land development and when charging taxes linked to building land. - The synthesis of knowledge in the field of property law, geodesy, spatial planning and civil engineering (technical and organizational aspect). - The use of national and international professional literature in the field of building land management. - Ability to present the design concept in the field of building land development. - Ability to make oral presentation of the results in front of the public.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Študijsko gradivo za predavanja in vaje je dostopno v spletni učilnici. Pri poučevanju in učenju se uporabljajo IKT tehnologije.	Lectures using visual aids (course materials available via E-classroom).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit:		Written exam:
teoretični del izpita	**50 %**	theoretical part
računski del izpita	**50 %**	calculation tasks

Reference nosilca / Lecturer's references:

ŠUBIC KOVAČ, Maruška, WEIß, Erich. Modeli urejanja stavbnih zemljišč v Zvezni republiki Nemčiji. Ljubljana: Fakulteta za gradbeništvo in geodezijo, Institut za komunalno gospodarstvo, 2008. 159 str., ilustr.
ŠUBIC KOVAČ, Maruška. Land Development Potential under Conditions of Sustainable Development in the Republic of Slovenia. V: HEPPERLE, Erwin (ur.). Land Management : Potential, Problems and Stumbling Blocks. Zürich: VDF Hochschulverlag AG an der ETH, 2013, str. 177-185. Dostopno na: http://www.vdf.ethz.ch/service/3479/3480_Landmanagement_OA.pdf.
ŠUBIC KOVAČ, Maruška, RAKAR, Albin. Model vrednotenja zemljišč kategoriziranih cest za namene pravnega prometa. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 253-266,ilustr.
Dostopno na: http://www.geodetski-vestnik.com/54/2/gv54-2_253-266.pdf.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Komunalne naprave
Course title:	Communal technical infrastructure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Maruška Šubic Kovač

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Komunala.

Prerequisites:

The course is part of the module Municipal engineering.

Vsebina:

Temeljne pojmovne opredelitve; pomen in vloga komunalnih dejavnosti; stroškovni vidiki izvajanja komunalnih dejavnosti; komunalna infrastruktura v prostorskih aktih; gradbeno dovoljenje in gradnja komunalne infrastrukture; pridobivanje in opremljanje zemljišč za gradnjo; tehnično-tehnološke značilnosti komunalnih omrežij, objektov in naprav; dimenzioniranje in lokacijski pogoji; tehnični pogoji opremljanja zemljišč za gradnjo.

Content (Syllabus outline):

Basic conceptual definitions; concept and role of municipal activities; cost aspects of municipal activity implementation; technical infrastructure within spatial planning document; building permit and construction of technical infrastructure; acquisition and development of building land; technical – technological characteristics of municipal networks, structures and devices; design and location conditions of technical infrastructure; technical conditions of building land development.

Temeljni literatura in viri / Readings:

Rakar, A. 2011. Komunalne naprave in seminar: študijsko gradivo. Ljubljana, UL FGG, 155 strani.
Ciuha, A. 1997. Komunalne naprave-daljinsko ogrevanje: študijsko gradivo. Ljubljana, UL FGG.
Panjan, J. 2002. Osnove zdravstveno-hidrotehnične infrastrukture. Ljubljana, UL FGG.
Platiše, G. 1999. Električna omrežja in naprave za javno razsvetljavo: študijsko gradivo. Ljubljana, UL FGG.
Žegarac, Z., Arsić, V. 1999. Programi unapređivanja javne infrastrukture, Urbanistički zavod Beograda Jp, 161 strani, izbrana poglavja.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Seznanitev s tehnično-tehnološkimi značilnostmi komunalnih omrežij, objektov in naprav ter s tehničnimi pogoji opremljanja zemljišč za gradnjo - V samostojnem projektu združiti in sintetizirati teoretična znanja o različnih infrastrukturnih sistemih v urbanem okolju Kompetence - Razumevanje delovanja komunalne infrastrukture kot pogoja za življenje in delo v urbanem okolju - Zna sintetizirati različne infrastrukturne sisteme v delujočo celoto.	Objectives - To familiarize students with technical / technological characteristics of municipal networks, structures and devices and technical conditions of building land development - To combine (within individually done project) theoretical knowledge about various infrastructure systems in urban environment Competences - Understanding the function of technical infrastructure as one of the conditions for urban living - Skills to synthesize various infrastructure systems into a working whole

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent razume delovanje komunalne infrastrukture kot nenadomestljiv pogoj za zagotavljanje temeljnih materialnih dobrin za življenje in delo v urbani sredini. - Pridobljeno znanje študent uporabi pri izdelavi idejnih zasnov in idejnih projektov komunalne in energetske infrastrukture. - Sinteza tehnično-tehnološko različnih sistemov v celoto, ki rezultira k skupnemu cilju. - Uporaba domače in tuje strokovne literature ter računalniške opreme in jezikov za projektiranje inženirskih objektov.	- Understand the role of public service infrastructure (technical infrastructure) as an irreplaceable condition for the provision of basic material goods to live and work in the urban environment - Acquired knowledge can be used when making a design concept in the field of public service infrastructure or energy infrastructure. - Synthesis of various technical / technological systems into a whole, aiming towards a common goal. - The use of domestic and foreign language literature; the design of engineering structures.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja z uporabo vizualnih pripomočkov, izdelava vaje (projekta) pod vodstvom asistenta in zunanjih sodelavcev.	Lectures using visual aids; individual project done under the guidance of assistants and external staff (practitioners in the field of technical infrastructure).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit Samostojno izdelana vaja (projekt)	**70 %** **30 %**	Written exam Individually done project

Reference nosilca / Lecturer's references:

RAKAR, Albin, ŠUBIC KOVAČ, Maruška, PERGAR, Petra, POLAJNAR, Matija, ČERNE, Tomaž, MESNER, Andrej, ZAJC, Tomaž, PUHAR, Martin, FLIS, Lara. Vrednost gospodarske infrastrukture in problematika zagotavljanja sredstev za njeno ohranitev : CRP - V5-1087 : končno poročilo o rezultatih raziskav. Ljubljana: Univerza v Ljubljani, Fakulteta za gradbeništvo in geodezijo, 2011. 148 str., ilustr.
RAKAR, Albin, ŠUBIC KOVAČ, Maruška, ČERNE, Tomaž, PUHAR, Martin, MESNER, Andrej, PEGAN, Miloš, ŠUNTAR, Aleš, BELEC, Marjan, ŠARLAH, Nikolaj. Načrt vzpostavitve sistema za zaščito javne gospodarske infrastrukture : zaključno poročilo : težišče "skladnejši regionalni razvoj in izboljšanje gospodarjenja s prostorom" : CRP program "konkurenčnost Slovenije 2006-20013 v letu 2008". Ljubljana: Fakulteta za gradbeništvo in geodezijo, 2009. 64 f., pril., ilustr.
ŠUBIC KOVAČ, Maruška, SITAR, Metka. Slowenian Experience in Public-Private Partnership : Case studies: Tehnopolis, Šmartinska Partnership, Stožice Sports Park. V: PANAGOPOULOS, Thomas (ur.). New Models for Innovative management and Urban Dynamics : COST Action TU0602 Conference, 12.-14. October 2009, Universidade do Algarve, Faro, Portugal. University of Algarve: COST office, 2009, str. 53-58, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Uvod v načrtovanje stavb
Course title:	Introduction to building design

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			45		75	5

Nosilec predmeta / Lecturer: Košir Mitja

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Stavbarstvo.
Opravljen izpit iz predmetov Stavbarstva I in Stavbarstva II oz. osvojena ustrezna primerljiva znanja.

Prerequisites:

Course is part of the module Buildings.
Passed exams in Buildings I and Buildings II or a similar comparable course.

Vsebina:

Načrtovanje prostora seznanja študente s splošnimi postavkami standardne predstavitve objekta. Uporaba ustreznih meril, projektnih mrež, modularne koordinacije in merske standardizacije omogočajo skladno predstavitev načrtovanega objekta. Izdelava prostorskih simulacij in modelov omogoča nazorno podobo objekta in prostora, ki ga obdaja.
Načrtovanje stanovanjskih stavb spoznava študente z razvojem le-teh v prostoru in času. Analiza razvoja na podlagi primerov iz pozitivne prakse skozi prostor in čas. Dimenzioniranje prostorov na podlagi opreme in komunikacij. Vzpostavljanje funkcionalne povezave z veznimi tehničnimi sklopi v zaključene enote. Umeščanje v dani prostor in oblikovanje po principu "genius loci".
Načrtovanje proizvodnih stavb obravnava vsebino t.im. nestanovanjskih stavb od poslovnih, obrtnih

Content (Syllabus outline):

This course introduces students to the general principles of building projects presentation. Use of appropriate scales, planning grids, modular coordination and standardization of measurement enables consistent presentation of the designed building. Creating spatial simulations and models enables a clear depiction of the building and the surrounding area.
Design of residential buildings introduces students to the current trends as well as to the historical developments. Historical development in design of residential buildings is presented through analysis of best practice examples. Dimensioning of residential spaces through functional analysis of human ergonomics and furniture dimensions. Individually designed spaces are organized into lager wholes through use of functional diagrams. At the end the principle of design according to the

do čisto industrijskih. Spoznavanje pojma "proizvajati". Analiza razvoja na podlagi primerov iz pozitivne prakse skozi prostor in čas. Raziskovanje proizvodnih procesov, dimenzioniranje prostorov na podlagi opreme in komunikacij. Vzpostavljanje funkcionalne povezave prostorov z veznimi tehničnimi sklopi v zaporedne proizvodne enote. Ureditev neposredne okolice z vsemi elementi urbane opreme z zunanjo razsvetljavo in hortikulturnim programom rabe površin.	"genius loci" is presented and applied in spatial placing of individual buildings. Design of production buildings deals with the so-called non-residential buildings (i.e. commercial and industrial buildings). Students are introduced to the concept of "manufacture and production". Historical development in design of commercial buildings is presented through analysis of best practice examples. Dimensioning of commercial and manufacturing spaces through functional analysis of human ergonomics and specifics of individual manufacturing processes. Individually designed spaces are organized into lager wholes through use of functional diagrams. Design of exterior urban spaces in the immediate surroundings of the buildings with all the elements of street furniture with outdoor lighting and horticultural land use.

Temeljni literatura in viri / Readings:

Neufert, E. 2008. Projektiranje v stavbarstvu: osnove, standardi, predpisi za konstrukcije, gradnja, oblikovanje, potrebni prostor, namembnost prostorov, mere zgradb, prostorov in opreme – s človekom kot merilom in ciljem : priročnik za projektante, izvajalce in študente. Ljubljana.
Ramsey, C. G. 2002. Architectural Graphic Standards. New York [etc.] : John Wiley & Sons, 2000 Tehniška založba Slovenije.
Lechner, Norbert. 1991. Heating, cooling, lighting : design methods for architects. New York [etc.] : John Wiley & Sons.
Deplazes Andrea. 2008. Constructional architecture.: materials, processes, structures: a handbook. 2nd ed. Birkhauser.
Področna zakonodaja.
Dostopno na: http://kske.fgg.uni-lj.si/.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Študent se pri predmetu seznani z osnovami človekovih potreb v aktivnih prostorih ter njihovo funkcionalno povezavo v sistemu stavbe in okolja. - Izboljšanje kakovosti grajenega okolja in vzpostavitev tekoče komunikacije med sistemoma aktivnih prostorov in funkcionalnih con. - Razumevanje, da je pri obravnavanju posameznih elementov in stavbe kot celote nujna navezava na smernice evropskih direktiv in na nacionalno regulativo. Kompetence - Razume principe skladnega načrtovanja, rabe in opreme prostora v objektih in neposredni okolici - Razume pojem "stanovati", ki temelji na primerjalni analizi razvoja nastajanja sodobne stanovanjske stavbe in umeščanja le-te v okolje	Objectives - To familiarize students with the basic human needs in the built environment, their functional interconnections in the system of the building and the external environment. - To improve the quality of the built environment and the establishment of ongoing communication between the system of active spaces (living and working spaces) and functional zones (building envelope). - Understanding the role of the European directives and national regulations in dealing with individual elements and the building as a whole Competences - Understanding of the principles of coherent planning, use of specific spaces in buildings and immediate surroundings

- Pozna različne stanovanjske in nestanovanjske stavbe razvrščene v skladu z Metodološkimi pojasnili in navodili za razvrščanje objektov po enotni klasifikaciji vrst objektov (CC-SI) - Sposoben je sodelovanja pri načrtovanju enostavnih bivalnih in delovnih objektov - Obvlada koncepte arhitektonskih zasnov in njihovih notranjih zakonitosti - Sposoben je podati oceno potrebnih intervencij na ravni zasnove konstrukcijskih sklopov na osnovi izdelanih arhitektonskih skic projektov bivalnih in delovnih prostorov (stavb).	- Understanding of the concept of "living" based on a comparative analysis of the historic development of contemporary residential buildings and their relation to the environment - Knowledge of different residential and non-residential buildings classified in accordance with the methodological explanations and instructions for sorting buildings according to the Slovenian Classification of Types of Constructions (CC-SI) - Student is able to participate in the design of simple residential and commercial buildings - Students understand and are capable of using different architectural concepts in practice - Student is able to estimate the necessary technical interventions at the level of constructional complexes based on a set of architectural drawings for a given building.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Sposobnost sodelovanja pri načrtovanju enostavnih bivalnih in delovnih objektov, na ravni razporejanja aktivnih prostorov in oblikovanja funkcionalnih con. - Razumevanje konceptualnih arhitektonskih zasnov in njihovih notranjih zakonitosti. - Spretnosti uporabe domače in tuje literature in drugih virov, zbiranja in interpretiranja podatkov, identifikacija in reševanje problemov, kritična analiza, sinteza, delo v timih.	- The ability to participate in the design of simple living and working buildings at the level of design of active spaces and functional zones. - Theoretical understanding of architectural concepts and their inherent specifics. - Skills to use national and international literature and other sources, collecting and interpreting data, identification and solving of problems, critical analysis, synthesis, teamwork.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, laboratorijske vaje.	Lectures, laboratory work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Laboratorijske vaje	**70 %**	Laboratory work
Pisni izpit	**30 %**	Written exam

Reference nosilca / Lecturer's references:

KOŠIR, Mitja, KRAINER, Aleš, KRISTL, Živa. Integral control sistem of indoor environment in continuously occupied spaces. Autom. constr.. [Print ed.], 2012, letn. 21, št. 1, str. 199-209, ilustr., doi: 10.1016/j.autcon.2011.06.004.
KRISTL, Živa, KOŠIR, Mitja, DOVJAK, Mateja, KRAINER, Aleš. Študija dnevne osvetljenosti pisarniškega prostora glede na vizualne in biološke vplive = Study ofdaylight office space regarding visual and biological influences. Gradb. vestn., mar. 2011, letn. 60, št. 3, str. 84-91, ilustr.
KOŠIR, Mitja, KRISTL, Živa, KRAINER, Aleš. Active control system based on the application of pasive solar architecture measures. V: ISES Solar World Congress 2011 : Rapid Transistion to a Renewabl e Energy World : Proceedings, Avgust 28 - September 2, 2011, Kassel, Germanij. Kassel: International Solar Energy Society, 2011, str. 1-10, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Elementi gradbene fizike
Course title:	Elements of building physics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Jožef Peternelj

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Stavbarstvo.
Opravljen izpit iz predmeta Fizika.

Prerequisites:

Course is part of the module Buildings.
Passed exam in Physics.

Vsebina:

Nestacionarna termodinamika: porazdelitev temperature in prenos toplote v snovi, osnovne metode reševanja difuzijske enačbe pri danih robnih in začetnih pogojih, toplotne lastnosti snovi, toplotne izgube in njihove značilnosti, toplotna zaščita zgradb.
Vlaga: relativna in absolutna vlažnost, merjenje vlažnosti, vlaga v gradbenih materialih in transport vlage in vodne pare v poroznih snoveh, vpliv vlage na mehanske in toplotne lastnosti gradbenih materialov.
Zvok: izviri zvoka in razširjanje zvoka v prostoru, reverberacija, zaznavanje in merjenje jakosti zvoka, karakterizacija in kontrola hrupa, akustični materiali, akustika prostorov in okoljska akustika, kontrola reverberacije in kontrola hrupa v zgradbah.
Termično sevanje in svetloba: nastanek in razširjanje elektromagnetnega valovanja, elektromagnetni spekter, svetloba in svetlobni tok, termično sevanje segretih teles, Stefan-

Content (Syllabus outline):

Time dependent thermodynamics: temperature distribution and heat transfer in matter, basic methods for solving the diffusion equation, boundary and initial conditions, thermal properties of materials, heat losses and thermal insulation of buildings.
Moisture: relative and absolute humidity, measurements of humidity, moisture in building materials, moisture and vapour transfer in porous materials, influence of moisture on thermal properties of materials.
Sound: sound sources and propagation of sound, reverberation, perception of sound and measurements of sound intensity, characterisation and noise control in buildings, acoustic materials, room acoustics, environment acoustics, reverberation and noise control in buildings.
Thermal radiation and light: sources of electromagnetic waves and propagation of electromagnetic waves, electromagnetic spectrum, light and radiation flux, thermal radiation of bodies,

Boltzmannov zakon ter emisivnost in absorptivnost snovi, razširjanje svetlobe skozi snov, lom odboj in sipanje svetlobe, barve teles in barvni pojavi v prostoru, fotometrija, sončna svetloba v zgradbah.	Stefan-Boltzmann law, emissivity and absorptivity, light propagation, reflection, refraction and scattering of light, colours and colours effects in space, photometry, sun light in buildings.

Temeljni literatura in viri / Readings:

R. Kladnik. 1958. Visokošolska fizika I. del. DZS, str.200-206 in str.216-222.
R.Kladnik. 1985. Visokošolska fizika III. del. DZS, str.38-100.
R.Kladnik. 1983. Nestacionarni temperaturni pojavi v ovojnem sklopu zgradbe, publikacija št.3. Ljubljana, FAGG, 80 str.
L.H. Bell and D.H. Bell. 1994. Industrial noise control, Fundamentals and applications, 2nd edition. Dekker, str. 135-234, str.330-348, str.505-556.

Cilji in kompetence:	**Objectives and competences:**
Cilji Ponuditi študentom poglobljeno znanje tistih naravnih pojavov, ki so pomembni v gradbeni stroki: - prenos toplote v zgradbah, - vpliv in vloga vlage v gradbenih objektih, - zvok in zaščita pred hrupom v zgradbah in urbanem okolju ter - uporaba dnevne svetlobe v zgradbah. Kompetence - Sposobnost samostojnega razmišljanja o konkretnih problemih in sistematičnost pristopa k reševanju problemov, ki sloni na splošnih fizikalnih zakonih, - Poglobljeno znanje s področja prenosa toplote, faznih sprememb in transporta vlage, zvoka in svetlobnih pojavov v obsegu, ki je koristen za gradbeno stroko ter bivalno in delovno okolje - Sposobnost identifikacije fizikalnih pojavov, ki so ključnega pomena pri problemih specifičnih za gradbeno stroko, - Sposobnost formulacije fizikalno-matematičnega problema in izbire primernega matematičnega orodja za dosego kvantitativnih rezultatov, - Obvladovanje osnovnih matematičnih metod reševanja difuzijske enačbe, valovne enačbe in tiste elemente fotometrije, ki so pomembni pri svetlobnih pojavih v gradbenih objektih.	Objectives Students obtain a more detailed description of those physical phenomena which are important for civil engineering: - heat transfer in buildings, - moisture in building elements, - sound and noise control and - use of daylight in buildings. Competences - Ability of an independent approach to solving practical problems, based on general physical principles. - Students are expected to possess an in-depth knowledge in the areas of heat transfer, phase transitions, moisture transport, and sound and light effects specific to civil engineering practice. - Ability to identify the physical processes relevant to particular problem and to present the corresponding physical and mathematical formulation together with the appropriate choice of mathematical tools necessary for its quantitative solution. - Mastering of basic mathematical methods required for the solution of diffusion and wave equation is also expected, together with sufficient knowledge of photometry.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent spozna osnovne fizikalne zakone povezane s transportom toplote in vlage, razširjanjem zvoka in svetlobe ter se nauči osnovnih matematičnih metod, ki mu omogočajo reševanje strokovnih problemov na teh področjih.	- Students are acquainted with the basic physical laws involved in heat and moisture transport, sound and light propagation together with the corresponding mathematical methods required for the solution of problems connected with the above processes.

- Razumevanje snovi temelji na fizikalni vsebini omenjenih pojavov in na sposobnosti študenta matematično formulirati problem in izbrati primerno matematično orodje za dosego kvantitativnih rezultatov - Zmožnost formulacije problema in izbire primernega matematičnega orodja za dosego kvantitativnih rezultatov. - Spodbuditi pogled, da naravoslovje na splošno in fizika še posebej, predstavljata med seboj povezano zbirko univerzalnih spoznanj, ki opisujejo naravo in svet okoli nas in do katerih se je človeštvo dokopalo z eksperimenti. - Implementacija novih rešitev za najbolj aktualne probleme.	- Understanding of the physical principles involved and being able to obtain quantitative solutions. - Ability to formulate a problem and select a suitable mathematical tools in order to obtain quantitative results - It is desired to promote the view that natural sciences in general and physics in particular represent a set of laws describing the world around us which were obtained with the help of numerous experiments throughout the history of science. - Implementation of new solutions for actual problems.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje in samostojno izdelane naloge.	Lectures, problem solving classes, and independent projects.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Predstavitev samostojno izdelanih nalog z ustnim zagovorom.	**100 %**	Presentation of independent projects with oral defence.

Reference nosilca / Lecturer's references:

KRANJC, Tomaž, PETERNELJ, Jože. Heat flow in composite rods : an old problem reconsidered. Int. j. heat mass transfer. [Print ed.], apr. 2011, letn. 54, št. 9-10, str. 2203-2206
KRANJC, Tomaž, PETERNELJ, Jože, KOZAK, Jernej. The rate of heat flow through a flat vertical wall due to conjugate heat transfer. Int. j. heat mass transfer. [Print ed.], februar 2010, letn. 53, št. 5/6, str. 1231-1236
KRANJC, Tomaž, PETERNELJ, Jože. The Rate of Heat Flow through Non-Isothermal Vertical Flat Plate. V: BELMILOUDI, Aziz (ur.). Heat trasfer - theoretical analysis, experimental investigations and industrial systems. First published January, 2011. Rijeka: InTech Open Access, 2011, str. 617-634.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Prenova stavb
Course title:	Building renovation

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Roman Kunič

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Predmet je del modula Stavbarstvo. Opravljen izpit iz predmetov Stavbarstva I in Stavbarstva II oz. osvojena ustrezna primerljiva znanja.	The course is part of the elective module Buildings. Passed exams in Buildings I and Buildings II or a similar comparable course.

Vsebina:	**Content (Syllabus outline):**
Opredelitev pojmov (vzdrževanja, prenove, sanacije in spremembe namembnosti). Struktura vzdrževalnih del, življenjska doba; sanacije (odprava napak in poškodb na ovoju stavbe) Sprememba namembnosti prostora (zakonodaja, zahteve); prenova izbrane stavbe – vaja; analiza situacije, študija možnosti; koncept in zasnova prenove; izvedba in preverjanje odziva obstoječe in prenovljene stavbe: svetloba, toplota, vlaga, zvok, požar.	Definition of concepts (maintenance, renovation, restoration and change of use). The structure of maintenance work, life cycle. Restoration (removing mistakes and damages in building envelope). Change of use of active spaces (legislation, requirements). Renovation of a selected building-tutorial: situation analysis, feasibility study; concept of design and renovation; implementation and checking of response of existing and renovated buildings: light, heat, humidity, sound, fire.

Temeljni literatura in viri / Readings:

Neufert, E. 2002. Projektiranje v stavbarstvu : osnove, standardi, predpisi za konstrukcije, gradnja, oblikovanje, potrebni prostor, namembnost prostorov, mere zgradb, prostorov in opreme – s človekom kot merilom in ciljem : priročnik za projektante, izvajalce in študente. Ljubljana, Tehniška založba Slovenije.

Smernice za energetsko prenovo stavb kulturne dediščine, Ministrstvo za infrastrukturo RS, Ministrstvo za kulturo RS, Zavod za varstvo kulturne dediščine Slovenije, Urbanistični inštitut RS, Gradbeni inštitut ZRMK, COBISS.SI-ID=287688960, ISBN 978-961-93518-6-4, dostopno na: http://www.energetika-portal.si/podrocja/energetika/energetska-prenova-javnih-stavb/

MUSEUMS. 1999. Energy Efficiency and Sustainability in Retrofitted & New Museums Building NNE5- 1999-20. Slovene Ethnographic Museum European Commission. 5th Framework Programme Programme Energy. Ljubljana, Slovenia, Slovene Ethnographic Museum. Dostopno na: http://kske.fgg.uni-lj.si/.
Deplazes A. 2008. Constructional architecture.: materials, processes, structures: a handbook. 2nd ed. Birkhauser.

Cilji in kompetence:

Cilji
- Dvig kakovosti obstoječega grajenega okolja, delovanja tega okolja z zmanjševanjem negativnih vplivov na zunanje okolje
- Usmerjanje v trajnostno oblikovanje stavb, ki temelji na učinkoviti izrabi virov in ekoloških načelih
- Pridobivanje znanja, tehničnih spretnosti in oblikovanje inovacijske sposobnosti za dvig kakovosti projektov.
- Razumevanje vloge smernic evropskih direktiv in nacionalne regulative pri obravnavanju konstrukcijskih sklopov in stavbe kot celote.

Kompetence
- Pozna specifike vzdrževanja, prenove, sanacije in spremembe namembnosti stavb
- Obvlada področje prenove in gospodarne rabe energije s pomočjo novih struktur konstrukcijskih sklopov in izboljšanja kakovosti notranjega okolja
- Zna pristopiti k procesu analize, načrtovanja in dimenzioniranja tistih delov stavbe, ki so potrebni vzdrževanja, prenove ali sanacije
- Sposoben je zasnovati, kritično ovrednotiti in uporabiti prenovljene elemente
- Uporablja inženirske metode in postopke pri prenovi bivalnega prostora
- Obvlada celostni pristop pri projektiranju in izvedbi v sistemu zunanji prostor - notranji prostor - človek - ovoj stavbe.

Objectives and competences:

Objectives
- To improve the quality of the built environment with minimization of negative impacts on the environment
- Focusing on the design of sustainable buildings with efficient use of natural resources, ecological principles
- Acquiring knowledge, technical and innovative skills to increase the quality of projects.
- Understanding the role of national and EU legislation in the assessment of constructional complexes and buildings

Competence
- Getting familiar with the specifics of maintenance, renovation, restoration and change of use of the building,
- Mastering the field of renovation and rational use of energy with implementation of new constructional complexes, improving the quality of the internal environment,
- Getting familiar with the approach of the analysis process, design, dimensioning of building elements that are necessary to maintain, renovate, restore,
- Ability of critical evaluation and use of refurbished elements,
- Use of engineering methods and procedures for renovation of living space,
- Mastering of integral approach in the design and implementation of the system: outdoor environment - indoor environment - human being - building envelope.

Predvideni študijski rezultati:	Intended learning outcomes:
- Študent zna pristopiti k procesu analize, načrtovanja in dimenzioniranja tistih delov stavbe, ki so potrebni vzdrževanja, prenove ali sanacije. - Pri spremembi namembnosti stavb je sposoben upoštevati in realizirati nove zahteve. - Študent je sposoben zasnovati, kritično ovrednotiti in uporabiti prenovljene elemente. - Razume in upošteva iteracijski proces inženirskega načrtovanja kot simulacije realne izvedbe. - Uporaba domače in tuje literature, branje načrtov, poznavanje zakonodaje s področja gradbeništva, delo z različnimi računalniškimi programi, javno nastopanje.	- Student knows how to approach the process of analysis, design and dimensioning of the parts of the building that are due for maintenance, renovation and restoration. - In case of change of intended use of buildings student is able to consider new requirements. - Student is able to design, critically evaluate and use renovated building elements. - Understanding and considering the iterative process of engineering design. - Skills for review of relevant literature sources and other references (national, international), student is familiar with relevant legislation, software tools and is able to publicly present his work.

Metode poučevanja in učenja:	Learning and teaching methods:
Predavanja, laboratorijske vaje.	Lectures, laboratory work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Laboratorijske vaje	**70 %**	Laboratory work
Pisni izpit	**30 %**	Written exam

Reference nosilca / Lecturer's references:

KUNIČ, Roman, KOŽELJ, Matjaž, OREL, Boris, SURCA, Angelja Kjara, VILČNIK, Aljaž, SLEMENIK PERŠE, Lidija, MERLINI, Dušan, BRUNOLD, Stefan. Adhesion and thermal stability of thickness insesitive spectrally selective (TISS) polyurethane-based paint coatings on copper substrates. *Solar energy materials and solar cells*, ISSN 0927-0248. [Print ed.], 2009, vol. 93, no. 5, str. 630-640.

KUNIČ, Roman, MIHELČIČ, Mohor, OREL, Boris, SLEMENIK PERŠE, Lidija, BIZJAK, Aleš, KOVAČ, Janez, BRUNOLD, Stefan. Life expectancy prediction and application properties of novel polyurethane based thickness sensitive and thickness insensitive spectrally selective paintcoatings for solar absorbers. *Solar energy materials and solar cells*, ISSN 0927-0248. [Print ed.], 2011, letn. 95, št.11, str. 2965-2975, ilustr., doi: 10.1016/j.solmat.2011.05.014.

KUNIČ, Roman, OREL, Boris, KRAINER, Aleš. An Assessment of the Impact of Accelerated Ageing on the Service Life of Bituminous Waterproofing Sheets. *Journal of materials in civil engineering*, ISSN 0899-1561, 2011, vol. 23, no. 12, str. 1746-1754, ilustr., doi: 10.1061/(ASCE)MT.1943-5533.0000326

KUNIČ, Roman. Forest-based bioproducts used for construction and its impact on the environmental performance of a building in the whole life cycle. V: KUTNAR, Andreja (ur.), MUTHU, Subramanian Senthilkannan (ur.). *Environmental impacts of traditional and innovative forest-based bioproducts*, (Environmental footprints and eco-design of products and processes, ISSN 2345-7651). Singapore: Springer Nature. cop. 2016, str. 173-204,

KUNIČ, Roman. Ozelenjene strehe. V: STANIČ, Gojko. *Sonaravni vrt na strehi : kako vsak dan v letu do sveže in zdrave zelenjave*. 1. natis. Ljubljana: G. Stanič - svetovanje. 2012, str. 88-97,

KUNIČ, Roman. Vacuum insulation panels - an assessment of the impact of accelerated ageing on service life. *Strojniški vestnik*, ISSN 0039-2480, okt. 2012, vol. 58, no. 10, str. 598-606, SI 121, ilustr., doi: 10.5545/sv-jme.2012.539

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Bioklimatsko načrtovanje
Course title:	Bioclimatic design

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30			30		60	4

Nosilec predmeta / Lecturer: Mitja Košir

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Stavbarstvo.
Opravljen izpit iz predmetov Stavbarstva I in Stavbarstva II oz. osvojena ustrezna primerljiva znanja.

Prerequisites:

Course is part of the module Buildings.
Passed exams in Buildings I and Buildings II or a similar comparable course.

Vsebina:

Pojem bioklimatske orientacije: upoštevanje fizioloških potreb človeka in geografskih in podnebnih razmer lokacije pri oblikovanju bivalnega in delovnega okolja in sonaravni razvoj. Povezava biologija stavbe – ekologija stavbe. Osnovni modeli pasivnih sistemov: direktni zajem, zbiralnoshranjevalna stena, staklenjak in hibridi. Stacionarna toplotna analiza stavbe s povezanimi mikroklimatskimi vplivi: prezračevanje, vlaga. Analiza dnevne svetlobe v prostoru. Analiza osončenja. Zvok v prostoru. Vloga in izhodiščne zasnove kontrolnih sistemov. Pregled avtohtonih bioklimatsko zasnovanih stavb v Sloveniji po regionalni strukturi.

Content (Syllabus outline):

Concept of bioclimatic orientation: consideration of physiological human needs, geography and climate conditions for the design of sustainable living and working environment. Connections: building biology – building ecology. Basic models of passive solar systems: direct solar gain, indirect solar gain, conservatory and hybrids. Steady-state thermal analyses in relation to microclimatic influences: ventilation, humidity. Daylight analyses of active spaces. Analyses of building insolation. Analyses of sound insulation and room acoustics. The role and basic design of building management systems. Overview of vernacular bioclimatic buildings in Slovenia.

Temeljni literatura in viri / Readings:

Goulding, J. R., Lewis, J. O., Steemers, T. C. 1992. Energy Conscious Design: A primer for Architects. B.T. Batsford Ltd.
Krainer, A. 2002. Viri in pasivni sistemi. Modul 2, Stavba 1. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Krainer, A. 2003. Razvoj tehnologij. Modul 2, Stavba 2. Ljubljana, Fakulteta za gradbeništvo in geodezijo, Katedra za stavbe in konstrukcijske elemente : Visoka šola za zdravstvo.
Jones, David Lloyd. 1998. Architecture and the environment : bioclimatic building design. London, Laurence King.
Študijsko gradivo dostopno na: http://kske.fgg.uni-lj.si/ .

Cilji in kompetence:

Cilji
- Študent se pri predmetu seznani z osnovami človekovega odziva na okolje ter obvlada prenos sistema zunanje okolje – ovoj – notranje okolje – človek v konceptualizacijo realne stavbe.
- Izboljšanje kakovosti grajenega okolja, delovanja tega okolja z zmanjševanjem negativnih vplivov, ki jih ima na zunanje okolje, usmerjanje v oblikovanje takih zgradb, ki upoštevajo principe trajnostnega razvoja z ustvarjanjem in odgovornim ravnanjem z zdravim grajenim okoljem, ki temelji na učinkoviti izrabi virov in ekoloških načelih ter pridobivanje znanja, tehničnih spretnosti in oblikovanje inovacijske sposobnosti za dvig kakovosti projektov.
- Razumevanje, da je pri obravnavanju konstrukcijskih sklopov in stavbe kot celote je nujna navezava na smernice evropskih direktiv in na nacionalno regulativo.

Kompetence
- Študent pozna konstitutivne elemente in procese, ki definirajo položaj umetnega okolja v naravnem okolju z upoštevanjem principa kontinuuma prostora in časa
- Obvlada prenos sistema zunanje okolje-ovoj-notranje okolje-človek v konceptualizacijo realne stavbe
- Razume značilnosti in delovanja osnovnih modelov pasivnih sistemov in njihovih realizacij
- Pozna izhodišča kontrolnih sistemov in njihovo vlogo pri optimizaciji delovanja stavb
- Pozna regionalno strukturo bioklimatskih zgradb v Sloveniji
- Obvlada postopek ocene toplotnega odziva stavbe (stacionarno); osončenja – dnevne svetlobe, požara; zvoka v prostoru

Objectives and competences:

Objectives
- Getting familiar with the principles of human physiology and its response in different environments, mastering the transfer between the analysed system “outdoor environment-indoor environment-human” and the building conceptualization.
- To improve the quality of the built environment, to minimize negative impacts on the environment, to consider the principles of sustainable design, responsible design and management of healthy indoor environments, to apply ecological principles for efficient use of natural resources, to acquire knowledge, technical and innovative skills for improving quality of building projects.
- Understanding that the analyses on the level of constructional complexes or buildings are based on national and EU legislation.

Competences
- Getting familiar with the constitutive elements and processes that define the status of built environment in relation to natural environment, considering continuum of space and time principles,
- Mastering of the transfer between the analysed system “outdoor environment-indoor environment-human” and building conceptualization,
- Understanding the characteristics and functioning of basic models of passive systems and their realizations,
- Getting familiar with the principles of control systems and their role in the process of building performance optimization,
- Getting familiar with the regional structure of vernacular buildings in Slovenia,
- Mastering the process of evaluation of thermal response of building (steady-state); insolation – daylight; fire; noise issues in active spaces,

- Sposoben je kritično oceniti in interpretirati pridobljene podatke (rezultate) - Sposoben je uporabljati računske metode in programsko opremo za področje gradbene fizike - Obvlada veljavno zakonodajo za področje gradbene fizike (evropske ditektive npr.CPD, slovensko zakonodajo npr. ZGO in podzakonske akte).	- Ability to critically evaluate and interpret results, - Ability to use calculation methods and computer software in the field of building physics, - Mastering of national and international legislation in the field of building physics (European directives, e.g. CPD, national legislation, e.g. ZGO and other requirements).

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Sposobnost identifikacije bioklimatskih faktorjev pri načrtovanju in izvedbi stavb. - Razumevanje delovanja značilnih pasivnih sistemov in analize vplivov direktnega zajema (stacionarno), sposobnost izdelave analize stacionarnega toplotnega odziva, osončenja in koeficienta dnevne svetlobe ter analize zvoka v prostoru - Uporaba računskih metod in programske opreme za analizo obravnavanih elementov toplotnega, svetlobnega in zvočnega odziva stavbe oziroma prostora. - Sposobnost samostojne ocene položaja in vloge posameznih obravnavnih funkcionalnih področij: predvsem toplota in dnevna svetloba ter z njimi povezanimi vplivnimi faktorji in identifikacija povezav med njimi. - Spretnosti uporabe domače in tuje literature in drugih virov, zbiranja in interpretiranja podatkov, identifikacija in reševanje problemov, kritična analiza, sinteza, delo v skupini.	- Ability to identify all bioclimatic factors for the design and construction of buildings. Understanding the functioning of typical passive solar systems with the analysis of influences of direct solar gain (steady- state), steady state analysis of thermal response, building insolation, daylight coefficient, sound insulation and acoustics. - Application of calculation methods and computer software for the analyses of the evaluated elements of thermal response of building/active space, daylight and sound issues. - Ability to evaluate the status and role of individual functional areas, e.g. thermal fluxes, daylight in relation with influential factors, identification of their connections. - Skills for review of relevant literature sources and other references (national, international), identification and problem solving, critical analyses, synthesis, team work.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in uporaba računalniških programov za simulacijo in analizo gradbenofizikalnih vidikov oblikovanja stavbe/prostora se izvaja na laboratorijskih vajah v manjših skupinah.	Lectures and laboratory work. Laboratory work, performed in small groups: use of computer software for simulation and analysis of various aspects of building physics, in the framework of building/active space design.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Laboratorijske vaje	**70 %**	Laboratory work
Pisni izpit	**30 %**	Written exam

Reference nosilca / Lecturer's references:

TOMAŽIČ, Simon, LOGAR, Vito, KRISTL, Živa, KRAINER, Aleš, ŠKRJANC, Igor, KOŠIR, Mitja. Indoor-environment simulator for control design purposes. Build. environ.. [Print ed.], Dec. 2013, vol. 70, str. 60-72, ilustr., doi: 10.1016/j.buildenv.2013.08.026.
KOŠIR, Mitja, KRAINER, Aleš, ŠESTAN, Primož, KRISTL, Živa. Študija delovanja programske opreme za izračun porabe energije v stavbah = Study of computer software performance for calculation of energy use in buildings. Gradb. vestn., mar. 2013, letn. 62, str. 61-71,ilustr.
KOŠIR, Mitja, KRAINER, Aleš, KRISTL, Živa. Integral control sistem of indoor environment in continuously occupied spaces. Automation in construction, ISSN 0926-5805. [Print ed.], 2012, letn. 21, št. 1, str. 199-209, ilustr., doi:10.1016/j.autcon.2011.06.004.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Vodenje projektov
Course title:	Project management

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		3	6
Civil Engineering – first cycle academic		3	6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			60	4

Nosilec predmeta / Lecturer: Jana Šelih, Primož Banovec

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je del modula Stavbarstvo.

Prerequisites:

The course is a part of the module Buildings.

Vsebina:

Osnovna znanja iz načrtovanja, vodenja in izvedbe projektov: teoretične osnove planiranja in vodenja projektov; tehnike planiranja projektov; posebnosti gradbenega projekta; napovedovanje, linearno programiranje; 'just in time' planiranje; kalkulacije, popis del; organizacija podjetij, organizacija na gradbišču; simulacijske analize (študija izvršljivosti ...); osnove varstva pri delu; osnove zagotavljanja kakovosti v gradbenem projektu; plan pogajanj; pogodbe v gradbeništvu, načini plačila, višja sila.

Content (Syllabus outline):

Fundamental knowledge from the field of planning, management and execution of projects: theoretical fundamentals of project planning and management; specific features of construction project; forecasting, linear programming; Just-in-time planning; determination of unit price, bill of quantities; organisation of an enterprise, construction site organisation; simulation studies (feasibility studies ...); fundamentals of safety at work; fundamentals of quality assurance within the constr. project; negotiation plans, construction contract, payment; procedures; acts of God.

Temeljni literatura in viri / Readings:

ASIMOW Morris. 1962. Introduction to Design, University of California, Los Angeles, USA.
Krajewski L.J., Ritzman L. P. 1996. Operations Management, Addison-Wesley Publishing Comp., str.: 274–302, 505–538 in 627–648.
Lužnik Pregl R., Križaj Bonač G. 1991. Priročnik za izdelavo investicijskega programa, Inštitut za ekonomiko investicij, Ljubljana, strani: 1–207.
Mansfield E. 1993. Managerial Economics, Theory, Applications and Cases, W.W. Norton & Comp. Inc. USA, strani: 1–107.
Rebernik M. 1995. Ekonomikla podjetja, Gospodarski vestnik, Ljubljana, strani: 1 – 25 in 209 – 247

Strukturni skladi EU v Sloveniji. 2004. Priročnik za izdelavo analize stroškov in koristi investicijskih projektov, Ljubljana, strani: 1–40.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati znanja in veščine, ki omogočajo načrtovanje, vodenje in izvedbo projektov. - Predstaviti principe varnosti pri delu, zagotavljanja kakovosti v gradbenem projektu in priprave gradbene pogodbe. Predmetnospecifične kompetence: - Pozna specifike načrtovanja, vodenja in izvedbe projekta in s specifike načrtovanja, vodenja in izvedbe gradnje - Uporablja tehnike kalkulacij, organizacije podjetij in gradbišč, simulacij projektov, kot tudi uporabne tehnike marketinga, trženja in financ - Razume kompleksnost in multidisciplinarnost obravnavnega področja in uporablja osvojene tehnike za njegovo obvladovanje - Obvlada kritično ovrednotenje posameznih vplivnih faktorjev - Delno je sposoben samostojnega odločanja.	Objectives - To get acquainted with the knowledge and skills indispensible for independent project planning and execution of civil engineering works. - To present the principles of safety at work, fundamentals of quality assurance within the constr. Project and preparation of construction contract. Specific competencies: - Knows the specific features of design, management and execution of a project - Uses techniques of calculation (determination of price), knows the organisation of enterprises and construction sites, project simulation, as well as applied techniques for marketing and finance - Understands the complexity and multidisciplinarity of the area, uses the acquired techniques for its control - Ability to critically assess individual factors of influence - Is partially able to decide independently.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent pridobi znanja in veščine, ki mu omogočajo načrtovanje, vodenje in izvedbo projektov. Ob tem v vseh fazah uporablja kritično ovrednoteje posameznih vplivnih faktorjev v razmerju do celote. - S pomočjo pridobljenih znanj kot aktiven subjekt sodeluje ali samostojno odloča v posameznih fazah projekta. - Razume kompleksnost in multidisciplinarnost obravnavnega področja in uporablja osvojene tehnike za njegovo obvladovanje. - Uporaba predstavljenih orodij in modelov za načrtovanje, izvedbo in zaključek projekta. - Spretnost uporabe domače in tuje literature, zbiranja in interpretiranja podatkov, delo v skupini, javno nastopanje, kritična razprava.	- Student acquires knowledge and skills that enable his/her independent project planning and execution. In all phases, student critically assesses the relation between individual factors and the project as a whole. - By using acquired knowledge, student is able to take part, as an active participant, in different project phases, and understands complexity and multidiciplinarity of the field under consideration. - Uses the learned techniques for its management. - Application of the tools and models (for planning, execution) introduced in the course. - Ability to use various literature, collection and interpretation of data, group work, public performance, critical discussion.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, v okviru katerih se izdela tudi samostojno nalogo.	Lectures, tutorial (includes independent preparation of seminar work).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Teor. izpit	**40 %**	Theor. exam
Računski izpit	**30 %**	Examples
Samostojna naloga	**30 %**	Individual seminar work

Reference nosilca / Lecturer's references:

SRDIČ, Aleksander, ŠELIH, Jana. Tveganja v gradbenem projektu - so ali niso obvladljiva?. Proj. mreža Slov., apr. 2012, letn. 15, št. 1, str. 4-9, 43, ilustr.
GUMILAR, Vladimir, ŽARNIĆ, Roko, ŠELIH, Jana. Increasing competitiveness of the construction sector by adopting innovative clustering. Inž. ekon., 2011, letn. 22, št. 1, str. 41-49, ilustr. http://www.ktu.lt/lt/mokslas/zurnalai/inzeko/71/1392-2758-2011-22-1-41.pdf.
SRDIČ, Aleksander, ŠELIH, Jana. Integrated quality sustainability assessment in construction - a conceptual model. Technol. econ. dev. econ. (Spausd.). [Print ed.], dec. 2011, letn. 17, št. 4, str. 611-626, ilustr. http://dx.doi.org/10.3846/20294913.2011.603177, doi: 10.3846/20294913.2011.603177.

STEINMAN, Franci, BANOVEC, Primož, ŠANTL, Sašo. Uporaba genetskih algoritmov pri načrtovanju in upravljanju vodovodnih sistemov = Application of genetic algorithms with water supply system planning and management. Gradb. Vestn., avgust 2001, let. 50, str. 195-204, ilustr.
STEINMAN, Franci, KLASINC, Roman, BANOVEC, Primož. Ermittlung der erwarteten Schadengröße bei Überflutungen hochwassergefährdeter Gebiete unter Verwendung moderner Technologien = Determination of expected damage resulting from the inundation of areas exposed to flood risks, using up-to-date technologies. Österr. Wasser- Abfallwirtsch.. [Print ed.], 2001, jg. 53, h. 9/10, str. 242-247, ilustr., graf. prikazi.
BANOVEC, Primož, CERK, Matej. Photo documentation and ontological approach to the construction management. V: RADUJKOVIĆ, Mladen (ur.). 10th International Conference Organization, technology and management in construction, OTMC 2011, 07-10 September 2011, Šibenik, Croatia. Proceedings. Zagreb: Croatian Association for Organization in Construction: = Hrvatska udruga za organizaciju građenja, 2011, str. 1-7, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Angleščina za gradbeništvo in geodezijo
Course title:	English for civil and geodetic engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	4, 6
Civil Engineering – first cycle academic		2, 3	4, 6

Vrsta predmeta / Course type: Izbirni strokovni/ Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
	60				60	4

Nosilec predmeta / Lecturer: Monika Kavalir, lektorica

Jeziki / Languages:	
Predavanja / Lectures:	Angleško / English
Vaje / Tutorial:	Angleško / English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Znanje angleščine na stopnji B1 po Skupnem evropskem jezikovnem okvirju.

Prerequisites:

B1 English skills (Common European Framework of Reference).

Vsebina:

Angleška terminologija s področij: urejanja prostora, organizacije gradbenih del in gradbenega poslovanja, gradbenih materialov, temeljenja in geotehničnih gradenj, masivnih, jeklenih, lesenih konstrukcij, hidrotehnike, geodezije, poslovne korespondence.

Content (Syllabus outline):

Specialized vocabulary in the fields of: municipal engineering, construction engineering, construction materials, foundation and geotechnical engineering, mass, steel frame and wood frame construction, water resources engineering, surveying and geodesy, business correspondence.

Temeljni literatura in viri / Readings:

M. Brkan, English for Students of Civil Engineerings, FG UM, 2009, 62 str.M. Horvatović, English for Civil Engineers, Naučna knjiga Beograd, 1991, 300 str.
Strokovni in splošni slovarji, n.pr.: D. Blockley, The new Penguin dictionary of civil engineering, Penguin book, 2005, 533 str.

Cilji in kompetence:

Cilji
- Spoznati temeljno strokovno terminologijo v angleškem jeziku s področja gradbeništva, da lahko kasneje pri študiju uporablja angleško literaturo in spletne vire.
- Ponovitev in nadgradnja angleške slovnice, pridobljene v srednješolskem izobraževalnem

Objectives and competences:

Objectives
- Familiarization with specialized civil and geodetic engineering vocabulary to be used in studying from English-language printed and online resources
- Revision and improvement of secondary- school English grammar skills with a focus on academic and business English

programu, s posebnim poudarkom na jezikovnem slogu v strokovni literaturi in poslovni korespondenci. Uporaba - Omogočen je nadaljnji študij po tujih virih, med katerimi prevladujejo viri v angleščini. - Sposobnost poslovne korespondence in pisanje krajših samostojnih strokovnih besedil.	Use - Using foreign resources, which mostly include English-language sources, in further study - Ability to correspond for business purposes and independently write relatively short specialized texts.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Razumevanje angleškega pisnega in govornega strokovnega jezika.	- Understanding written and spoken specialized English.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Lektorske (seminarske) vaje z analizo strokovne literature. Spremljanje in analiza filmskega gradiva s področja gradbeništva v angleškem jeziku. Pouk v celoti poteka v angleškem jeziku.	Language (seminar) practical classes that include analysis of specialized literature. Following and analysing English-language video materials in the field of civil and geodetic engineering. The course is carried out in English only.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Seminarska naloga	**40 %**	Seminar paper
Ustna predstavitev seminarske naloge	**10 %**	Oral presentation
Pisni izpit	**50 %**	Written exam

Reference nosilca / Lecturer's references:

KAVALIR, Monika. Culture in ESP syllabus : why and how. Rom. J. Eng. Stud., 2013, vol. 10, str. 113-122.
KAVALIR, Monika. Modal structure in Kurt Vonnegut's Slaughterhouse-five. Acta neophilol., 2011, [Letn.] 44, [št.] 1/2, str. 103-111, 165.
KAVALIR, Monika. Teaching reference skills : does it really matter?. ELOPE (Ljubl.), autumn 2010, vol. 7, str. 113-122.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Digitalno načrtovanje
Course title:	Digital design

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	3–6
Civil Engineering – first cycle academic		2, 3	3–6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			60	4

Nosilec predmeta / Lecturer: Tomo Cerovšek

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Vloge računalnika pri načrtovanju in modeli BIM. Orodja za konceptualno in detajlno načrtovanje. Obvladovanja okolij za digitalno načrtovanje. Ravnina in prostor, koordinatni sistemi in mreže. Pogledi, transformacije k.s. in elementov. Modeliranje teles, platonična telesa in telesa CSG. Modeliranje elem. stavb, knjižnice predmetov GDL. Programiranje geometrije na osnovi API. Modeliranje terena, operacije in As-built modeli. Površine teles, teksture, senčenje in svetloba. Animacija, Sončne študije in 4D modeli. 5D simulacija časovnih sprememb geometrije. Standardi, interoperabilnost in BIM menedžment. Napredna uporaba pogledov projekcije, kosovnice. Metode priprave in izmenjave dokumentacije.	The role of computers in engineering design and the use of BIM models. Tools for conceptual and detailed design. Environments for digital design. Planar and space geometry, coordinate systems and grids. Views, transformations of coordinate systems and geometrical entities. Modelling of bodies, platonic solids and CSG. Modelling of building elements and libs GDL. Programming of geometrical entities via API. Modelling of terrain, operations and As-builts. Surfaces, textures, shading and daylight. Animations, sun studies and 4D models. 5D simulation of changes of geometry. Standards, interoperability and BIM mngt. Advanced use of views, projections, take-of. Methods of authoring and exchange of project documentation.

Temeljni literatura in viri / Readings:

MITCHELL and McCULLOUGH M. 1995. Digital design media . - 2nd ed. - New York [etc.] : Wiley, cop. 1995. - XVI, 494 str., ilustr. ; 26 cm.
CEROVŠEK T (2013) Prosojnice za predmet Digitalno Načrtovanje, Univerza v Ljubljani.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilji
- Spoznati vlogo digitalnega načrtovanja v procesu graditve
- Spoznati način delovanja programov za načrtovanje
- Spoznati uporabo modelov za različne potrebe

Kompetence
- Izbrati pravo orodje za digitalno načrtovanje glede na vrsto objekta, kompleksnost in fazo projekta
- Samostojno izdelati model gradbenega objekta s ključnimi informacijami
- Uporabiti avtomatizacijo procesa načrtovanja glede na zahtevnost in obseg problema
- Sposobnost uporabe geometrijskih podatkov v različne namene

Objectives and competences:

Objectives
- Student shall understand the role of digital design throughout project stages
- Student shall understand the way tools for digital design work
- Student shall understand the use of models

Competences
- Use the right tool for digital design that matches types of building, complexity and project phase
- Independent authoring of a model of a building with essential geometrical and non- geometrical data
- Ability to automate the design process to match scale and complexity of the design problem
- Ability to use geometrical data for different purposes

Predvideni študijski rezultati:

- Poznavanje pomena digitalnega načrtovanja skozi življenjski cikel stavb.
- Razumevanje delovanja programov za digitalno načrtovanje.
- Znanje o uporabi računalniških programov.
- Poznavanje dela s programi za konceptualno načrtovanje.
- Izdelani modeli v različnih programskih paketih in glede na potrebe različnih faz gradbenega projekta.

Intended learning outcomes:

- Knowledge and understanding of the role of digital design throughout building project stages.
- Knowledge and understanding of tools for digital design from conceptual design to detailed design.
- Developed models in different authoring environments for digital design for different information needs in several project stages.

Metode poučevanja in učenja:

Problemsko zasnovano učenje. Študentu se podajo problemi iz prakse, ki so povezani z digitalnim načrtovanjem, pri reševanju pa se lahko posvetuje s predavateljem, bodisi na korekturah ali preko spletnih tehnologij za komunikacijo v dejanskem času, lahko si pomaga s primeri dobre prakse.

Learning and teaching methods:

Problem based learning. Students are faced with problems from the industry, which are related to digital design. Students get part of the knowledge just in time and one part just in case. Students have regular consultations with the lecturers either in person or live using real-time collaboration tools.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Naloge	**40 %**	Excercises
Sprotno delo pri vajah	**40 %**	Regular course work
Samostojne naloge	**20 %**	Final project

Reference nosilca / Lecturer's references:

CEROVŠEK, Tomo. A review and outlook for a 'Building Information Model' (BIM) : a multi-standpoint framework for technological development. Advanced engineering informatics, 2011, letn. 25,št. 2, str. 224-244, ilustr., doi: 10.1016/j.aei.2010.06.003.
CEROVŠEK, Tomo. Informacijsko modeliranje zgradb (BIM) : uvod. Gradb. vestn., mar. 2010, letn. 59, št. 3, str. 71-72, ilustr.
CEROVŠEK, Tomo. Process Reuse in Product Development with 5D Models : Concepts, Similarity Measures and Query Techniques. V: PUTNIK, Goran D. (ur.). VINORG 11 : July 6.-8., 2011, Ofir, Portugal, (Communications in Computer and Information Science). Ofir: 2100 Project Association, 2012, str. 1-10, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Športna vzgoja
Course title:	Physical education

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	3–6
Civil Engineering – first cycle academic		2, 3	3–6

Vrsta predmeta / Course type: Izbirni splošni / Elective general

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
5			55		60	4

Nosilec predmeta / Lecturer: Branko Škof

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Zdravstveni status, ki dovoljuje ustrezen telesni napor.	Health status, which allows appropriate physical exercise.

Vsebina:	Content (Syllabus outline):
Predavanja Splošni teoretični del vsebuje predavanja, ki so skupna vsem športnim programom in se izvajajo skupno za vse študente (osnove delovanja človekovega telesa, njegovega gibalnega, srčno žilnega in dihalnega sistema, psihomotorične in funkcionalne sposobnosti, športno-gibalna aktivnost kot preventivna in kurativna dejavnost za ohranjanje in utrjevanje zdravja, osnove zdravega prehranjevanja in regulacije telesne teže ter drugih medicinskih vidikov športa, metode preverjanja in ugotavljanja stanja psihomotoričnih in funkcionalnih sposobnosti). Specialni teoretični del je vezan na izbrano športno panogo (posebnosti športne panoge, njen vpliv na človeka, tehnika, taktika in pravila, osnove telesne in tehnično taktične priprave) in se izvaja skozi praktične vaje; Praktične vaje Študent izbira med ponujenimi športnimi panogami. Za vsako panogo se izvaja program	Lectures General theoretical part contains lectures, which are common to all sports programs made collectively for all students (basic function of the human body, movement of the body and cardiovascular system, psychomotor and functional abilities, prevention and curative activity for developing health, basic nutrition and healthy diet, regulation of body weight and other medical aspects of sports, checking methods and assessment of psychomotor and functional abilities). Special theoretical part is linked to the selected sport (specificity of sport, human development through sport, technique, tactics and rules, fundamentals of physical and technical preparation) and is implemented through practical exercises; Practical work Students choose between the offered sport branches. For each sport have a program of learning

učenja, izpopolnjevanja znanja in osnovnega treniranja. Poleg izbrane športne panoge bo študent moral opraviti 5 vodenih enodnevnih ali večdnevnih športnih aktivnosti v naravi, ter preizkus motoričnih in funkcionalnih sposobnosti.	and skill training. Students have to do: five guided multi-day sports activities in nature and aerobic endurance test.

Temeljni literatura in viri / Readings:

Škof, B. 2012. Does physical activity at a young age really mean a healthier adulthood and old age? Annales kinesiologiae, ISSN 2232-2620, 2012, vol. 3, no. 2, str. 149-166.
Škof, B. 2010. Spravimo se v gibanje - za zdravje in srečo gre: kako do boljše telesne zmogljivosti slovenske mladine? Ljubljana, Fakulteta za šport UL, Inštitut za šport, 253 str.
Škof, B. et at., 2007. Šport po meri otroka in mladostnika. Ljubljana, Fakulteta za šport UL, Inštitut za šport, 445 str.
Berčič, H. et at. 2007. Šport v obdobju zrelosti. Fakulteta za šport UL, Inštitut za šport, 240 str.
Škof, B., Zabukovec V., Boben, D., Cecič Erpič S., 2005. Pedagoško-sociološki vidiki športne vzgoje. Ljubljana, Fakulteta za šport UL, Inštitut za kineziologijo, 237 str.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Odpravljanje in preprečevanje posledic pomanjkanja gibanja oz. skrb za izboljšanje psihofizičnih sposobnosti, krepitev zdravja in ustvarjalno izrabo prostega časa. - Ozaveščanje o vrednotah športa in preko tega vplivanje na oblikovanje pozitivnih stališč do športa in navajanje na zdrav način življenja - Izpopolnjevanje znanja v izbrani športnih panogah - Oblikovanje trajnega aktivnega odnosa do športa kot kompenzacijske dejavnosti k študiju in delu Kompetence - Oblikovanje trajnega pozitivnega odnosa do športne dejavnosti in trajne skrbi za ohranjanje zdravja in delovnih sposobnosti, - Racionalno vgrajevanje športa v način življenja, - Sposobnost samostojne skrbi za zdrav način življenja skozi športno-gibalno aktivnost, - Pripravljenost in sposobnost samostojnega vključevanja v organizirane ali neorganizirane oblike športnega udejstvovanja v novih študijskih ali delovnih okoljih, - Promocija in uveljavljanje fakultete in univerze.	Objectives - Care for improving psychophysical abilities, health strength and creative use of free time - Raising awareness about the values of sports, encouraging a positive attitude to sports and healthy way of lifestyle - Perfecting knowledge in selected sports - Encouraging positive attitude to sport as a compensatory activity to study and work Competences - Formed positive attitude towards sports activities and permanent concern for the preservation of health and working ability. - Rational incorporation of sports into lifestyle, - Understand the concern for a healthy lifestyle through sports and physical activity, - Readiness and ability of self-depended inclusion in organized or non-organized forms of sports in the new study or work environments, - Promotion and recognition of the Faculty and University.

Predvideni študijski rezultati:	Intended learning outcomes:
- Razumevanje temeljnih pojmov in teorij delovanja človekovega gibalnega, srčno žilnega in dihalnega sistema ter njihovih najpogostejših patologij - Oblikovanje razumskega in čustvenega odnosa do telesnega napora, poznavanje teorije aktivnega počitka in metod za regeneracijo telesa, poznavanje zdravega prehranjevanja in regulacije telesne teže. Izpopolnitev znanja izbranih športnih zvrsti - Uporaba pridobljenih znanj in vedenj v vsakodnevnem življenju za kompenzacijo negativnih učinkov enostranskih obremenitev v času študija - Skozi pridobljena znanja in vedenja zagotovitev večje kvalitete življenja in večje učinkovitosti pri študiju in delu - Psihofizična pripravljenost organizma je pogoj za reševanje vsakodnevnih obveznosti in nalog.	- Understanding the basic concepts and theories of human locomotion, cardiovascular and respiratory systems and their most frequent pathologies in relation to mental health - Creation of rational and emotional attitude toward physical effort, knowledge of the theory of active rest and methods for body regeneration, knowledge of healthy diet and body weight regulation, - Improvement of knowledge in selected sport. Use of acquired knowledge and skills in daily life to compensate daily stresses and negative effects of unilateral load during the study, - Through the acquired knowledge and behaviour increased quality of life and increased efficiency of study and work are ensured, - Good psychophysical preparedness is a condition to solve everyday duties and obligations.

Metode poučevanja in učenja:	Learning and teaching methods:
Pouk se izvaja v pokritih športnih objektih in v naravi v obliki predavanj in vaj, skupinskih in individualnih konzultacij kontinuirano preko celega semestra, pa tudi v zgoščenih (kurznih) oblikah, vendar z enakim fondom ur, pri čemer se večji del teorije podaja skozi praktične vaje. Uporablja se naslednje učne oblike: frontalna, individualna, delo v manjših skupinah.	Activities are implemented in indoor sports facilities and the natural environment in the form of lectures and exercises, group and individual consultations through the whole semester as well as in concentrated forms, major part of theory is performed through practical exercises. Learning forms: frontal, individual, small group work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Teoretični izpit	**20 %**	Theoretical exam
Praktični izpit	**80 %**	Practical exam

Reference nosilca / Lecturer's references:

AUERSPERGER, Irena, ŠKOF, Branko, LESKOŠEK, Bojan, KNAP, Bojan, JERIN, Aleš, LAINŠČAK, Mitja. Exerciseinduced changes in iron status and hepcidin response in female runners. PloS one, 2013, vol. 8, issue 3, tabele, graf. prikazi, [8 str.]

PLEVNIK, Matej, PIŠOT, Rado, ŠKOF, Branko. The effects of a six-month training programme on running endurance, morphological characheristics [!] and some aerobic ability parameters of adult women with different physical abilities = Vpliv šestmesečnega vadbenega programa na tekaško vzdržljivost, morfološke značilnosti in nekatere kazalce aerobne zmogljivosti odraslih žensk z različno začetno zmogljivostjo. Ann. Kin. (Koper, Tisk. Izd.), 2012, vol. 3, no. 2, str. 181-195.

AUERSPERGER, Irena, KNAP, Bojan, JERIN, Aleš, BLAGUS, Rok, LAINŠČAK, Mitja, SKITEK, Milan, ŠKOF, Branko. The effects of 8 weeks of endurance running on hepcidin concentrations, inflammatory parameters and iron status in female runners. Int. J. sport nutr. Exerc. Metab. (Print), 2012, vol. 22, issue 1, str. 55-63.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Podjetništvo
Course title:	Entrepreneurship

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	4, 6
Civil Engineering – first cycle academic		2, 3	4, 6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		15			60	4

Nosilec predmeta / Lecturer: Aleš Vahčič

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
V okviru predmeta se študentje spoznajo z naslednjimi vsebinami: pomen podjetništva; inovacije in podjetniške priložnosti; vloga podjetnika; pojavne oblike podjetništva (notranje podjetništvo, družinsko podjetništvo, tehnološko podjetništvo); priprava poslovnega načrta (panoga dejavnosti, podjetje, proizvodi in storitve; tržna raziskava in analiza; ekonomika poslovanja podjetja; načrt trženja; proizvodni in storitveni načrt; načrt razvoja; vodstvena skupina in kadri; terminski načrt; kritična tveganja in izzivi; finančni načrt; pridobivanje in upravljanje z viri).	In the framework of the course, students get knowledge on the following topics: importance of the entrepreneurship; innovations and business opportunities; the role of entrepreneur; different types i.e. forms of undertakings (inner enterprise, family enterprise, technological enterprise); business proposal (business fields, enterprise, products and services; market research and analyses; economics of a business units; marketing plan; production and service plan; development plan; management and human resources; scheduling; risks and challenges; getting and managing of the resources).

Temeljni literatura in viri / Readings:

Antončič, B., Hisrich, R. D., Petrin, T., & Vahčič, A. 2002. Podjetništvo. Ljubljana, GV založba, 435.
Nussbaum, B. 2004. The power of design. Business Week, 68-75.
Kelley, T., & Littman, J. 2005. The ten faces of innovation: Currency Doubleday.
Kelley, T., & Littman, J. 2001. The art of innovation: HarperCollinsBusiness.
Dodatna literatura glede na izbrani projekt.

Cilji in kompetence:

- Predmet je namenjen študentom, ki želijo osvojiti osnovne podjetniške pojme in podjetniške sposobnosti preko priprave poslovnega načrta z d.school pristopom (pristopom preko dizajnerskega načina razmišljanja).
- Dizajnersko razmišljanje predstavlja odmik od klasičnega ekonomskega reševanja problemov, s tem da spodbuja multidisciplinaren pristop pri reševanju problemov, spodbuja kulturo neprestanih inovacij in hitrega prototipiranja, spodbuja drugačnost mišljenja in išče sinergije med različnimi pogledi na reševanje problemov.
- Cilj predmeta je obvladati osnovne podjetniške pojme ter razumeti bistvo podjetniškega pristopa razviti sposobnost samostojnega odločanja in prevzemanja odgovornosti izdelati projekt poslovnega načrta za ustanovitev lastnega podjetja, za uvedbo novega proizvoda v obstoječem podjetju oz. razširitev poslovanja v lastnem družinskem podjetju.

Kompetence:
- Študent je sposoben izdelati poslovni načrt za ustanovitev lastnega podjetja

Objectives and competences:

- This course is meant for students who are interested in getting knowledge from the field of entrepreneurship and in getting business competences through preparation of a business plan using the “d.school approach” (based on design thinking).
- Design thinking differs from the classical economic problem solution approach, enhancing the interdisciplinary approach for problem solutions, permanent innovations and fast prototyping, dissimilar thinking, and trying to find synergies between different aspects of problem solutions.
- The aim of the course is the understanding of basic business terminology and the business approach development of skills for the individual decisions and taking responsibilities finalizing a project of business plan for the establishment of an own enterprise, for the introduction of a new product in an existing enterprise or business development of a family enterprise.

Competences
- Student is abble to prepare a busines plan for his/her own enterprise

Predvideni študijski rezultati:

- Študent(ka) pozna osnovne podjetniške koncepte in aktivnosti, ki jih izvajajo podjetniki.
- Razume bistvo podjetniškega pristopa in vlogo podjetništva in podjetnikov ustanoviteljev v nacionalnem gospodarstvu.
- Predmet daje močan poudarek praktični uporabi, saj so pridobljena znanja izhodišče za obvladovanje osnovnih aktivnosti, povezanih z vodenjem novega podjetja.
- Pridobljena znanja omogočajo podjetniški način razmišljanja v sprejemanju poslovnih odločitev.
- Na osnovi pridobljenih teoretičnih znanj bo študent sposoben prepoznati vzorce obnašanja in tako povezati teoretična znanja s praktičnimi izzivi.
- Študent(ka) pridobi spretnosti zbiranja, interpretacije in aktivne uporabe elektronskih virov.

Intended learning outcomes:

- Student is familiar with the basic business concepts and activities, conducted by entrepreneurs.
- He/she understands the essence of business approach as well as the role of entrepreneurship and entrepreneurs for the national economy.
- The course is focused on practical implementation, since its contents are fundamental for the activities related to management of a new enterprise.
- The knowledge is important for business thinking when making business decisions.
- Based on the theoretical knowledge, students will be able to recognize different behaviour patterns and as such they will be able to link the theoretical knowledge with the practical challenges.
- Students get skills for acquisition, interpretation and active use of e-references.
- Students get skills for critical thinking and work.

- Študent(ka) pridobi sposobnosti kritičnega razmišljanja in dela. - Študent(ka) pridobi sposobnosti ustnega in pisnega poročanja.	- Students get skills for oral and written communication.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Pri predavanjih slušatelji spoznajo osnovne pojme podjetništva, podjetniškega procesa in planiranja novih poslov. Seminarske vaje Študenti v skupinah pripravljajo projektno nalogo. Pripravljene naloge so ob koncu šolskega leta predstavljene v okviru vaj. Predavatelji so dnevno odzivni po elektronski pošti.	Lectures Students get knowledge about basic concepts in the field of entrepreneurship, business process and business planning. Tutorials Student work is organized in groups, as a project work. The results of project work are presented at the end of the course in the framework of tutorials. The lecturers are daily available via e-mail.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit	**100 %**	Written exam

Reference nosilca / Lecturer's references:

VAHČIČ, Aleš, GLAS, Miroslav, STRITAR, Rok, ZUPAN, Blaž. 2007. "D.School" - a creative approach to teaching interdisciplinary course on entrepreneurship at higher education institutions. V: IntEnt 2007. Gdansk: University of Technology, 19 str.

VAHČIČ, Aleš. 2004. Politična ekonomija konkurenčnosti in podjetništva : gradivo za Pogovore o prihodnosti Slovenije, 1. Marec 2004. V: Pogovori o prihodnosti Slovenije. Pogovor 4, Konkurenčnost Slovenije : Ljubljana, 1. marec 2003. Ljubljana, Urad Predsednika Republike Slovenije, str. 183-185.

SHAPIRO, Daniel, VAHČIČ, Aleš, PAPANIA, Lisa. 2008. Seaway : building boats in Slovenia. V: AIDIS, Ruta (ur.), WELTER, Friederike (ur.). The cutting edge : innovation and entrepreneurship in new Europe. Cheltenham (UK); Northampton (MA): E. Elgar, cop. 2008, str. 146-165.

ČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Pravica gradnje in gradbena pogodba
Course title:	Building right and building contract

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	4, 6
Civil Engineering – first cycle academic		2, 3	4, 6

Vrsta predmeta / Course type: Izbirni strokovni / Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
30		30			60	4

Nosilec predmeta / Lecturer: Mitja Juhart, Viktor Grilc

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Prerequisites:

Vsebina:

Uvod: civilno pravo kot posebno pravno področje; splošne značilnosti civilnega prava; pravni viri.
Stvarno pravo: predmet in pravice stvarnega prava; pravica gradnje po gradbenih predpisih; lastninska pravica, solastnina, skupna lastnina, etažna lastnina; služnost, hipoteka; stavbna pravica; druge pravice na nepremičninah; evidentiranje nepremičnin (kataster in zemljiška knjiga).
Obligacijsko pravo: uvod; pogodbeno pravo – viri, pogoji za veljavnost pogodbe in neveljavnost pogodb, predpogodbena faza s pogajanji in različnimi zapisi (letter of intent, punktacije, predpogodba …), nastanek pogodbe (ponudba, ponudba v sistemu javnega naročanja), izpolnitev in odgovornost za napake; pogodbe s področja gradbeništva – splošni in posebni viri (Obligacijski zakonik, Gradbene uzance, pravila FIDIC …), podjemna in mandatna pogodba, gradbena pogodba (določanje cene, jamčevanje, sodna praksa), Inženiring; osnove odškodninskega prava – predpostavke odškodninskega zahtevka, krivdna in

Content (Syllabus outline):

Introduction: civil law as special legal area; general characteristics of civil law; legal sources.
Property law: subject and rights of property law; building right according to building regulations; property right, joint ownership, common ownership, floor ownership; easement, mortgage; building title; other real estate rights; recording of real estate (cadastre and land register).
Law of obligations: introduction; contractual law – sources, conditions for validity of contract and invalidity of contracts, pre-contract stage with negotiations and different records (letter of intent, punctations, pre-contract, etc.), contracting procedure (offer, offer in the public procurement system), completing and responsibility for errors; contracts from the area of civil engineering – general and special sources (OZ, GU, FIDIC rules, etc.), work and mandate contract, construction contract (definition of price, warranty, case law), Engineering; basics of damage law – assumptions of damage claim, liability for fault and objective liability, responsibility for employees.

objektivna odgovornost, odgovornost za zaposlenega. Reševanje sporov.	Solving of disputes.

Temeljni literatura in viri / Readings:

Juhart, M., Tratnik, M., Vrenčur, R., Plavšak, N., Geč, M. 2007. Stvarno pravo. GV založba.
(predvsem v delu, ki obravnava nepremičnine / in particular chapters on real-estate)
Slovenska zakonodaja, pravilniki s področja obravnave: Uradni list RS: http://www.uradni-list.si, www.dz-rs.si, www.pisrs.si /
Gradiva odložena na spletno učilnico UL FGG / Other study material via the student web classroom.

Cilji in kompetence:	**Objectives and competences:**
- Poglavitni cilj predmeta je pridobivanje temeljnih znanj s področja prava na nivoju seznanjanja s temeljnimi pojmi in instituti. - Predmet je orientiran na pravne institute civilnega prava in zajema opredelitev pravice graditi, zemljiško knjižno ureditev, pojem in vsebino gradbene pogodbe ter osnove odškodninskega prava.	- The main goal of the course is to acquire basic knowledge from the area of law on the level of understanding the basic notions and institutes. - The course is focused on legal institutes and civil law and contains the definition of the building right, the land register regulation, the concept and contents of building contract and the bases of damage law.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spozna osnovne pravne pojme s področja civilnega prava, s katerimi se gradbenik srečuje pri opravljanju svoje dejavnosti. - Razume pomen posameznih pravnih izrazov in opravil, kar omogoča presojo lastnega ravnanja v konkretnih položajih. - Zmožnost jasnega oblikovanja stališč v komunikaciji s pravnikom pri sestavi pravnih aktov, zmožnost samostojnega izvrševanja enostavnejših pravnih poslov. - Zavedanje pravnih posledic različnih ravnanj pri opravljanju dela.	- Learning the basic legal terms from the area of civil law that civil engineer meets in practice. - Understands the importance of individual legal terms and legal tasks, which allows the judgement of own handling in real situations. - Ability of clear formation of standpoints in communication with lawyer when preparing legal acts, ability of independent execution of simple legal acts. - Awareness of legal consequences of different actions in practice.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja z audiovizualnimi pripomočki. Seminarji s poudarkom na praktičnem delu (iskanje pravnih aktov, spoznavanje zemljiške knjige, sodelovanje pri pripravi pravnih aktov).	Lectures with audiovisual aids. Seminars with the emphasis on practical work (searching legal acts, learning about land register, cooperation in the preparation of legal acts).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit	**100 %**	Exam

Reference nosilca / Lecturer's references:

JUHART, Miha. Upravičenje (pravica) gradnje in njeno izkazovanje. Pravni letopis …, 2010, str. 159- 164.
JUHART, Miha. Funkcionalno zemljišče skozi čas in predpise. PP, Prav. Praksa (Ljubl.), 24. jan. 2008, letn. 27, št. 3, pril. Str. II-V.
JUHART, Miha. Hipoteka in neposredna izvršljivost. Pravni letopis …, 2008, str. 31-38.

GRILC, Peter. Konkurenčno pravo v obdobju gospodarske krize (državne pomoči). Podjet. Delo, 2010, let. 36, št. 8, str. 1453-1469.
GRILC, Peter. Konkurenčno pravo in politika konkurence. V: KAJNČ LANGE, Sabina (ur.), LAJH, Damjan (ur.). Evropska unija od A do Ž. Ljubljana: Uradni list Republike Slovenije, 2009, str. 201- 211.
GRILC, Peter. Konkurenčno pravo v obdobju gospodarske krize (državne pomoči). Podjet. Delo, 2010, let. 36, št. 8, str. 1453-1469.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Upravni postopek in upravni spor
Course title:	Administrative procedure and administrative dispute

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		2, 3	4, 6
Civil Engineering – first cycle academic		2, 3	4, 6

Vrsta predmeta / Course type: Izbirni strokovni/ Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
45		15			60	4

Nosilec predmeta / Lecturer: Mitja Horvat

Jeziki / Languages:		
	Predavanja / Lectures:	slovenski / Slovene
	Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**

Vsebina:	**Content (Syllabus outline):**
Splošno o pravu in njegovi strukturi: pravne norme, pravni akti, zakonitost, veljavnost prava, pravni viri. Državna ureditev Republike Slovenije: ustavni sistem, zakonodajna, sodna in izvršilna oblast, državna uprava. Lokalna samouprava: lokalne skupnosti, struktura in pristojnosti, razmerje do države, financiranje. Upravni postopek in upravni spor: temeljna načela, postopek na 1. stopnji, upravna odločba, splošno o pravnih sredstvih, pritožba, izredna pravna sredstva, upravni spor (sodni nadzor nad upravo).	General about law and its structure: legal norms, legal acts, legality, validity of law, legal sources System of government of the Republic of Slovenia: constitutional system, legislation, legal and executive authority, national administration Local self-government: local communities, structure and authorities, relation to the state, financing. Administrative procedure and administrative dispute: basic principles, first instance procedure, administrative decree; general about legal remedies, appeal, extraordinary legal remedies, administrative dispute (judicial control over administration).

Temeljni literatura in viri / Readings:

Godec, Rupko; Horvat, Mitja; Pirnat, Rajko; Šturm, Lovro; Trpin, Gorazd. 1996. Upravni zbornik, Inštitut za javno upravo pri Pravni fakulteti v Ljubljani, Ljubljana, str. 9-86, 217-282, 303-323.
Grad, Franc, Kaučič, Igor; Ribičič, Ciril, Kristan, Ivan. 1999. Državna ureditev Slovenije, Ljubljana. Ustava RS in zakoni, ki obravnavajo področja tega predmeta.
Constitution of RS and laws dealing with the areas of the course.

Cilji in kompetence:	**Objectives and competences:**
- Poglavitni cilj predmeta je pridobivanje temeljnih znanj s področja javnega prava na ravni seznanjanja s temeljnimi pojmi in instituti. - Podrobneje je predstavljen upravni postopek in upravni spor oziroma sodni nadzor nad upravo.	- The main objective of the course is to give basic knowledge from the area of public law at the level of learning the basic concepts and institutes. - In detail, the administrative procedure and administrative dispute or judicial control over administration are presented.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spozna osnovne pravne pojme s področja javnega prava, s katerimi se gradbenik srečuje pri opravljanju svoje dejavnosti. - Razume pomen posameznih pravnih izrazov in opravil, kar omogoča presojo lastnega ravnanja v konkretnih položajih. - Zmožnost jasnega oblikovanja stališč v komunikaciji s pravnikom pri sestavi pravnih aktov, zmožnost samostojnega izvrševanja nalog pri pridobivanju dovoljenj. - Zavedanje pravnih posledic različnih ravnanj pri opravljanju dela.	- Learning the basic legal terms from the area of public law that civil engineer meets in practice. - Understands the importance of individual legal terms and legal tasks, which allows the judgement of own handling in real situations. - Ability of clear formation of standpoints in communication with lawyer when preparing legal acts, ability of independent execution of tasks related to acquisition of permits. - Awareness of legal consequences of different actions in practice.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja z audiovizualnimi pripomočki, seminarske vaje.	Lectures with audiovisual aids, seminar tutorials.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit	**100 %**	Exam

Reference nosilca / Lecturer's references:

HORVAT, Mitja. 2007. Vezanost abstraktnega upravnopravnega delovanja. Javna uprava, letn. 43, št. 1, str. 147-170.
HORVAT, Mitja. 2005. Določitev davkov z zakonom. Javna uprava, 2005, letn. 41, št. 2/3, str. 300-312.
HORVAT, Mitja. 2004. Upravnopravna zadeva in lokalna samouprava. Javna uprava, letn. 40, št. 3, str. 479-503.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Od ideje do gradbenega objekta
Course title:	From idea to building structure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo – prva stopnja UN		1–3	1–6
Civil Engineering – first cycle academic		1–3	1–6

Vrsta predmeta / Course type: Izbirni strokovni/ Elective professional

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
60		15			75	5

Nosilec predmeta / Lecturer: učitelj na študijskem programu / teacher at the study programme

Jeziki / Languages:	
Predavanja / Lectures:	slovenski / Slovene
Vaje / Tutorial:	slovenski / Slovene

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Predmet je namenjen študentom drugih študijskih programov, predvsem s področja družboslovja, zanje ni pogojev pristopa, ne more pa ga izbrati študent kateregakoli študijskega programa s področja gradbeništva.

Prerequisites:

The course is intended to students of other study programs, mainly those from social sciences; no Prerequisites are foreseen, but it cannot be selected by students of civil engineering.

Vsebina:

Predavanja
- Zgodovina in pomen gradbeništva za družbeni in gospodarski razvoj, vpliv gradbenih posegov na naravno in urbano okolje
- Osnovni pojmi v gradbeništvu, klasifikacija dejavnosti, klasifikacija gradbenih objektov
- Gradbeništvo kot interdisciplinarna gospodarska panoga (sodelovanje drugih strok pri investicijskih projektih), vloga in organizacija inženirske zbornice
- Zakonodajni okviri umeščanja v prostor in graditve
- Potek in vodenje investicijskega projekta (definiranje ciljev projekta, faze, udeleženci)
- Posebnost gradbene industrije: projektiranje in izvedba unikatnih produktov – prototipov
- Umeščanje v prostor
- Vplivi lokacije (vsak projekt je unikaten z vidika namembnosti, tal, hidroloških, prostorskih in

Content (Syllabus outline):

Lectures:
- History and importance of civil engineering for social and economic development, influence of construction activities on natural and urban environment
- Basic concepts in civil engineering, classification of activity, classification of building structures
- Civil engineering as interdisciplinary industry (cooperation of other professions in investment projects), role and organisation of the chamber of engineers
- Legal frameworks of urban planning and of construction
- Procedure and management of investment project (definition of project goals, phases, participants)
- Specifics of construction industry: design and implementation of unique products – prototypes
- Urban planning

klimatskih pogojev, prometnih povezav, lokalne zakonodaje …) - Načini dela za zagotavljanje kakovosti in obvladovanje tveganj v investicijskem projektu (predstavitev zakonsko predpisanih zahtev in zahtev stroke, ki zagotavljajo varnost in kakovost gradbenega objekta, predstavitev vrst tveganj, njihovih posledic ter možnih ukrepov za mitigacijo – revidiranje, nadzor, kontrola kakovosti materialov …) - Pomen odločitev (gospodarskih, prostorskih) v začetnih fazah investicijskega projekta, vpliv teh odločitev na nadaljevanje / izvedbo investicijskega projekta - Gradbeni materiali: pregled, proizvodnja, kontrola kakovosti, certificiranje - Energetska bilanca stavb, skrb za zdravo bivalno okolje, gradbeništvo in ekologija (življenjski cikel stavb, ogljični odtis …) - Osnove načrtovanja in gradnje prometne in komunalne infrastrukture: umeščanje v prostor in gradnja, interakcije objekt – infrastruktura – prostor – človek - Pregled tehnologije gradnje stavb in inženirskih objektov - Gradbeništvo in naravne nesreče (Varstvo pred poplavami in urejanje vodotokov, potresi, plazenje tal) - Informacijske tehnologije v gradbeništvu, inženirska komunikacija (baze prostorskih podatkov, GIS, geodetske podlage, gradbeni načrti) - Gospodarjenje z nepremičninami in njihovo vrednotenje Vaje: - Razumevanje prostorskih aktov: Državni prostorski načrt, Občinski podrobni prostorski načrt - Baze prostorskih podatkov: kataster, GIS … - Sestavni deli projektne dokumentacije - Razumevanje gradbenih načrtov - Analiza tveganj	- Influences of location (each project is unique from the aspect of purpose, ground, hydrological, spatial and climatic conditions, traffic connections, local legislation, etc.) - Principles of profession that provide quality and management of risks in investment project (presentation of legally prescribed demands and demands of the profession that provide safety and quality of a building structure, presentation of risk types, their consequences and possible mitigation measures – revision, supervision, quality control of materials, etc.) - Importance of decisions (economic, spatial) in initial phases of investment project, influence of these decisions on continuation / implementation of investment project - Building materials: overview, manufacturing, quality control, certification - Energy balance of buildings, taking care of healthy dwelling environment, civil engineering and ecology (life cycle of buildings, carbon footprint, etc.) - Basics of design and construction of traffic and municipal infrastructure: planning and construction, interactions structure – environment – human - Overview of technology for the construction of buildings and civil engineering structures - Civil engineering and natural disasters (protection against floods and torrent control, earthquakes, landslides) - Information technologies in civil engineering, engineering communication (spatial data bases, GIS, geodetic bases, construction design drawings) - Real estate management and valuation Tutorials: - Understanding spatial acts: National spatial plan, Municipal detailed spatial plan - Spatial data bases: cadastre, GIS … - Integral parts of project documentation - Understanding construction designs - Risk analysis

Temeljni literatura in viri / Readings:

Posamezna poglavja iz:
Gosar, L. 2013. Steinman, F.: Osnove gradbeništva, Univerza v Ljubljani, 101 str.
Humar, G. 2000. Slovenski mostovi 1. del, Pontis Ljubljana, 112 str.
Humar, G. 2002. Slovenski mostovi 2. del, Pontis Ljubljana, 112 str.
Humar, G. 2004. Predori: iskanje svetlobe, Pontis Ljubljana, 136 str.
70 wonders of the modern world. 1998. Readers digest, 160 str.

Cilji in kompetence:

Cilj
- Študent spozna osnovne pojme gradbeništva, zakonodajne okvire umeščanja objektov v prostor in graditve objektov in značilnosti gradbenega projektiranja in same gradnje v kontekstu realizacije investicijskega projekta.

Kompetence
- Sposobnost komuniciranja s strokovnjaki tehničnih strok pri investicijskih projektih.
- Poznavanje značilnosti in razumevanje procesa načrtovanja in graditve objektov ter naravnih, okoljskih in družbenih omejitev, ki nastopajo pri načrtovanju in izvedbi.

Objectives and competences:

Objectives
- Student learns about the basic concepts of civil engineering, legislative context of urban planning and of construction, characteristics of building design and construction in the context of implementing an investment project.

Competences
- Ability to communicate with experts of technical professions within investment projects.
- Understanding characteristics and processes of building design and building construction as well as natural, environmental and social limitations appearing in the design and implementation.

Predvideni študijski rezultati:

- Študent razume posebnosti gradbeništva kot tehnične gospodarske panoge in pozna potek razvoja gradbenega projekta od ideje preko realizacije do vzdrževanja.
- Spozna zakonodajne okvire gradbeništva.
- Razume, da pravočasno in utemeljeno sprejete odločitve vodijo k racionalni investiciji gledano v celotni življenjski dobi objekta.

Intended learning outcomes:

- Student understands the specifics of civil engineering as economic sector and knows the course of building projects from their concepts through realisation to maintenance.
- They know the legislative context of civil engineering.
- They understand that timely and reasoned decisions lead to rational investment as regards the total life cycle of a structure.

Metode poučevanja in učenja:

Predavanja, vaje. V sklopu predmeta je predvidena strokovna ekskurzija.

Learning and teaching methods:

Lectures, tutorials.
The course foresees field trip.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Način (pisni izpit, ustno izpraševanje, naloge, projekt)		Type (examination, oral, coursework, project):
pisni izpit	**80 %**	written exam
ocena oddanih vaj in seminarske naloge	**20 %**	evaluation of tutorials and seminar work

Reference nosilca / Lecturer's references: