Univerza *v Ljubljani*
Fakulteta *za gradbeništvo in geodezijo*

Učni načrti

Magistrski študijski program druge stopnje

GRADBENIŠTVO (MA)

Nizke gradnje

Course Syllabi

2nd cycle master study

CIVIL ENGINEERING (MA)

Infrastructural Engineering

KAZALO / TABLE OF CONTENTS

STROKOVNI IZBIRNI PREDMETI / PROFESSIONAL ELECTIVE COURSES

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Matematika 3
Course title:	Mathematics 3

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	1
Civil Engineering - second cycle MA	Infrastructural Engineering	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
45		30			75	5

Nosilec predmeta / Lecturer: izr. prof. dr. Gašper Jaklič

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

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

Opravljena izpita iz Matematike I in Matematike II oz. primerljive vsebine matematike v obsegu najmanj 15 KT.

Prerequisits:

Passed exams in Mathematics I and Mathematics II or other courses with comparable content with min. 15 ECTS.

Vsebina:

Linearni in evklidski prostori: linearna neodvisnost, baza, linearna preslikava, ničelni prostor in zaloga vrednosti, matrična predstavitev, prehodna matrika, rang, lastne vrednosti in lastni vektorji, skalarni produkt, norma, ortogonalnost, Gram-Schmidtova ortogonalizacija, pravokotna projekcija (vektor najboljše aproksimacije), Fourierovi koeficienti, metoda najmanjših kvadratov, predoločeni sistemi, normalna enačba, regresijska premica. Numerična linearna algebra: numerično računanje in napake, linearni sistemi, matrični razcepi: LU, QR, SVD. Navadne diferencialne enačbe: linearna DE n-tega reda, LDE s konstantnimi koeficienti, linearni sistemi DE 1. reda, matrična rešitev začetnega problema, robni problem. Parcialne diferencialne enačbe: enačbe matematične fizike, nihanje strune, d'Alembertova rešitev, toplotna enačba, Fourierove vrste, začetni in robni problem. Osnove teorije grafov: matrična predstavitev, izomorfnost, pot, cikel, sprehod, vpeto drevo, Hamiltonov in Eulerjev graf.

Content (Syllabus outline):

Linear and euclidean spaces: linear independence, basis, linear mappings, nullspace and range, matrix representation, transitional matrix, rank, eigenvalues and eigenvectors, scalar product, norm, orthogonality, Gram-Schmidt orthogonalisation, orthogonal projection (vector of best approximation), Fourier coefficients, least squares method, overdetermined systems, normal system, regression line. Numerical linear algebra: numerical computation and errors, linear systems, matrix decompositions: LU, QR, SVD. Ordinary differential equations: linear DE of order n, LDE with constant coefficients, linear systems of DE of first order, matrix solution of initial problem, boundary value problem. Partial differential equations: equations of mathematical physics, vibrating string, d'Alembert solutions, heat equation, Fourier series, initial and boundary value problem. Basics on graph theory: matrix presentation, isomorphism, path, cycle, walk, spanning tree, Hamiltonian and Eulerian cycle.

Temeljni literatura in viri / Readings:

Demmel, J.W. 2000. Uporabna numerična linearna algebra. Ljubljana, DMFA – založništvo.
Gerald, C. F., Wheatley, P. O. 1993. Applied Numerical Analysis, Addison-Wesley Publishing Company.
Lampret, V. 2013. Matematika 1 - prvi del: preslikave, števila, vektorski prostori. Ljubljana, UL FGG.
Meyer, C. D. 2001. Matrix Analysis and Applied Linear Algebra, SIAM.
Dostopno na: http://matrixanalysis.com/ .
Pinchover, Y., Rubinstein, J. 2005. An Introduction to Partial Differential Equations, Cambridge University Press.

Cilji in kompetence:

Cilji:
- Nadgraditi pridobljeno matematično znanje omogočiti razumevanje matematičnega aparata, ki ga uporabljajo strokovni predmeti
- Usposobiti za pravilno postavitev in numerično reševanje konkretnih problemov.

Pridobljene kompetence:
- Sposobnost kritične presoje podatkov in dobljenih računskih rezultatov
- Sposobnost uporabe matematičnega znanja v inženirski praksi.

Objectives and competences:

Objectives:
- To upgrade the acquired mathematical knowledge
- To enable understanding of mathematical tools used by engineering courses
- To train for correct posing and numerical solving of given practical problems.

Gained competences:
- Capability of a critical judgement of data and obtained numerical results
- To be able to use mathematical knowledge in engineering problems.

Predvideni študijski rezultati:

- Formulacija konkretnih problemov v matematičnem jeziku
- Identifikacija ustreznega matematičnega modela za reševanje inženirskega problema
- Poznavanje teoretičnih osnov za praktično iskanje rešitev
- Sposobnost kritične presoje rezultatov
- Poznavanje računalniških orodij (Mathematica, Matlab)
- Dosežena matematična podlaga za strokovne predmete

Intended learning outcomes:

- Formulation of practical problems in mathematical language
- Identification of the appropriate mathematical model
- Basic theoretical knowledge for using in practical problems
- Capability of critical judgement of obtained numerical results
- Ability to use computational tools (Mathematica, Matlab)
- Establishing mathematical background for the engineering courses

Metode poučevanja in učenja:

Predavanja, seminarske vaje, domače naloge, konzultacije

Learning and teaching methods:

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:

JAKLIČ, Gašper. Uniform approximation of a circle by a parametric polynomial curve. Computer Aided Geometric Design, ISSN 0167-8396, 2016, vol. 41, str. 36-46.http://dx.doi.org/10.1016/j.cagd.2015.10.004. [COBISS.SI-ID 17654873]
JAKLIČ, Gašper, KANDUČ, Tadej. Hermite and Lagrange interpolation in R[sup]d by G[sup]1 cubic splines with small strain energy. Journal of numerical mathematics, ISSN 1570-2820, 2015, vol. 23, iss. 3, str. 257-270. http://dx.doi.org/10.1515/jnma-2015-0017. [COBISS.SI-ID 17654617]
JAKLIČ, Gašper, KOZAK, Jernej, KRAJNC, Marjetka, VITRIH, Vito, ŽAGAR, Emil. High order parametric polynomial approximation of conic sections. Constructive approximation, ISSN 0176-4276, 2013, vol. 38, iss. 1, str. 1-18. http://dx.doi.org/10.1007/s00365-013-9189-z. [COBISS.SI-ID 16716121]
JAKLIČ, Gašper, MODIC, Jolanda. On Euclidean distance matrices of graphs. The electronic journal of linear algebra, ISSN 1081-3810, 2013, vol. 26, str. 574-589. http://www.math.technion.ac.il/iic/ela/ela-articles/articles/vol26_pp574-589.pdf. [COBISS.SI-ID 16734553]
JAKLIČ, Gašper, KOZAK, Jernej, KRAJNC, Marjetka, ŽAGAR, Emil. On geometric interpolation by planar parametric polynomial curves. Mathematics of computation, ISSN 0025-5718, 2007, vol. 76, no. 260, str. 1981-1993. http://www.ams.org/mcom/2007-76-260/S0025-5718-07-01988-6/home.html. [COBISS.SI-ID 14340953]
JAKLIČ, Gašper, PISANSKI, Tomaž, RANDIĆ, Milan. Characterization of complex biological systems by matrix invariants. Journal of computational biology, ISSN 1066-5277. [Print ed.], 2006, vol. 13, št. 9, str. 1558-1564. http://www.liebertonline.com/toc/cmb/13/9. [COBISS.SI-ID 14157401]

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Numerične metode
Course title:	Numerical methods

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	1
Civil Engineering - second cycle MA	Infrastructural Engineering	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
30			30		60	4

Nosilec predmeta / Lecturer: prof. dr. Boštjan Brank

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

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

Prerequisits:

Vsebina:

Motivacija za študij metode končnih elementov (MKE); 1D linearna MKE: od diferencialne enačbe do sistema enačb; 1D končni elementi za prevajanje toplote in pretok tekočine; interpolacija, preslikave območij, numerična integracija; ploskovni končni elementi za ravninske probleme; izoparametrični končni elementi; končni elementi za plošče; končni elementi za lupine; reševanje enostavnih primerov z računalniškimi programi po MKE:
- Priprava numeričnih modelov,
- MKE analize,
- Kritična ocena rezultatov.

Content (Syllabus outline):

Motivation for studying the finite element method (FEM); one-dimensional linear FEM: from a differential equation to a system of linear equations; one-dimensional linear FEM for elasticity and heat and fluid flows; interpolation and numerical integration in FEM; finite elements for plane stress and plane strain elasticity; isoparametric finite elements; finite elements for elastic plates; finite elements for elastic shells; solving structural examples with FEM software:
- Preparation of good numerical models,
- FEM analysis,
- Critical evaluation of numerical results.

Temeljni literatura in viri / Readings:

B. Brank. 2014. Osnove metode končnih elementov - skripta.
J. N. Reddy. 2006. An introduction to the finite element method. Mc Graw Hill.
T.J.R. Hughes. 2000. The finite element method. Dover.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Spoznati osnove linearne metode končnih elementov - Naučiti se uporabljati računalniški program po metodi končnih elementov - Naučiti se pripraviti pravilen numerični model obravnavanega problema. Kompetence - Zna uporabljati računalniške programe, ki delujejo po metodi končnih elementov - Zna pripraviti ustrezen numerični model - Zna kritično oceniti rezultate numerične analize.	Objectives - To study FEM - To learn how to prepare a FEM model for a specific engineering problem - To learn how to use FEM software for a structural analysis - To learn how to interpret and critically assess results of FEM analysis. Competences - To be able to solve simple engineering problems using FEM - To get familiar with software tools for FEM structural analysis - To be able to critically evaluate results of numerical analysis.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Priprava dobrih modelov za analizo končnih elementov - Spoznati osnove metode končnih elementov - Uporabiti metodo končnih elementov pri reševanju enostavnejših problemov	- To be able to prepare good models for a FEM analysis - To be able to solve simple civil engineering problems by using FEM software - To be able to interpret and critically evaluate results of a FEM numerical analysis - To understand basics of linear FEM

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja v učilnici. Primeri z računalniki pod nadzorom učitelja.	Lectures are given in a classroom. Examples are worked out by students on computers (in a computer room) under teacher's supervision.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Računski del izpita: modeliranje in analiza problema z računalnikom	**50 %**	FEM modelling, analysis and evaluating of results of a civil engineering problem
Teoretični del izpita	**50 %**	Theoretical knowledge on FEM basis

Reference nosilca / Lecturer's references:

JUKIĆ, Miha, BRANK, Boštjan, IBRAHIMBEGOVIĆ, Adnan. Embedded discontinuity finite element formulation for failure analysis of planar reinforced concrete beams and frames. Engineering structures, ISSN 0141-0296. [Print ed.], maj 2013, letn. 50, št. 5, str. 115-125, ilustr., doi: 10.1016/j.engstruct.2012.07.028.

DUJC, Jaka, BRANK, Boštjan, IBRAHIMBEGOVIĆ, Adnan. Stress-hybrid quadrilateral finite element with embedded strong discontinuity for failure analysis of plane stress solids. International journal for numerical methods in engineering, ISSN 0029-5981, jun. 2013, letn. 94, št. 12, str. 1075-1098, ilustr., doi: 10.1002/nme.4475.

BOHINC, Uroš, BRANK, Boštjan, IBRAHIMBEGOVIĆ, Adnan. Discretization error for the Discrete Kirchoff plate finite element approximation. Computer Methods in Applied Mechanics and Engineering, ISSN 0045- 7825. [Print ed.], feb. 2014, letn. 269, str. 415-436, ilustr., doi: 10.1016/j.cma.2013.11.011

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Geotehnika nizkih gradenj
Course title:	Geotechnics of infrastructural facilities

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	1
Civil Engineering - second cycle MA	Infrastructural Engineering	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	30	45			120	8

Nosilec predmeta / Lecturer: izr. prof. dr. Janko Logar

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

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

Opravljen izpit iz predmetov Mehanika tal in inženirska geologija ter Geotehnika

Prerequisites:

Passed exams in Soil Mechanics and Engineering Geology and Geotechnics.

Vsebina:

Predavanja
Metode izboljšanja tal (preobremenitev, radialna konsolidacija, dinamična komprimacija, gruščnati koli, injektiranje, jet grouting, metode površinskega in globinskega mešanja z anorganskimi in organskimi vezivi); strujanje podzemne vode skozi zasičena izotropna in anizotropna tla, vzgon, kritični hidravlični gradient, hidravlične porušitve (hidravlični lom tal, notranja erozija, piping); zemeljske pregrade: strujanje vode skozi pregrado, ukrepi za zmanjšanje neugodnih posledic, načrtovanje filtrov, stabilnost zemeljskih pregrad v statičnih pogojih in v slučaju potresne obtežbe; likvifakcija tal; raba geosintetikov za tesnjenje, filtriranje, ločevanje in armiranje; analiza in upravljanje z geotehnično pogojenimi tveganji. osnove mehanike kamnin (klasifikacije kamnin, mehanske lastnosti kamnin, Hoekov in Brownov porušni kriterij, analiza stabilnosti blokov in klinov, Schmidtova projekcija, Marklandov test, analitične in numerične metode). Osnove načrtovanja in gradnje predorov (tehnologije gradnje,

Content (Syllabus outline):

Lectures
Methods of soil improvement (pre-loading, radial consolidation, dynamic compaction, stone columns, grouting, jet grouting, methods of surface and deep mixing with inorganic and organic binders); groundwater flow through saturated isotropic and anisotropic soil, buoyancy, critical hydraulic gradient, hydraulic fracture (hydraulic failure, internal erosion, piping); earth dams: flow of water through dam, measures to reduce the adverse consequences, filter design, stability of earth dams under static and dynamic (seismic) conditions; liquefaction of soil; use of geosynthetics: sealing, filtration, separation and reinforcement; analysis and management of geotechnical risks.
Fundamentals of rock mechanics (classification of rock, mechanical properties of rock, Hoek&Brown failure criterion, structurally controlled instability of blocks and wedges, Schmidt's projection, Markland test, analytical and numerical methods). Basics of design and construction of tunnels (technology, machinery, support measures, primary and

mehanizacija, podporni ukrepi, primarna in sekundarna napetostna stanja, principi in metode za projektiranje, geotehnični monitoring) osnove numerične geotehnike (nelinearni elastoplastični modeli za zemljine, principi nelinearnih numeričnih analiz. Vaje Račun učinka izboljšave tal z vertikalnimi drenažami, gruščnatimi koli, preobtežbo (peš in z uporabo računalniških orodij); analiza strujanja vode skozi in pod zemeljsko pregrado; stabilnostna analiza prečnega prereza zemeljske pregrade v statičnih pogojih in pogojih delovanja seizmičnih vplivov; analiza likvifakcije tal na osnovi rezultatov terenskih in laboratorijskih preiskav tal; dimenzioniranje mineralnih filtrov v pregradi; dimenzioniranje in izbira geosintetikov za namen ločevanja, filtracije, tesnjenja; analiza in načrt armirane brežine; izdelava kataloga tveganj in analize tveganja za izbran geotehnični projekt. Klasifikacija kamnin in ocena mehanskih parametrov s pomočjo Hoekovega in Brownovega porušnega kriterija. Strukturna analiza stabilnosti kamninskih blokov in klinov. Načrt podpiranja prečnega prereza predora. Numerična analiza predora in izbranega zemeljskega objekta (nasip, podporna konstrukcija, vkop z oporno konstrukcijo …).	secondary stress states, principles and methods for the design, geotechnical monitoring). Fundamentals of numerical methods in geotechnics (nonlinear elasto-plastic models for soils, principles of non-linear numerical analysis). Tutorials Ground improvement with vertical drains, stone columns, pre-loading (analytical methods and by using computer tools); analysis of the groundwater flow through dam and subsoil; stability analysis of earth dam under static and seismic conditions, seismic impact; analysis of soil liquefaction based on the results of field and laboratory tests of soils; sizing of mineral filters in earth dam; the design and choice of geosynthetics for separation, filtration and sealing; analysis and design of reinforced earth; risk analysis for a selected geotechnical project. Classification of rocks and evaluation of m echanical parameters using Hoek&Brown's failure criteria. Structural analysis of the stability of rock blocks and wedges. Design of tunnel cross section. Numerical analysis of a tunnel and selected earth structure (embankment, retaining structure, earth-cut with retaining structure, ...)

Temeljni literatura in viri / Readings:

SIST EN1997-1:2005 Evrokod 7-1: Geotehnično projektiranje - 1. del Splošna pravila.
SIST EN1997-2:2007 Evrokod 7-2: Geotehnično projektiranje - 2. del Preiskovanje in preskušanje tal.
Vaniček I, Vaniček M. 2008. Earth Structures in Transport, Water and Environmental Engineering, Springer, 637 str.
Moseley, M.P., Kirsch, K. 2006. Ground improvement, Taylor & Francis, London, 432 p.
Recommendations for Design and Analysis of Earth Structures using Geosynthetic Reinforcement EBGEO, Ernst & Sohn, DGGT, 2011.
Nonveiller, E. 1983. Nasute brane, projektiranje i građenje, Školska knjiga Zagreb.
Clayton, C.R.I. 2001. Managing geotechnical risk, Thomas Thelford.
Chapman, D., Metje, N., Stärk, A. (2010). Introduction to tunnel construction, Spon press.
Hoek, E.: (2007) Practical Rock Engineering, dosegljivo na http://www.rocscience.com/hoek/corner/Practical_Rock_Engineering.pdf
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:	**Objectives and competences:**
- Spoznati metode izboljšanja tal, njihove dobre strani in omejitve v posameznih pogojih tal in predvidene vrste gradnje - Spoznati zakonitosti strujanja podzemne vode in	- To learn about methods of soil-improvement, their benefits and restrictions based on specific ground conditions and type of construction - To learn about groundwater flow and percolation

precejanje skozi zemeljske pregrade ter potencialne probleme, ki iz tega izhajajo ter možne rešitve - Seznaniti študenta z vplivi potresa na tla in geotehnične objekte (vpliv na stabilnost in likvifakcijo) - Predstaviti možnost uporabe geosintetičnih materialov v geotehničnem inženirstvu - Predstaviti geotehnično pogojena tveganja in preproste možnosti analize in upravljanja s tveganji - Spoznati se z osnovami mehanike kamnin - Spoznati osnovne principe načrtovanja in gradnje predorov - Usposobiti študenta za osnovno razumevanje in uporabo nelinearnih numeričnih orodij za geotehnične analize	through earth dams (structures) and potential problems and possible solutions - To acquaint student with the effects of earthquakes on the ground and geotechnical facilities (impact on stability and liquefaction) - To present the possibility of using geosynthetic materials in geotechnical engineering - To present the geotechnical risks and to perform simple risk management analysis. - To learn about the basics of rock mechanics - To recognize basic principles of planning and tunnel construction - To provide basic understanding and use of nonlinear numerical tools for geotechnical analysis

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Študent pozna metode izboljšanja tal in se zna odločiti katera je primerna v določenih pogojih - Razume in pozna metode za račun stacionarnega toka vode skozi zasičena izotropna in anizotropna tla ter skozi zemeljske pregrade - Zna analizirati vpliv strujanja vode glede na možnost pojava hidravličnega lom tal in notranje erozije - Razume vpliv potresne obtežbe na zemeljske pregrade in zna vpliv upoštevati v analizi stabilnosti - Razume pojav likvifakcije tal in ga zna ovrednotiti - Pozna možnosti uporabe geosintetikov glede filtracije, separacije, tesnenja in armiranja - Razume geotehnično pogojena tveganja in jih zna analizirati. - Pozna klasifikacijske sisteme kamnin (RQD, RMR, GSI, Q) - Zna analizirati stabilnost blokov in klinov kamnine z uporabo ustreznih orodij - Razume osnovne principe načrtovanja in gradnje predorov - Študent je sposoben preprostih numeričnih geotehničnih analiz z uporabo nelinearnih numeričnih modelov	- Student knows the methods of soil improvement and is able to decide which is suitable under certain conditions - Student understands and knows methods for stationary flow of water through saturated isotropic and anisotropic soil and through earth dams - Ability to analyze the impact of groundwater flow depending on the optional occurrence of hydraulic failure and internal erosion - Understanding of the impact of seismic actions on earth dams and how to take them into account (stability analysis) - Understanding of the phenomena of liquefaction of soil and how to evaluate the associated risk - Knowledge of geosynthetics with respect to filtration, separation, sealing and reinforcement - Understanding of geotechnical risks and how to analyze them. - Knowledge about rock classification systems (RQD, RMR, GSI, Q) - Ability to analyze the stability of rock blocks and wedges with using appropriate tools - Understanding of basic design principles and construction techniques of tunnels - Student is capable of performing basic numerical geotechnical analysis using non- linear numerical models.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, vaje v računalniški učilnici, samostojno delo.	Lectures, tutorials, exercises in the computer lab, individual work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Računski izpit ali 2 kolokvija	**50 %**	Written exam or 2 midterm tests
Samostojno delo	**15 %**	Individual work (Seminar)
Teoretični izpit	**35 %**	Theoretical exam

Reference nosilca / Lecturer's references:

PULKO, Boštjan, MAJES, Bojan, LOGAR, Janko. Geosynthetic-encased stone columns - analytical calculation model. Geotextiles and geomembranes, ISSN 0266-1144. [Print ed.], feb. 2011, letn. 29, št. 1, str. 29-39, ilustr., doi: 10.1016/j.geotexmem.2010.06.005.

ŠTRUKELJ, Andrej, ŠKRABL, Stanislav, ŠTERN, Ksenija, LOGAR, Janko. The assesment of pile shaft resistance based on axial strain measurements during the loading test. Acta geotechnica Slovenica, ISSN 1854-0171, 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. Natural hazards and earth system sciences, ISSN 1561-8633, 2005, 5, str. [447]-457.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Zagotavljanje in kontrola kakovosti
Course title:	Quality assurance and quality control

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	1
Civil Engineering - second cycle MA	Infrastructural Engineering	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
30		30			60	4

Nosilec predmeta / Lecturer:	prof. dr. 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):**
Predavanja Zgodovinski pregled na področju vodenja kakovosti, temeljni pojmi (kontrola, zagotavljanje, vodenje kakovosti), vidiki kakovosti, pomen kakovosti gradbenega objekta. Relevantna zakonodaja in standardizacija (pomen, uporabnost standardov, priprava in izdajanje standardov). Statistična kontrola procesov v serijski proizvodnji gradbenih proizvodov. Potrjevanje skladnosti gradbenih proizvodov (pregled gradbenih proizvodov, spremljajoča harmonizirana evropska zakonodaja, standardi za gradbene proizvode, sistemi potrjevanja skladnosti). Povezava kakovosti in poslovne uspešnosti gradbenega podjetja, stroški kakovosti. Zagotavljanje kakovosti v vseh fazah gradbenega projekta (s posebnim poudarkom na kakovosti projektiranja), vodenje kakovosti v gradbenem projektu. Integrirani sistemi vodenja kakovosti v organizacijah (sistemi vodenja kakovosti, sistemi ravnanja z okoljem, sistemi za zdravje in varstvo pri delu). Kvalitativne metode zagotavljanja kakovosti. Študijski obisk slovenskih institucij, ki delujejo na	Lectures Historical overview of quality management development , fundamental terms (control, assurance, management of quality, aspects of quality, importance of quality of a structure). Relevant legislature and standardisation (importance and relevance, application of standards, preparation of standards). Statistical process control in serial production of construction products. Conformity assessment for construction products (overview of construction products, accompanying legislature, standards for construction products, conformity assessment systems). Relationship between quality and business success, costs of quality. Quality assurance in all stages of construction project (with special emphasis to quality of design), quality management in construction project. Integrated management systems (QMS, EMS, OHSAS). Qualitative methods for quality assurance. Site visits (to Slovenian institutions working in the field of quality assurance in civil engineering).

področju zagotavljanja kakovosti v gradbeništvu.	

Temeljni literatura in viri / Readings:

REFLAK, J., Zagotavljanje kakovosti, skripta UL FGG, Ljubljana, 2005, 165 p.
Marolt, Gomišček. 2005. Management kakovosti, Kranj (izbrana poglavja)
McGeorge, D., Palmer, A. 2002. Construction management: new directions (izbrana poglavja).
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Podati osnove vodenja kakovosti ter njihovo aplikacijo v gradbeništvu - Podati sistematiziran pregled ukrepov in metod za vodenje kakovosti v gradbenem projektu. Pridobljene kompetence - Razumevanje pomena kakovosti gradbenega objekta v vseh fazah njegovega življenjskega cikla - Sposobnost izdelave plana kakovosti za vse faze gradbenega projekta.	Objectives - To provide fundamentals of quality management and their application in construction - To give systematic overview of actions and methods for quality management in construction project. Acquired competences - Understanding of the importance of quality of a structure in all life cycle stages - To be able to prepare quality plans for all stages of the construction project.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Pridobljeno temeljno znanje o pomenu kakovosti gradbenega objekta - Razumevanje povezanosti med doseženim nivojem kakovosti gradbenega objekta in fazami ter dejavnostmi gradbenega projekta - Osvojene računske spretnosti za načrtovanje statistične kontrole procesov - Razumevanje nekvantitativnih metod za zagotavljanje kakovosti - Sposobnost abstraktne formulacije vodstvenih procesov v organizaciji - Sposobnost kritične presoje podatkov, pridobljenih v procesih kakovosti, pri načrtovanju sistemov kakovosti.	- Acquirement of fundamental knowledge related to the importance of structure-s quality - Understanding how the achieved level of quality of the structure and phases and activities of the construction project are connected - Acquired skills for planning of statistical process control - Understanding of descriptive methods for quality assessment - Ability of abstract formulation of management processes within an enterprise - Ability of critical assessment of data acquired in quality management processes, and their use in planning of QMS.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske vaje, oboje z uporabo IKT.	Lectures, seminar tutorial, supported by ICT tools.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Samostojna naloga	**50 %**	Individual work
Pisni izpit	**50 %**	Written exam

Reference nosilca / Lecturer's references:

ŠELIH, Jana. Environmental management systems and construction SMEs : a case study for Slovenia. Journal of civil engineering and management, ISSN 1392-3730. Tiskana izdaja, 2007, letn. 13, št. 3, str. 217- 226, ilustr. Dostopno na: http://www.jcem.vgtu.lt/upload/civil_zurn/selih.pdf.
ŠIJANEC-ZAVRL, Marjana, ŽARNIĆ, Roko, ŠELIH, Jana. Multicriterial sustainability assessment of residential buildings. Technological and economic development of economy, ISSN 1392-8619. Print ed., 2009, letn. 15, št. 4, str. 612-630, ilustr. Dostopno na: http://www.tede.vgtu.lt/en/lt/3/NR/PUB/20453 .
GUMILAR, Vladimir, ŽARNIĆ, Roko, ŠELIH, Jana. Increasing competitiveness of the construction sector by adopting innovative clustering. Inžinerinąe ekonomika, ISSN 1392-2785, 2011, letn. 22, št. 1, str. 41-49, ilustr. Dostopno na: http://www.ktu.lt/lt/mokslas/zurnalai/inzeko/71/1392-2758-2011-22-1-41.pdf.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Operativno planiranje in spremljanje projektov
Course title:	Operative planning and monitoring of projects

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	1
Civil Engineering - second cycle MA	Infrastructural Engineering	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		15	15		75	5

Nosilec predmeta / Lecturer: prof. dr. Jana Šelih

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

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

Prerequisites:

Vsebina:

Predavanja:
Operativno planiranje kot element vodenja projektov. Tehnika mrežnega planiranja in metoda kritične poti. Viri za izvedbo gradbenega projekta in njihova vključitev v projektni model. Optimizacija terminskega plana z vidika virov. Stroški gradbenih projektov in optimizacija terminskega plana z vidika stroškov. Elementi spremljave poteka izvedbe gradbenega projekta. Analiza zamud in porazdelitev odgovornosti. Tehnika planiranja lokacijskih planov (linearni plani in ciklogrami). Modeliranje projektnih tveganj v operativnih planih (stohastično planiranje).
Labaratorijske vaje: uporaba različnih programskih orodij za operativno planiranje gradbenih projektov.

Content (Syllabus outline):

Lectures:
Operational planning as element of project management. Critical path methods. Resources required for the construction project execution, inclusion of resources into project model. Optimisation of schedule, from the viewpoint of resources. Costs of construction projects, optimisation of schedule for the viewpoint of costs. Elements of monitoring the execution. Delay analysis, allocation of responsibility. Techniques for planning the location plans (linear plans, cyclograms). Modelling project risks in operational plans (stochastic planning).
Tutorial: Use of various computer-supported tools for operational planning of construction projects.

Temeljni literatura in viri / Readings:

Rodošek E. 1985. Operativno planiranje, učbenik. Ljubljana.
Hegazy, Tarek. 2002. Computer-based construction project management.
Griffis, Fletcher Hughes. 2000. Construction planning for engineers.
Project Management for Construction. Dostopno na: http://www.ce.cmu.edu/pmbook/index.html .

Cilji in kompetence:	**Objectives and competences:**
Cilji - Nadgraditi splošno znanje vodenja projektov z metodami in tehnikami operativnega planiranja - Podati ključne elemente terminskega plana in spremljajočih planov - Podati definicije optimalnosti operativnega plana - Podati poglobljeno znanje o tehnikah optimizacije operativnega plana - Podati elemente spremljave in analize plana ter ukrepanja pri odstopanjih. Pridobljene kompetence - Sposobnost izdelave detaljnega modela projekta - Razumevanje povezave med stroški, časom in kakovostjo kot ključnih parametrov operativnega plana - Sposobnost variantne obdelave modela in izdelave operativnega plana - Sposobnost uporabe računalniških orodij za različne tehnike operativnega planiranja.	Objectives - To upgrade the general knowledge of project management with methods and techniques of operational planning - To provide key elements of schedule and accompanying plans - To provide the definition of optimal operational plan - To give in-depth knowledge on operational plan optimisation techniques - To present elements of monitoring and analysis of plan, and actions related to identified deviations. Acquired competences - Ability to prepare detailed project model - Understanding the relationship among costs, time and quality, as key parameters of the operational plan - Ability to study alternatives for the model and for the operational plan - Ability to use computer supported tools for different operational planning techniques.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Pridobljeno znanje o modeliranju projektov (deterministični in stohastični modeli) - Razumevanje prednosti in smiselnosti uporabe posameznih metod terminskega planiranja - Osvojeno znanje uporabe računalniške podpore za operativno planiranje - Dobro razumevanje metod in tehnik izdelave operativnih planov izvedbe gradbenih objektov ter kriterijev in meril za njihovo optimalnost - Sposobnost modeliranja poslovnih procesov - Sposobnost analitične obravnave problema in sintezne obdelave rešitev - Sposobnost uporabe računalniškega programa za simulacijo.	Acquired knowledge on modelling of projects (deterministic and stochastic models) - Understanding advantages and suitability of use of individual scheduling methods - Acquired knowledge in the field of computer-supported operational planning - Thorough understanding of methods and techniques for the preparation of operational plans in construction, and related criteria and measures for their optimality - Ability to model business processes - Ability to tackle the problem analytically, and to synthesize the solutions - Ability to use Appropriate software for simulation.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in seminarske vaje z uporabo IKT (potekajo vzporedno preko celega semestra).	Lectures and seminar tutorial by using ICT tools (running parallel to the lectures, during the whole semester).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Samostojna naloga z računskim primerom in njen zagovor	**50 %**	Individual work (with case study) and its defence
Pisni izpit	**50 %**	Written exam

Reference nosilca / Lecturer's references:

SRDIČ, Aleksander, ŠELIH, Jana. Integrated quality sustainability assessment in construction - a conceptual model.
Technological and economic development of economy, ISSN 2029-4913. [Print ed.], dec. 2011, letn. 17, št. 4, str. 611-626.
ŠELIH, Jana. Residential building stock refurbishment design supported by a multi criteria decision support system. WSEAS transactions on systems, ISSN 1109-2777, 2007, letn. 6, št. 6, str. 1124-1131.
ŠIJANEC-ZAVRL, Marjana, ŽARNIĆ, Roko, ŠELIH, Jana. Multicriterial sustainability assessment of residential buildings. Technological and economic development of economy, ISSN 1392-8619. Print ed., 2009, letn. 15, št. 4, str. 612-630.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Gospodarjenje z nepremičninami
Course title:	Real estate management

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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		30			75	5

Nosilec predmeta / Lecturer:	izr. prof. dr. Maruška Šubic Kovač

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

Vsebina:	**Content (Syllabus outline):**
Predavanja Temeljni pojmi s področja ekonomike nepremičnin; življenjski cikel nepremičnine od investicije do rabe nepremičnine; urbana ekonomika in analiza trga nepremičnin; razvojni potencial zemljišč; investiranje v nepremičnine, vloga in pojmovna opredelitev posameznih vrst investicij, metode vrednotenja investicijskih projektov na mikro- in makroekonomski ravni; pomen, pravne podlage in metode za vrednotenje upravičenosti in učinkovitosti investicij javnega sektorja; obdavčenje nepremičnin; posredovanje v prometu z nepremičninami, pravni in stroškovni vidiki posredovanja v prometu z nepremičninami; nepremičnine kot faktor produkcije, »facility management«; trg in tržno vrednotenje nepremičnin; osnove posamičnega in množičnega tržnega vrednotenja nepremičnin. Vaje Seminarske vaje (računske vaje).	Lectures Basic concepts related to real estate economics, real estate life cycle(from real estate development to real estate reuse); urban economics and real estate market analysis; land development potential; investing in real estate, role and conceptual definition of certain types of investments, methods of evaluating investment projects at micro- and macro-economic levels; legal basis and evaluation methods to measure efficiency of public investment; taxation of real estate; real estate brokers' activities, legal and cost aspects of real estate brokers' activities; property as factor of production facility management; real estate market and real estate valuation; basics of individual and mass real estate valuation. Tutorial Calculation exercises.

Temeljni literatura in viri / Readings:

Šubic Kovač, M. 2013. Gospodarjenje z nepremičninami, študijsko gradivo, Ljubljana, UL FGG, 186 strani.
Bajt, A., Štiblar F. 2002. Ekonomija, Ekonomska analiza in politika, GV založba, Ljubljana, str.103- 148.
Geltner, M.D., Miller, N.G. 2010. Commercial Real Estate Analysis and Investment, South Western Thomson Learning, 898 strani, izbrana poglavja.
Aktualni predpisi: http://www.gov.si .

Cilji in kompetence:

Študent se pri tem predmetu seznani:
- Z znanji s področja ekonomike nepremičnin in projektnega managementa,
- Z vrednotenjem investicijskih projektov na mikro in makro ravni,
- S "facility management",
- S terminologijo in postopki vrednotenja nepremičnin.

Po opravljenem izpitu študent pridobi naslednje predmetno specifične kompetence:
- Pozna in razume vsebine s področja ekonomike nepremičnin,
- Pozna, razume, zna načrtovati in uporabljati različne postopke, ki so potrebni za vrednotenje razvojnega potenciala zemljišč v prostorskem planiranju, vrednotenje investicijskih projektov na mikro in makro ravni, za posredovanje v prometu z nepremičninami
- Pozna in razume izrazoslovje ter proces posamičnega in množičnega vrednotenja nepremičnin.

Objectives and competences:

Objectives
- To get students familiar with real estate economics and project management
- To get students familiar with the evaluation of investment projects at micro and macro levels
- To get students familiar with facility management
- To familiarise student with terminology and with the process of individual/mass real estate valuation.

Competences
- To know and understand the contents in the field of real estate economics
- To know and understand (as well as to know how to design and use) various procedures, needed for the valuation of land development potential, evaluation of investment projects at micro and macro levels for the purpose of real estate brokerage
- To know and understand the terminology and the process of individual/mass real estate valuation.

Predvideni študijski rezultati:

- Študent spozna bistvene karakteristike s področja ekonomike nepremičnin od faze prostorskega načrtovanja do obratovanja nepremičnin.
- Študent pridobljena znanja uporabi pri izdelavi prostorskih aktov, odločitvah o investicijah, vrednotenju in trženju nepremičnin.
- Študent na podlagi sinteze znanj s področja prava, ekonomike, prostorskega planiranja in gradnje inženirskih objektov (tehnični in organizacijski vidik) kritično presoja investicijske odločitve v praksi.
- Uporaba domače in tuje strokovne literature s področja gospodarjenja z nepremičninami in uporaba ustrezne računalniške opreme.

Intended learning outcomes:

- Student is familiar with basic characteristics in the field of real estate economics from the spatial planning phase to the final phase – operation of the real estate.
- Acquired knowledge can be used when making spatial planning documents, when deciding on investment, real estate valuation and real estate marketing.
- Synthesis of knowledge in the field of property law, geodesy, spatial planning and civil engineering (technical and organizational aspect) allows student to critically consider investment decisions in practice.
- Use of national and international professional literature in the field of real estate management and appropriate computer software.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske vaje z uporabo IKT.	Lectures and tutorial are presented using visual aids.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Dva kolokvija:		Two mid-term written exams:
teoretičen del	**50 %**	Theoretical part
računski del	**50 %**	Calculation exercises
ali		or
pisni izpit:		Written examination:
teoretičen del	**50 %**	Theoretical part
računski del	**50 %**	Calculation exercises
Vsak del mora biti ocenjen pozitivno.		Each part of the exam must be graded positively.

Reference nosilca / Lecturer's references:

RAKAR, A., MESNER, A., MLINAR, J., ŠARLAH, N., ŠUBIC KOVAČ, M. 2010. Zaščita in ohranjanje vrednosti gospodarske javne infrastrukture. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 242-252, ilustr.
ŠUBIC KOVAČ, M. 2011. Urban land development potential under conditions of sustainable development. V: MULLINER, Emma (ur.). Sustainability: Focus on Urban and Peri-Urban Development : 1st International and Interdisciplinary Symposium of European Academy of Land Use and Development, 1st -3st September 2011, Liverpool, UK : Synopsis of Abstracts. Liverpool: BEST: JMU, 2011, str. 22-25.
ŠUBIC KOVAČ, M. 2010. Zagotavljena zasebna lastnina ter tehtanje javnega in zasebnega interesa za trajnostni prostorski razvoj. AR, Arhit. razisk. (Tisk. izd.). [Tiskana izd.], št. 1, str. 74-75, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projektiranje gradbenih konstrukcij
Course title:	Design of building structures

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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			30		60	4

Nosilec predmeta / Lecturer: doc. dr. Drago Saje

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 Postopek projektiranja gradbenih konstrukcij. Posebnosti obnašanja lesenih, betonskih in zidanih konstrukcij. Principi smotrne izbire konstrukcijskega sistema v odvisnosti od izbranega materiala. Projektna obtežba. Osnove projektiranje lesenih konstrukcij (mehanske in reološke lastnosti materiala, dimenzioniranje linijskih lesenih elementov, temeljna pravila izvedbe priključkov lesenih konstrukcij). Osnove projektiranja betonskih konstrukcij (dimenzioniranje in konstrukcijska izvedba linijskih konstrukcij, plošč in sten ter temeljev). Osnove projektiranja zidanih konstrukcij (mehanske lastnosti zidakov, malte in zidovja, dimenzioniranje nearmiranih zidanih konstrukcij na osno-upogibno in strižno obremenitev, izvedba potresnovarnih enostavnih zidanih konstrukcij). Vaje: Seminarske vaje (računski primeri).	Lectures Design procedure for building structures; specifics of the behaviour of timber, concrete and masonry structures; principles for sensible selection of a structural system in dependence of the selected material; design load; basics for the design of timber structures (mechanical and rheological properties of material, design of planar timber elements, basic rules for the execution of joints of timber structures); basics for the design of concrete structures (design and structural execution of planar structures, slabs and walls as well as foundations), Basics for the design of masonry structures (mechanical properties of brick, mortar and masonry, design of plain masonry structures with respect to bending moment and axial force as well as shear force, execution of simple earthquake resistant structures). Tutorials: Seminar tutorials (computational examples)

Temeljni literatura in viri / Readings:

H. Nilson, D. Darwin, C.W. Dolan. 2003. Design of Concrete Structures-thirteenth edition. McGraw-Hill, strani 321-374, 412-479, 545-574, 599-633.
W.G. Curtin, G. Shaw, J.K. Beck, W.A. Bray. 2006. Structural Masonry Designers Manual-third edition. , Blackwell Science, strani 1-72S.
Thelanderson, H.J. Larsen (urednika). 2003. Timber Engineering. John Wiley & Sons, strani 1-11, 131-168, 221-240.
Ustrezni deli standardov za gradbene konstrukcije Evrokod 0, Evrokod 1, Evrokod 2, Evrokod 5, Evrokod 6, Evrokod 8 (SIST EN 1990, SIST EN 1991-1, SIST EN 1991-1-3, SIST EN 1991-1-4, SIST EN 1992-1-1, SIST EN 1995-1-1, SIST EN1996-1-1, SIST EN 1998-1).
Spletno mesto Katedre za masivne in lesene konstrukcije: http://www.fgg.uni-lj.si/kmlk/index.htm.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilji:
- Podati razlike v obnašanju konstrukcij iz različnih materialov
- Podati osnove za snovanje in projektiranje gradbenih konstrukcij
- Podati podlage za izbiro ustreznega računskega modela nosilne gradbene konstrukcije

Pridobljene kompetence
- Sposobnost snovanja in projektiranja enostavnih masivnih in lesenih konstrukcij.

Objectives and competences:

Objectives:
- To present the differences in the behaviour of structures made of different materials,
- To present the bases for the conception and design of building structures,
- To present the bases for the selection of adequate computational model of a load-bearing structure,

Acquired competences
- Ability to concept and design simple mass concrete and timber structures.

Predvideni študijski rezultati:

- Poznavanje temeljnih načel projektiranja gradbenih konstrukcij
- Poznavanje primernih nosilnih sistemov konstrukcij iz različnih materialov
- Razumevanje delovanja osnovnih nosilnih mehanizmov konstrukcij
- Poznavanje posebnosti pristopa k projektiranju konstrukcij iz različnih materialov
- Pridobljeno znanje študentom omogoča projektiranje enostavnih gradbenih konstrukcij, v primeru zahtevnejših konstrukcij pa so sposobni preudarne presoje o morebitni potrebni vključitvi specialistov
- Sposobnost uporabe strokovne literature, standardov in enostavnih računalniških programov v procesu projektiranja gradbenih konstrukcij.

Intended learning outcomes:

- Knowledge of the basic principles of the design of building structures
- Knowledge of appropriate load-bearing systems of structures made of different materials
- Understanding of the basic mechanisms of load-bearing structures
- Knowledge of the specifics how to approach the design of structures made of different materials
- The acquired knowledge allows students to design simple building structures; in case of demanding structures, they are able to make a well-grounded assessment if specialists need to be engaged
- Ability to use professional literature, standards and simple software in the process of the design of building structures.

Metode poučevanja in učenja:

Predavanja in večji del vaj v klasični učilnici, manjši del vaj pa tudi v računalniški učilnici.

Learning and teaching methods:

Lectures and large part of tutorials in classical classroom, small part of tutorials in computer classroom.

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

Reference nosilca / Lecturer's references:

SAJE, F. LOPATIČ, J., A Time-Dependent Analysis of Reinforced Prestressed and Composite Concrete Structures, Int. j. eng. model., 1997, vol. 10, str. 17-24.
LOPATIČ, J., Vpliv dolgotrajnih visokih nivojev napetosti na tlačno trdnost betona, Gradbeni vestnik, Ljubljana, ISSN 0017-2774, April 2003, letn. 52, strani 74-80, 2003.
LOPATIČ, J., SAJE, F., Non-linear analysis of time-dependent response of civil engineering structures. V: TOPPING, Barry H. V. (ur.), MONTERO, G. (ur.), MONTENEGRO, R. (ur.). Proceedings of the eighth International conference on computational structures technology, Las Palmas de Gran Canaria-Spain, 12-15 September 2006. Stirling: Civil-Comp, cop. 2006.

BRATINA, S., Kontrola napetostnega in deformacijskega stanja lesenega lameliranega lepljenega nosilca nadstrešnice CP Brezje - strokovno mnenje, Ljubljana: UL FGG, 2006, 13 str.
BRATINA, S., HOZJAN, T., Ocena požarne odpornosti armiranobetonske podporne konstrukcije v galeriji Šentvid in pokritem vkopu Šentvid z uporabo napredne računske metode v skladu s standardom SIST EN 1992-1-2:2005, Ljubljana: UL FGG, 2010, 143 str.
MARKOVIČ, M., KRAUBERGER, N., SAJE, M., PLANINC, I., BRATINA, S., Non-linear analysis of pre-tensioned concrete planar beams, Engineering Structures, 2013, letn. 46, str. 279-293.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Inteligentni transportni sistemi
Course title:	Intelligent transport systems

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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		15	60	4

Nosilec predmeta / Lecturer: doc. dr. Tomaž Maher

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

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

Prerequisites:

Vsebina:

Predavanja
Nadgradnja splošnih znanj o teoriji prometnega toka in prometnem planiranju; opazovanje prometa, merilne naprave v cestnem prometu; sistemi vodenja prometa na medmestni prometni mreži, sistem posredovanja prometnih informacij (dinamično vodenje po cestni mreži) oziroma aktivni dinamični sistemi povečanja propustnosti ceste; cestno-vremenski informacijski sistem in zimska služba, meteorološka stanja vozišča; sistemi elektronskega plačevanja in cestninjenja; sistemi upravljanja prometa v mestih, cestna problematika v naseljih, prometni režimi prometna signalizacija in oprema v naseljih; naprave za umirjanje prometa v naseljih; parkirišča in garažne hiše, sistem vodenja in plačevanja parkiranja, potrebe po parkirnih površinah; sistemi vodenja blagovnega prometa, tehtanje vozil; sistemi storitev v javnem prometu, avtobusna postajališča; prometna signalizacija in prometna oprema; sistemi za upravljanje z izrednimi dogodki, dela na cesti, promet in okolje.

Content (Syllabus outline):

Lectures
Upgrade of general knowledge about the theory of traffic flow and planning of traffic, monitoring of traffic, measuring devices in road traffic, traffic management systems in intercity traffic network, system of communicating traffic information (dynamic management in road network) or active dynamic systems of increasing road permeability, roadside weather information system and winter service, meteorological conditions of carriageway, electronic toll collection systems, traffic management systems in urban areas, traffic issues in urban areas, traffic regimes, traffic control and equipment in urban areas, traffic calming devices in inhabited areas, parking areas and garage houses, system for fee paying managing and parking, needs for parking surfaces, systems of managing heavy goods traffic, weigh in motion of vehicles, systems of public traffic services, bus stops, traffic control and traffic equipment, systems for incident detection and managing, road works, traffic and

Seminarske vaje (računske vaje) in laboratorijske vaje (demonstracijske vaje na računalniških modelih). Terensko delo - zbiranje in analiza podatkov.	environment. Tutorial and laboratory practice (demonstration exercises on computer models) Fieldwork - data collection and analysis.

Temeljni literatura in viri / Readings:

SITSA – Slovenska ITS arhitektura: aktualni razvoj ITS, 2006. Ljubljana, FGG - PTI, (elektronski dokument).
Highway capacity manual, HCM2000. 2000. Washington, ZDA, 16 poglavje.
http://www.spcregion.org/downloads/ops/fhwa_trafficcontrolsystemshandbook_10-2005- final.pdf

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Spoznati osnovne pojme upravljanja prometa in inteligentnih transportnih sistemov in storitev (ITS), - Spoznati najpomembnejše sisteme ITS v okviru cestnega prometa, - Naučiti se določiti potrebne parametre ter kriterije za uporabo v ITS, - Usposobiti se za izdelovanje projektov iz področja prometnih gradenj in avtomatskega vodenega prometa. Pridobljene kompetence: - Sposobnost izdelave zahtevnih analiz, študij in projektov za prometne objekte iz področja ITS, - Sposobnost izvajanja nadzora in spremljanje prometa s pomočjo ITS.	Objectives: - To learn about the basic concepts of traffic and transportation management and Intelligent Transport Systems and Services (ITS). - To learn about the most important ITS systems within road traffic - To learn how to set the required parameters and criteria for applications in ITS - To be able to produce projects in the areas of traffic and transportation engineering and automated guided traffic and transport. Acquired competences: - The ability to manufacture complex analyzes, studies and projects for transportation infrastructure in the field of ITS - Ability to conduct surveillance and traffic monitoring by using ITS.l

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spoznavanje ITS kot ukrep pri optimizaciji upravljanja prometa na prometni infrastrukturi oziroma kot ukrep izkoriščanja obstoječe prometne infrastrukture, to je predvsem brez ali z minimalnim vložkom v novogradnje - Razumevanje soodvisnosti, ki vplivajo na optimalno, varno in ekonomično dogajanje v prometu. - Študent bo sposoben zbrati in obdelati parametre prometnega toka na terenu in določiti odvisnosti med njimi za dimenzioniranje odprte ceste in za dimenzioniranje samostojnega križišča oziroma za potencialno uvedbo ITS. - Doseženo znanje uporabljajo pri izdelavi diplomskega dela oz. v inženirski praksi - Dobro razumevanje prednosti, ki jih predstavljajo ITS v prometnem inženirstvu - Sposobnost abstraktne formulacije procesov v cestnem prometu	- Knowledge of ITS as a measure for the optimization and/or management of traffic flows on transport infrastructure or as a measure of exploitation of existing transport infrastructure, especially with no or minimal investment in new infrastructure - Understanding the interdependencies that affect the optimum, safe and economical developments in transportation. - Students will be able to collect and process parameters of traffic flow in the field and determine dependencies between them for the design of open roads and intersections, or for potential deployment of ITS. - Achieved knowledge used in the preparation of the thesis or in engineering practice - Good understanding of the advantages posed by ITS in transportation engineering - Ability of abstract formulation processes in road

- Sposobnost kritične presoje vhodnih podatkov in dobljenih računskih rezultatov pri načrtovanju ITS - Sposobnost upoštevanja dinamike prometnih procesov pri načrtovanju dejavnosti ITS v prostoru - Sposobnost uporabe računalniških modelov v prometnem inženirstvu.	traffic - Ability for critical analysis of input data and computational results obtained in the design of ITS - Ability to take into account the dynamics of transport processes in planning activities in the area of ITS - Ability to use computer models in transport engineering

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit	**50 %**	Theory - oral or written exam
Izdelava in zagovor vaj	**50 %**	Exercise defense

Reference nosilca / Lecturer's references:

TOLLAZZI, T., MAHER, T., RENCELJ, M., ZAVAŠNIK, Z. Analiza značilnosti krožnih križišča državnem cestnem omrežju. Gradb. vestn., avgust 2005, letn. 54, str. 178-183.
KASTELIC, T., MAHER, T. Logical progression : the future for electronic tolling in Slovenia. Traffic technol. int., Annu. rev., April/May 2003, str. 91-95.
KASTELIC, T., MAHER, T. Electronic toll collection system in Slovenia. V: Modern traffic, (Suvremeni promet, Special issue, Vol. 18). Mostar: Institutes for Mechanical Engineering University of Mostar, 1998, str. 21-24.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Optimizacijske metode v gradbeništvu
Course title:	Optimization methods in civil engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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	15		60	4

Nosilec predmeta / Lecturer: izr. prof. dr. Marijan Žura

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

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

Prerequisites:

Vsebina:

Predavanja
Linearno programiranje (splošni problem, grafične metode, metoda simpleksov, transportni problemi, metoda stopalnikov, metoda modi, degeneracija, celoštevilčno linearno programiranje). Nelinearno programiranje (metode reševanja problemov brez omejitev, brez uporabe odvodov, z uporabo odvodov; metode reševanja problemov z omejitvami. Lagrangevi multiplikatorji, transformacijske metode, metode kazenskih funkcij). Diskretno dinamično programiranje. Genetski algoritmi. Večkriterialno odločanje.

Content (Syllabus outline):

Lectures
Linear programming (general problem, graphical methods, the simplex method, transport problems, stepping stone method, MODI, degeneration, integer linear programming). Nonlinear programming (methods for solving problems without constraints, without the use of derivatives, with the use of derivatives; methods for solving problems with constraints: Lagrange multipliers, transformation methods, penalty functions). Discrete dynamic programming. Genetic Algorithms. Multiple criteria decision making.

Temeljni literatura in viri / Readings:

Žura M. 2008. Matematično programiranje – študijsko gradivo
Vadnjal A. 1971. Rešeni problemi linearnega programiranja.
Vadnjal A. 1976. Diskretno dinamično programiranje.

Cilji in kompetence:

Cilji:
- Podati teoretične osnove optimizacije
- Spoznati metode reševanja optimizacijskih

Objectives and competences:

Objectives
- Give the theoretical basis of optimization
- To know how to solve optimization problems

problemov - Na številnih praktičnih primerih pridobiti sposobnost prepoznavanja problemov in njihove matematične formulacije. Pridobljene kompetence - Sposobnost prepoznavanja problemov v gradbeništvo kot problemov matematičnega programiranja - Sposobnost matematičnega formuliranja problemov - Sposobnost uporabe ustreznih metod in orodij za reševanje problemov.	- On the basis of many practical cases to obtain ability to identify problems and develop their mathematical formulation. Acquired competences - Ability to recognize problems in construction as problems of mathematical programming - Ability to formulate mathematical problems - Ability to use appropriate methods and tools for problem solving.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Prepoznavanje problemov v gradbeništvo kot problemov matematičnega programiranja - Poznavanje osnov optimizacijskih metod Uporaba - Sposobnost matematičnega formuliranja - Sposobnost reševanja problemov z uporabo računalniških programov - Sposobnost interpretacije rezultatov - Na podlagi pridobljenih znanj bo študent sposoben prepoznavanja podobnih problemov, njihove matematične formulacije in reševanja - Pridobljene spretnosti bodo v večji meri uporabne v naslednjem letniku zlasti pri predmetu Planiranje izgradnje prometne infrastrukture	- Identifying problems in construction as a problem mathematical programming - Knowing the basics of optimization methods Use: - Ability to formulate mathematically - Ability to solve problems by using computer programs - Ability to interpret results: - Based on the acquired knowledge student will be able to identify similar problems, derive their mathematical formulation and solution - Acquired skills will be useful in next year, especially in the course Planning construction of transport infrastructure

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske in računalniške vaje	Lectures and exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretični del	**50 %**	Theoretical exam
Računski del	**50 %**	Practical assignment

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.
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

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Računalniško integrirana graditev
Course title:	Computer integrated construction

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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	15		75	5

Nosilec predmeta / Lecturer:	prof. dr. Žiga Turk

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 vloga gradbene informatike; kaj je gradbena informatika in njena zgodovina; specifični problemi gradbene informatike, modeli in paradigme oblikovanja in načrtovanja in vloga IT, tehnološki, znanstveni in razvojnociklični okviri IT; uvajanje informatike v podjetja; strateški vidiki informatizacije na področju gradbeništva; vloga in mesto informatike v gradbenem podjetju in družbi; reinženiring poslovnih procesov in uvajanje IT, gradbena informatika kot poklicna priložnost; tematski zemljevid gradbene informatike, modeliranje kot metoda reševanja problemov; računalniško integrirana graditev; komunikacijska integracija, informacijska integracija; procesna integracija; povezovanje znanja, rezultati; računalniško integrirana graditev; sočasno inženirstvo (concurrent) engineering; virtualna podjetja, eDelo, ePoslovanje; česa računalniki ne zmorejo. Laboratorijske in seminarske vaje O posamezne vaje in seminar iz računalniško	Lectures Role of construction informatics; definition of construction informatics and its history; specific problems of construction informatics (uniqueness); models and paradigms of design and planning and the role of IT; technological, scientific and development frameworks of IT in Construction; introduction of information technology in enterprises; strategic aspects of information in the field of construction; role of IT in construction company and broader in society; construction business process; reengineering and introduction of ITC the ITC as a career opportunity; hematic map construction information; modelling as a method of problem solving; computer-integrated construction. How: integration of communication, information integration, process integration, integration of knowledge results in computer-integrated construction and concurrent engineering (concurrent) engineering; virtual enterprises eWork, eBusiness; what computers are not able to. Laboratory and tutorials

integrirane graditve in uporabo orodij na projektnem problemu.	Individual exercises and seminar in computer integrated construction and use of tools in the project problem.

Temeljni literatura in viri / Readings:

Turk, Ž, Računalniško integrirana graditev, 27 snopičev prosojnic, spletna učilnica FGG.
Različni avtorji, Global Center for Excellence in Computing teaching modules, http://www.asce.org/gcec/Zarli, Alain et al. (2004). Building a Better Future, eBook, ICCI Consortium.
Hardin, Brad. BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons, 2011.
Eastman, Chuck, et al. BIM handbook: A guide to building information modeling for owners, managers, designers, engineers and contractors. John Wiley & Sons, 2011.
Raphael, Benny, and Ian FC Smith. Fundamentals of computer-aided engineering. John Wiley & Sons, 2003.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Spoznati pomen informatike kot povezovalnega gradnika med subjekti gradbene industrije in procesi, ki v njej potekajo. - Spoznati osnovno teoretično in tehnološko ozadje rešitev problema povezovanja v industriji. - Poglobiti razumevanje o neposrednih in strateških vidikih informatizacije v gradbeništvu - Postaviti konceptualni okvir tematik gradbene informatike, ki ga bodo v toku študija na smeri izpopolnili drugi predmeti. - Razumeti pomen specialistovega področja v gradbeni industriji in z njo povezanih panogah. Pridobljene kompetence: - Sposobnost strateškega in kritičnega razmišljanja o uporabi informacijskih tehnologijah v gradbeništvu. - Sposobnost uporabe tehnoloških rešitev.	Objectives: - Understand the importance of information technology as an integrating element among the entities of construction industry and its processes. - Recognize basic theoretical and technological backgrounds for the solutions of connecting the industry. - Deepen the understanding of the direct and strategic aspects of informatization in construction - Establish a conceptual framework of themes and topics of construction informatics, which will (in the course of study be detailed by other courses) - Understand the importance of information specialists in the field of construction industry and related industries. Acquired competences: - Ability of strategic and critical thinking about the use of information technology in construction. - Ability the use of technological solutions, software.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Vloga informatike v družbi nasploh in v gradbeništvu posebej. - Pregled nad temami gradbene informatike. strateški vidiki informatizacije na področju gradbeništva. - Razumevanje znanstvenih metod dela v gradbeni informatiki. - Raba ključnih orodij za delo in učenje na daljavo. - Uporaba znanstvenih metode pri informatizaciji procesov v gradbeništvu. - Kritična analiza uporabe IKT v gradbeništvu. - Sposobnost uporabiti metode znanstvenega dela v okviru gradbene informatike tudi na druga področja.	- The role of information technology in society in general and in construction in particular. - An overview of the topics of construction informatics. - The strategic aspects of information in the field of construction. - Understanding of scientific methods in construction Informatics. - Use of the key tools for distance working and distance learning. - Use of the key tools for the three kinds of integration (information-knowledge, process, communication). - Using scientific methods in the computerization

- Sposobnost sistematične analize uporabe informacijskih tehnologij. - Sposobnost organiziranja IKT podpore projektom. - Sposobnost postati informacijski manager (CIO) projekta.	processes in construction. - Critical analysis of the use of ICT in construction. - Ability to use the methods of scientific work in the context of construction information to other areas - Ability of systematic analysis of the use of information technologies. - Ability to organize ICT project support. - Ability to become an IT manager (CIO) of a project, of BIM manager of a project.

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. Distance learning. Project based leaning. Teamwork.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretično znanje na izpitu	**40 %**	Theoretical exam
Sodelovanje na vajah in predavanjih	**20 %**	Activity and collaboration
Projektni izdelek	**40 %**	Project work quality

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. http://www.sciencedirect.com/science/article/pii/S0926580514000363, doi: http://dx.doi.org/10.1016/j.autcon.2014.02.011.

TODOROVIĆ, Miloš, TURK, Žiga. Upoštevanje trajnostnih kriterijev pri projektiranju z orodjem BIM = Designing using sustainability criteria with BIM tools. Gradbeni vestnik, ISSN 0017¬2774, okt. 2011, letn. 60, št. 10, str. 279-284, ilustr.

KLINC, Robert, TURK, Žiga, DOLENC, Matevž. Engineering collaboration 2.0 : requirements and expectations. Journal of information technology in construction, ISSN 1874¬4753, 2009, letn. 14, pos. št., str. 473¬488, ilustr. http://www.itcon.org/2009/31.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Verjetnostni račun in statistika
Course title:	Probability theory and statistics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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:	izr. prof. dr. Marjeta Kramar Fijavž, doc. dr. Mitja Lakner

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisits:**
Opravljena izpita iz Matematike I in Matematike II oz. drugih predmetov s primerljivo vsebino.	Passed exams in Mathematics I and Mathematics II or other courses with comparable content.

Vsebina:	**Content (Syllabus outline):**
Računanje z dogodki, neodvisni in nezdružljivi dogodki. Definicije verjetnosti, pogojna verjetnost, formula o popolni verjetnosti, Bayesova formula. Slučajne spremenljivke: diskretne in zvezne, porazdelitvena funkcija, gostota verjetnosti, matematično upanje, disperzija, posebne porazdelitve: Bernoullijeva, binomska, geometrijska, Poissonova, eksponentna, enakomerna, normalna. Slučajni vektorji: diskretni in zvezni; robne in pogojne porazdelitve, neodvisnost, koreliranost, kovarianca, dvorazsežna normalna porazdelitev, funkcije slučajnega vektorja. Osnove stohastičnih procesov. Limitni izreki: neenakosti Markova in Čebiševa, centralni limitni izrek. Osnove statistike: vzorčenje, ocenjevanje parametrov, metoda momentov, metoda največjega verjetja, intervali zaupanja, preskušanje domnev.	Algebra of events, independent and exclusive events. Definitions of probability, conditional probability, total probability, Bayes' Theorem. Random variables: discrete and continuous, cumulative distribution function, probability density function, mathematical expectation, variance, special distributions: Bernoulli, binomial, geometric, Poisson, exponential, uniform, normal. Random vectors: discrete and continuous, marginal and conditional distributions, independence, correlation, covariance, bivariate normal distribution, functions of random vectors. Basics in stochastic processes. Limit theorems: Markov and Chebyshev's inequality, the central limit theorem. Basics in statistics: sampling, estimation of parameters, the method of moments, the method of maximum likelihood, confidence intervals, hypothesis testing.

Temeljni literatura in viri / Readings:

J. A. Baglivo. 2005. Mathematica Laboratories or Mathematical Statistics: emphasizing simulation and computer intensive methods, ASA-SIAM.
R. Jamnik. 1995. Verjetnostni račun in statistika. Ljubljana, DMFA – založništvo.
D. C. Montgomery, G. C. Runger. 2007. Applied Statistics and Probability for Engineers. John Wiley & Sons.
G. Turk. 2012. Verjetnostni račun in statistika. Ljubljana, UL FGG.
K. Siegrist. 1997-2011. Virtual Laboratories in Probability and Statistics.
Dostopno na: http://www.math.uah.edu/stat/ .

Cilji in kompetence:

Cilji:
- Poznavanje osnov verjetnostnega računa in osnovnih statističnih metod
- Omogočiti razumevanje matematičnega aparata, ki ga uporabljajo strokovni predmeti
- Usposobiti za pravilno postavitev in reševanje konkretnih problemov s pomočjo statističnih metod.

Pridobljene kompetence:
- Poznavanje različnih statističnih metod
- Sposobnost uporabe matematičnega znanja v inženirski praksi.

Objectives and competences:

Objectives:
- To obtain basic knowledge in probability theory and simple statistical methods
- To enable the understanding of mathematical tools used by engineering courses
- To train for correct posing and solving of given practical problems using statistical methods.

Gained competences:
- Familiarity with various statistical methods
- To be able to use mathematical knowledge in engineering problems.

Predvideni študijski rezultati:

- Formulacija konkretnih problemov v matematičnem jeziku
- Identifikacija ustreznega matematičnega modela
- Poznavanje teoretičnih osnov za praktično iskanje rešitev
- Doseženo matematično znanje uporabljajo strokovni predmeti
- Statistika je glavno orodje za analizo kvantitativnih podatkov
- Spretnost uporabe literature in modernih tehnologij,
- Poznavanje računalniških orodij (Mathematica, Matlab)

Intended learning outcomes:

- Formulation of practical problems in mathematical language
- Identification of the appropriate mathematical model
- Basic theoretical knowledge for using in practical problems
- Statistics is the main tool for quantitative data analysis
- Skills in using literature and modern technologies
- Ability to use computational tools (Mathematica, Matlab)

Metode poučevanja in učenja:

Predavanja, seminarske vaje

Learning and teaching methods:

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.
http://springerlink.metapress.com/app/home/issue.asp?wasp=9ed0dca63b2b46c3ad74b3d0e2855bcc&referrer=parent&backto=journal,5, 116;linkingpublicationresults,1:100443,1.

LAKNER, Mitja, PETEK, Peter. The one-equator property. Exp. math., 1997, let. 6, št. 2, str. 109-115.
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. http://dx.doi.org/10.1017/S1446181112000065.

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 - druga stopnja MA	Nizke gradnje	1	2
Civil Engineering - second cycle MA	Infrastructural Engineering	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
6				80	34	4

Nosilec predmeta / Lecturer: doc. dr. 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. Predvsem: se seznani z organizacijsko strukturo in tehnologijo gradbenega podjetja, se seznani s predpisi o varstvu pri delu in njihovi izvedbi v praksi, de seznani se z aktualnim dogajanjem v gradbenem podjetju, spozna menedžerski vidik dela v podjetju, dela na terenu – aktualnem gradbišču, oziroma v pisarni - samostojno opravi dela na aktualnem projektu pod vodstvom mentorja, razvija uporabo znanstvenoraziskovalnih metod v širšem spektru problemov v stroki, razvija kritične refleksije, socialne in komunikacijske zmožnosti za vodenje skupinskega dela, pokaže iniciativnost in samostojnost pri vodenju najzahtevnejših delovnih sistemov pod nadzorom mentorja.

Content (Syllabus outline):

Student is introduced to the performance of work done by graduate in practice. Especially, students are: aware of the organizational structure and technology of building companies, familiar with the regulations about safety at work and their implementation in practice, familiar with current developments in a construction company, introduced to executive aspect of work when undertaking field work - current site, or in office - self- performed work on current project under the guidance of a mentor; they develop the use of scientific research methods in a broad spectrum of problems in the profession, develop critical reflection, social and communication skills for teamwork management, show initiative and independence in the management of most complex work systems under the supervision of mentor.

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. 2007. Ljubljana, UL. 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:

Cilji
- Študent v okviru praktičnega usposabljanja spozna operativno delo v ciljnih poklicih in organizacijsko strukturo subjektov na področju gradbeništva.
- Praksa, izvedena med izobraževalnim procesom, ima tudi motivacijski cilj ter namen.
- Študent spozna dejavnike kariernega načrtovanja in razvoja in procese povezane s kariernim razvojem.
- 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.

Pridobljene kompetence
- Obvladovanje uporabe in prenosa teoretičnih znanj, ki jih študent pridobi med študijem pri predavanjih, vajah ter seminarjih, v inženirsko prakso.
- Sposobnost za povezovanje teorije in dela v praksi.

Objectives and competences:

Objectives
- In the context of practical training student learns about operational work in targeted occupations and organizational structure of entities in the construction field.
- The practice during the educational process has also motivational goal and purpose.
- Students learn about the elements of career planning and development and processes related to career development.
- Student is facilitated to do self-evaluation of competences and factors that support the processes of professional identification in relation to academic environment and working environments.
- Students learn about the characteristics of workplace learning and the characteristics of working environments and the characteristics of observation of workflows.

Gained competences
- Control of the application and transfer of theoretical knowledge acquired while studying in academic environment (lectures, tutorials and seminars) to engineering practice. Ability to integrate theory and practical work.

Predvideni študijski rezultati:

- Študent pridobi praktična znanja in izkušnje na področju nalog in storitev gradbene stroke.
- Pridobljena znanja mu koristijo pri izdelavi magistrskega dela.
- Študent se po opravljeni praksi lažje in hitreje uvaja v delo po končanem študiju, razume različne gradbene subjekte in njihovo vlogo v družbi.
- Študent se na podlagi sinteze pridobljenih znanj tekom študija lahko sooči z aktualnimi delovnimi nalogami oz. uporabi aktualna znanja in pripomočke pri izpolnjevanju nalog, ki jih opravlja

Intended learning outcomes:

- Students will acquire practical knowledge and experience in the field of tasks and services of the construction field.
- Obtained knowledge will be useful in the preparation of master thesis.
- During the practice students are more efficiently introduced to the work needed after completing their studies, understand various construction entities and their role in society.
- Synthesis of knowledge acquired during the study may be confronted with the actual work and tasks

organizacija, v kateri poteka praktično usposabljanje. - Pridobljena znanja in spretnosti pripomorejo h kakovostnejšemu razumevanje vsebin posameznih predmetov v študijskem procesu, tudi pri izdelavi magistrskega dela, kakor tudi kasneje pri uvajanju na prvo delovno mesto. - 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.	through the application of core knowledge and tools in fulfilling the tasks carried out by the organization in which the practical training takes place. - Knowledge and skills to help achieve higher quality of comprehension of the content of individual courses in the study process, also in the writing of master thesis, as well as later in the introduction to the first employment. - Student is able to evaluate work against the objectives and targets achieved. Professional work is reflected on the basis of the information collected. Students develop competences for career planning and self-assessment of knowledge 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 keep a diary and portfolio of practices.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Dnevnik prakse	**40 %**	Diary of practical work,
Portfolio	**30 %**	Portfolio
Ustni zagovor	**30 %**	Oral presentation
Predmet se ocenjuje z »opravil« / »ni opravil«		The course is assessed with "passed" /"not done"

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.
ŠUBIC KOVAČ, Maruška, ISTENIČ STARČIČ, Andreja. Kompetence diplomantov gradbeništva - evropski raziskovalni projekt TUNING = Competences of graduates in civil engineering - the European Research Project TUNING. Gradb. vestn., julij 2006, letn. 55, str. 178-186, ilustr.
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.

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 - druga stopnja MA	Nizke gradnje	2	3
Civil Engineering - second cycle MA	Infrastructural Engineering	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: prof. dr. Jana Šelih

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

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

Prerequisites:

Vsebina:

Predavanja
Projekt kot sistem, cilji projekta, komponente in relacije v projektu, odnos z okoljem. Organizacija izvajanja projektov, stalna in nestalna projektna organiziranost. Področja projektnega vodenja. Specifika in faze projektov v gradbeništvu. Strukturiranje projekta, matrika odgovornosti. Planiranje in spremljanje projektov. Oblikovanje projektnega tima. Upravljanje s tveganji.

Vaje
Izdelava lastnega projekta od zasnove do generalnega plana. Modeliranje tveganj pri projektih v gradbeništvu in simulacija vplivov.

Content (Syllabus outline):

Lectures
Project as a system, project goals, project components and their relationships, project environment interaction. Project execution organisation, permanent and temporary project organisation. Areas of project management Specific features and project phases in construction projects. Project structuring, responsibility matrix Project planning and monitoring. Formation of a project team. Risk management

Tutorial
Preparation of a case study. Risk simulation in construction projects, impact simulation.

Temeljni literatura in viri / Readings:

Česen, A., Kern, T., Bajec, M. 2008**.** Vodnik po znanju projektnega vodenja, 3. Izdaja. Založba Moderna organizacija.
Rant, M., Jeraj, M., Ljubič, T. 1998. Vodenje projektov.
Šelih, J. 2005. Vodenje gradbenih projektov, delovno gradivo. Ljubljana, UL FGG.

Cilji in kompetence:	**Objectives and competences:**
- Pridobitev znanj o posameznih udeležencih v procesu graditve, - Pridobitev znanj o fazah projekta (s poudarkom na gradbenem projektu), - pridobitev znanj o procesu vodenja projekta.	- Acquisition of basic knowledge regarding construction project participants, - Acquisition knowledge of project phases (with emphasis on construction projects), - Acquisition of the process of project management.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Osvojeno znanje s področja projektnega vodenja (proces, udeleženci, medsebojni odnosi, oblike sodelovanja), - Sposobnost uporabe računalniških orodij za vodenje projektov.	- Acquired knowledge from the field of project management (process, stakeholders, participants' relations), - Ability to use computer – supported project management tools.

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (teoretični del)	**50 %**	Written exam (theory)
Pisni izpit (računski del)	**50 %**	Written exam (examples**)**

Reference nosilca / Lecturer's references:

FORCA, S., SRDIČ, A., ŠELIH, J. 2006. Follow up and analysis of time delays in project management. V: Semolič, B. (ur.), Kerin, A. (ur.), Stare, A. (ur.). Value management - how to ensure value for project stakeholders : proceedings and congress programme. Ljubljana, ZPM Slovensko združenje za projektni management, 1-4.

ŠELIH, J., SRDIČ, A. 2007. Time and cause delay analysis in construction projects. V: Milašinović, D. (ur.). Medunar. Konf. 2006. Savremeni problemi u granevinarstvu. Subotica: Građevinski fakultet.

ŠELIH, J. 2007. Residential building stock refurbishment design supported by a multi criteria decision support system. WSEAS Trans. Syst. 6/6, 1124-1131.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Mehanizacija in tehnologija gradnje cest
Course title:	Road construction machinery and technology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	3
Civil Engineering - second cycle MA	Infrastructural Engineering	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
60		15	30		105	7

Nosilec predmeta / Lecturer: izr. prof. dr. Marijan Žura, doc. dr. Ana Petkovšek

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 Gradbena mehanizacija. Elementi in karakteristični prečni prerezi ceste in vozišča. Osnovni cestogradbeni materiali, umetni materiali, sekundarne surovine in kemično stabilizirani materiali. Osnovne preiskave in orientirane raziskave na pogoje uporabe cestogradbenih materialov. Karakteristične plasti v cestnem prerezu. Gibanje in delovanje vode v cestnem telesu in v plasteh vozišča. Postopki gradnje in utrjevanja plasti in postopki preverjanja kakovosti Vaje Izdelava elaborata o izboru ustrezne gradbene mehanizacije za gradnjo cest. Izdelava Tehnološkega elaborate gradnje cest v vkopu, nasipu, mešanemu prečnemu profilu ceste in na prehodu zemljinski objekt – gradbeni objekt. Seminar Dimenzioniranje voziščnih konstrukcij.	Lectures Construction machinery; elements and characteristic cross-sections of road and carriageway, basic road- construction materials, artificial materials, secondary raw materials and chemically stabilized materials, basic tests and investigations according to the conditions of using road-construction materials, characteristic layers in road cross-section, water movement and actions in road elements and in carriageway layers, procedures of construction and compaction of layers and procedures of quality check. Tutorial Elaboration of a report on the selection of adequate road construction machinery, elaboration of technological report on road construction in excavation, slope, mixed cross-section, road transition from ground to bridge. Seminar Dimensioning of road structure

Temeljni literatura in viri / Readings:

Žmavc, Janez. 2008. Voziščne konstrukcije
SIST EN 1997-1:2005 Evrokod 7-1: Geotehnično projektiranje
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilji
- Pridobiti osnovna znanja o gradbeni mehanizaciji
- Pridobiti osnovna znanja o karakterističnih prečnih prerezih ceste in voziščne konstrukcije glede na pogoje v geološkem okolju in glede na prometne obremenitve
- Pridobiti osnovna znanja o vplivih okolja in vremenskih razmer na obnašanje ceste in vozišča
- Nadgraditi osnovna znanja o geo-materialih, o postopkih za njihovo poboljšanje in kemično stabiliziranje in pridobiti poglobljena znanja o proizvedenih cestogradbenih materialih
- Pridobiti osnovna znanja o merilih in postopkih za vrednotenje kakovosti gradnje
- Pridobiti znanja za dimenzioniranje vseh vrst voziščnih konstrukcij Pridobljene kompetence:
- Sposobnost izdelave tehnoloških elaboratov za gradnjo cest
- Sposobnost vodenja nadzora zemeljskih del pri gradnji cest
- Sposobnost načrtovanja in dimenzioniranja vozišč.

Objectives and competences:

Objectives
- To acquire basic knowledge of construction machinery
- To acquire basic knowledge of characteristic cross sections of road and pavement structure according to the conditions in geological environment and the traffic load
- To acquire basic knowledge about the effects of environmental and weather conditions on the pavement
- To upgrade basic knowledge of geo-materials, procedures for their hardening chemical stabilization and to acquire in-depth knowledge of the road construction materials
- To acquire basic knowledge about the criteria and procedures for the evaluation of the quality of construction
- To acquire knowledge for the design of all kinds of pavements
- Ability to prepare technological studies for the construction of road
- Ability of management control in the construction of earthworks
- Ability to design and dimension pavement.

Predvideni študijski rezultati:

- Poznati različno gradbeno mehanizacijo
- Poznavanje škodljivih vplivov okolja in materialov na trajnost in funkcionalnost vozišč
- Poznavanje tehnologij gradenj cest in nadzorovanja kakovosti izvedenih del
- Znati dimenzionirati voziščne konstrukcije
- Doseženo znanje uporabljajo pri izdelavi diplomskega dela oz. v inženirski praksi pri načrtovanju, gradnji in nadzoru cest in v proizvodnji cesto-gradbenih materialov
- Razumevanje obnašanja ceste in voziščne konstrukcije v specifičnih pogojih okolja in prometa, ki je ključna za varnost in uporabnost.
- Sposobnost prepoznavanja povečane. ranljivosti cest v določenih pogojih okolja
- Sposobnost racionalnega pristopa pri načrtovanju, gradnji in vzdrževanju cest
- Sposobnost razumevanja prilagajanja inženirskih ukrepov vsakokratnim terenskim razmeram.

Intended learning outcomes:

- Knowledge of road construction machines
- Knowledge of harmful effects of the environment and materials on the durability and functionality of roads
- Knowledge of technologies and quality control procedures
- Ability to design pavement structure Use:
- Achieved knowledge used in the preparation of final thesis in design, supervision and construction of roads and in the production of road construction materials
- Understanding of the behavior of road and pavement structure in specific conditions of the environment and traffic, which is crucial for safety and usefulness.
- Ability to recognize the increased vulnerability of roads in certain environmental conditions
- Ability of a rational approach to the design, construction and maintenance of roads

	- Ability to adapt to different weather, geological and traffic conditions.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje.	Lectures and exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit (teoretičen del)	**30 %**	Exam (theory)
Samostojna naloga	**35 %**	Individual work
Predstavitev naloge	**35 %**	Project presentation

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.
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. 200-20

MAČEK, Matej, MAUKO, Alenka, MLADENOVIČ, Ana, MAJES, Bojan, PETKOVŠEK, Ana. A comparison of methods used to characterize the soil specific surface area of clays. Applied clay science, ISSN 0169-1317. [Print ed.], oktober 2013, letn. 83-84, str. 144-152, doi: http://dx.doi.org/10.1016/j.clay.2013.08.026.
MAČEK, Matej, MAJES, Bojan, PETKOVŠEK, Ana. Influence of mould suction on the volume - change behaviour of compacted soils during inundation = Vpliv vrojene sukcije na volumensko obnašanje zgoščenih zemljin med vlaženjem. Acta geotechnica Slovenica, ISSN 1854-0171, 2011, vol. 8, [no]. 2, str. 67-79.
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, ISSN 1435-9529, 2010, vol. 69, no. 4, str. 561-574

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Mestne prometne površine
Course title:	Urban roads

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	3
Civil Engineering - second cycle MA	Infrastructural Engineering	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		15	15		75	5

Nosilec predmeta / Lecturer: doc. dr. Peter Lipar

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

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

Prerequisites:

Vsebina:

Sistematika mestne cestne mreže – administrativna in funkcionalna; projektni elementi mestnih cest – v situaciji, v podolžnem profilu, v prečnem prerezu, preglednost; projektni elementi križišč – oblike, računski elementi; prometni otoki, pregledno polje, avtobusna postajališča; mirujoči promet – različne oblike parkiranja umirjanje prometa v naseljih – namen in ukrepi na mreži in na vozišču; kolesarske površine – različne oblike, projektni elementi; površine za pešce – cone za pešce, nadhodi, podhodi; nivojska prečkanja; prometna signalizacija – vertikalna, horizontalna.

Content (Syllabus outline):

Road classification – administrative and functional; road design elements – plan, longitudinal profile, cross section, sight field; intersection design – shapes, traffic islands, bus, bays; parking facilities; traffic calming – purpose and measures; bicycle facilities – design elements; pedestrian facilities – pedestrian zones, over and under passes, pedestrian crossings; traffic signalization, vertical and horizontal.

Temeljni literatura in viri / Readings:

Tehnični normativi in navodila za projektiranje mestnih prometnih površin. 1991. Ljubljana, FGG – PTI.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Podati osnove mestne prometne politike - Podati osnove za kategorizacijo mestnih prometnih površin - Detajlno obdelati projektne elemente posameznih vrst mestnih prometnih površin - Opredeliti možne ukrepe za izboljšanje prometne varnosti na mestnih prometnih površinah Pridobljene kompetence: - Sposobnost načrtovanja mestnih prometnih površin - Sposobnost projektiranja mestnih prometnih površin - Možnost ocenitve ustreznosti mestne prometne politike	Objectives: - To understand basic concepts of urban transport policies - To understand basic road classification - To process design elements of various types of urban road surfaces - To identify possible measures to improve road safety in urban traffic areas Acquired competences: - Ability of urban road planning - Ability of urban road design - Possibility to assess the adequacy of urban transport policy

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spoznavanje osnovnih potreb za normalno funkcioniranje različnih oblik prometa na mestnih prometnih površinah - Pridobljeno znanje o reševanju problematike prometne varnosti - Spoznavanje principov projektiranja Uporaba: - Pridobljeno znanje se uporablja za uspešno načrtovanje in projektiranje mestnih prometnih površin v praksi. - Pravilna ocena o porabi prostora in poznavanje značilnosti posameznih oblik prometa so osnova za pravilno načrtovanje in projektiranje mestnih prometnih površin. - Zmožnost zaznavanja potencialnih prometno nevarnih situacij pri projektiranju - Sposobnost pravilne izbire ukrepov iz nabora. možnih rešitev - Zmožnost povezovanja parcialnih rešitev v celoto.	- To meet basic needs for normal functioning of various forms of transport in urban traffic areas - Knowledge about solving the problem of traffic safety - Learning about the principles of urban road design - The acquired knowledge is used for successful planning and design of urban road surfaces in practice. - Correct assumption of the use of space and knowledge of the characteristics of individual modes of transport are the basis for proper planning and design of urban traffic areas - Ability to detect potential dangerous traffic situations in the design - Ability of correct selection of actions from a set of possible solutions - Ability to connect partial solutions in a whole.

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni in/ali ustni izpit	**60 %**	Exam
Vaje	**40 %**	Practical work

Reference nosilca / Lecturer's references:

LIPAR Peter; JUVANC Alojz, Racionalizacija pri projektiranju cest, 1. Slovenski kongres o cestah in prometu, Zbornik kongresnih gradiv in referatov, str 115-119, Bled.
LIPAR Peter, Vrednotenje vplivov ceste in prometa na okolje s pomočjo GIS in določitev optimalne variante, Zbornik predstavitev nekaterih slovenskih strokovnih člankov o cestah – ob zaključni konferenci OECD/RTRP v Sloveniji, str. 60-64, Ljubljana 1995.
LIPAR Peter, GROOTE Wouter, Za trajnostno mobilnost v Srednji in Vzhodni Evropi, 5. Slovenski kongres o cestah in prometu, Povzetek referatov str. 16, 1-7, celotni referat na CD, Bled 2000.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Informacijsko modeliranje zgradb
Course title:	Building information modelling

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	3
Civil Engineering - second cycle MA	Infrastructural Engineering	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	15	30		90	6

Nosilec predmeta / Lecturer: doc. dr. Tomo Cerovšek

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

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

Prerequisites:

Vsebina:

Predavanja
Uvod v informacijsko modeliranje zgradb (BIM). Načini uvajanja in uporabe BIM v gradbeništvu. Sintaksa, struktura in semantika podatkov. Načrtovanje podatkovnih modelov in jezik Express. Zbirke podatkov za informacijsko modeliranje zgradb. Pregled aspektnih modelov in ogrodij BIM. Metode, standardi in orodja za interoprabilnost BIM. Standardi za izmenjavo podatkov ifc, cis2, landxml, cobie. Uporaba BIM za energetsko učinkovitost in trajnostno gradbeništvo Parametrično modeliranje informacijskih modelov zgradb.
Vaje
Izdelave sheme za konstrukcijske elemente ali gradbene (pol)proizvode. Izdelava delov informacijskih modelov zgradb. Izdelava parametričnega modela gradbeni. Informacijsko modeliranje istega gradbenega produkta z več orodji. Parametrizacija in povezovanje z informacijskimi modeli zgradb.
Seminar
Projekt iz informacijskega modeliranja zgradb.

Content (Syllabus outline):

Lectures
Introduction to building information modelling BIM Uses and implementations in building projects throughout project phases. Syntax, structure and semantics of data. Design of data structures and language Express. Databases for building information modelling. Overview of aspect models. Methods, standards and tools for BIM Interoperability. Standards for BIM data exchange: IFC, CIS2, LandXML, COBIE. Use of BIM for Energy Efficient and sustainable design. Parametrical modelling.
Lab work
Development of schemata for structural elements and/or building products. Development of building information models. Development of parametric models of the same building element using different tools. Parameterization and interlinking of BIM.
Seminar
BIM Project.

Temeljni literatura in viri / Readings:

EASTMAN C, TEIHOLZ P, SACKS R & LISTON K. 2013. BIM Handbook A Guide to Building Information Modelling for Owners, Managers, Designers, Engineers, and Contractors, New Jersey: John Wiley & Sons.
WEYGANT, RS. 2011. BIM Content Development: Standards, Strategies, and Best Practices. John Wiley & Sons.
BRITISH STANDARDS. PAS 1192 Specification for information management for the capital/delivery phase of construction projects using Building information modelling. 2013. British Standards.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilji:
- Spoznati osnovne koncepte informacijskega modeliranja zgradb
- Pripraviti študente na uvajanje in uporabo informacijskih modelov zgradb
- Pripraviti študente na nadgradnjo uporabe informacijskih modelov zgradb.

Pridobljene kompetence:
- Izdelati shemo informacijskih modelov zgradb
- Izdelati konkreten informacijski model in pridobiti ustrezne podatke
- Uporabiti informacijski model zgradb za vizualizacijo, dokumentacijo in analize
- Analitično obravnavati izmenjavo informacijskih modelov in vlogo pri komunikaciji
- Sodelovati pri gradbenih projektih, ki temeljijo na informacijskih modelih zgradb.

Objectives and competences:

Objectives:
- Become familiar with basic concepts of schematic (BIM Schema) and concrete building information modelling (BIM Model)
- Prepare students to be BIM Change agents who will implement BIM in the industry
- Prepare students to upgrade the BIM Uses

Competences:
- Ability to develop a BIM Schema
- Ability to develop infrastructure or building BIM model
- Making use of BIM for different purposes
- Analytical study of the use of BIM for project communication and exchange of data
- Collaboration in BIM based projects.

Predvideni študijski rezultati:

- Poznavanje teoretičnih osnov in standardov za BIM
- Poznavanje metod izdelave shem in zbirk podatkov za BIM
- Razumevanja pomena in potenciala BIM
- Razumevanje kritičnih vsebin in elementov pri implementaciji BIM
- Sposobnost planiranja uporabe in implementacije BIM
- Sposobnost kritične presoje uvajanja BIM glede na zrelost sodelujočih in konkreten projekt
- Sposobnost analizirati in odpraviti ovire za interoperabilnost BIM.

Intended learning outcomes:

- Knowledge and understanding of BIM theory and standards
- Methods of development of schemata and databases that are relevant to BIM
- The role and potential of BIM for the industry
- Critical aspects in BIM implementation
- BIM planning and execution
- Assessment procedures that are relevant for successful implementation of a project
- Interoperability issues in BIM based exchange of project information in infrastructure and building projects

Metode poučevanja in učenja:

Predavanja sledijo problemsko naravnanemu delu na konkretnem projektu. Vsebine so delno posredovane v obliki multimedijskih gradiv.

Learning and teaching methods:

Learning is supported by online learning content management systems with interactive content. Student work is individual as well as in groups.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Sprotno delo - naloge	**50 %**	Course-work
Preizkus teoretičnega znanja	**20 %**	Written exam
Projekt BIM	**30 %**	BIM 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, ISSN 1474-0346, 2011, letn. 25, št. 2, str. 224-244, ilustr., doi: 10.1016/j.aei.2010.06.003.
CEROVŠEK, Tomo. The lifecycle of BIM : a university project case study (MEP coordination). V: HORE, Alan (ur.), MCAULEY, Barry (ur.), WEST, Roger (ur.). Proceedings of CITA BIM gathering conference, 14-15 November 2013. [Dublin]: Construction IT Alliance, 2013, str. 253-260, ilustr.
SLAK, Tomaž, CEROVŠEK, Tomo, ZUPANČIČ-STROJAN, Tadeja, KILAR, Vojko. A comperative study of model-based framework for the AEC competency evaluation ofbuilding [!] tenders. Tehnics tehnologies education management, ISSN 1840-1503, 2013, vol. 8, no. 1, str. 449-463, ilustr. http://www.ttem.ba/pdf/ttem_8_1_web.pdf.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Magistrsko delo
Course title:	Master thesis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	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
				150	150	10

Nosilec predmeta / Lecturer:	učitelj na študijskem programu / teacher at 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):**
Magistrsko 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 magistrskem delu 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.	Master thesis shall be 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 thesis 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 magistrskega dela.
T. Koler-Povh, G. Turk: Navodila za oblikovanje visokošolskih del na FGG in navajanje virov, FGG UL, Ljubljana, 2011, 39 strani, priloge. 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:

Cilji
- Uporabiti pridobljena znanja v poglobljenem študiju na temi magistrskega dela.
- Pod mentorstvom izdelati koncept dela, v katerem so opredeljeni namen, cilji, metode in viri za izdelavo tega dela.
- Razvijanje samostojnega, kritičnega in etičnega načina dela.

Pridobljene kompetence:
- Z javno predstavitvijo magistrskega dela pridobiti komunikacijske spretnosti in sposobnosti.

Objectives and competences:

Objectives
- To use the knowledge gained by in-depth study on the thesis topic.
- Under supervisor's supervision student prepares a concept, where the purposes, goals, methods and references for the thesis are presented.
- To develop independent, critical and ethical way of working.

Acquired competences:
- With public presentation student obtains communication skills and abilities.

Predvideni študijski rezultati:

- Pridobi znanja na vseh fazah, ki so del samostojnega reševanja konkretnih problemov in nalog na področju gradbeništva, sodelovanja in tudi skupinskega dela v okviru različnih subjektov na področju gradbeništva.
- Razume gradbeništvo kot interdisciplinarno panogo, vezano na ostale naravoslovne in tehniške vede in na okolje.
- Doseženo znanje uporabi v inženirski praksi.
- Uporaba teoretičnih znanj v praksi.
- Povezovanje ter inovativna dejavnost pri delu.
- Načrtovanje, izvedba in kritično vrednotenje pri reševanju problemov ter prezentacija izsledkov strokovnih nalog in raziskav.
- Sodelovanje, vključevanje strokovnjakov in skupno reševanje problemov.

Intended learning outcomes:

- Students acquire knowledge in all phases, which are part of a real problem and tasks in civil engineering, as well as cooperation and teamwork within various entities in civil engineering.
- They understand civil engineering as an interdisciplinary field, connected to other natural and technical sciences and the environment.
- They learn how to use the theoretical knowledge in engineering practice.
- Use of theoretical knowledge in practice.
- Planning, execution and critical evaluation in problem solving and presentation of results of technical tasks and research.
- Including, participation, involvement of experts and joint problem solving.

Metode poučevanja in učenja:

Mentorsko vodeno samostojno delo.

Learning and teaching methods:

Independent work under supervision.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Magistrska naloga	**50 %**	Master thesis
Zagovor	**50 %**	Defence

Reference nosilca / Lecturer's references:

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Komunalno in stanovanjsko gospodarstvo
Course title:	Municipal and housing economics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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	45			90	6

Nosilec predmeta / Lecturer:	izr. prof. dr. 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 Komunalno inženirstvo.	The course is a part of the module Municipal Engineering.

Vsebina:	**Content (Syllabus outline):**
Predavanja Javne potrebe, javne gospodarske službe, javna infrastruktura; pojem, pomen in vloga komunalnih dejavnosti; stroškovni vidiki izvajanja komunalnih dejavnosti; organiziranost komunalnih dejavnosti; sistem javnih financ na lokalni ravni; ekonomski instrumenti varstva okolja; temeljni pojmi s področja stanovanjskega gospodarstva; lastninska in druge pravice na stanovanju; planiranje stanovanjske gradnje; trg stanovanj in stanovanjskih hiš; upravljanje države in občin z nepremičninami; upravljanje v večstanovanjskih hišah; stroški uporabe stanovanj in stanovanjskih hiš (najemnine). Seminar Izdelava samostojnega seminarja s področja komunalnega in/ali stanovanjskega gospodarstva in predstavitev. Vaje Seminarske vaje (računske vaje)	Lectures Public needs, public utility, public infrastructure; concept and role of municipal activities; cost aspects of performing municipal activities implementation; organization of public utilities; public finance system at local level; economic instruments for environmental protection; basic concepts related to housing; property and other rights to housing; housing construction within spatial planning; housing market; state and municipal real estate management; management of multi-dwelling houses; costs and housing expenses (rent). Seminar Making of individual seminar work in the field of municipal and/or housing economics. Tutorial Calculation exercises in the field of municipal and housing economics.

Temeljni literatura in viri / Readings:

Rakar, A. 2011. Komunalno gospodarstvo: študijsko gradivo, Ljubljana, UL FGG, 71. strani.
Rakar, A., Šubic Kovač M. 2010. Stanovanjsko gospodarstvo: študijsko gradivo. Ljubljana, UL FGG, 92 str.
Rakar, A. 1994. Komunalno gospodarstvo, učbenik, Ljubljana, UL, FGG, 184 strani.
Balchin P., Rhoden M. 2002. Housing policy, Routledge, London and New York, str. 99-120, 328- 338.
Aktualni predpisi: http://www.gov.si.

Cilji in kompetence:

Cilj
- Seznaniti študenta s področjem komunalnega in stanovanjskega gospodarstva, vključno z izhodišči za pripravo strokovnih podlag v pripravi prostorskega načrta.

Kompetence:
- Poznavanje in razumevanje strokovnega izrazoslovja s področja komunalnega in stanovanjskega gospodarstva poznavanje in razumevanje bistvenih značilnosti pravnih, organizacijskih in ekonomskih vidikov na področju komunalnega in stanovanjskega gospodarstva, razumevanje in uporaba teoretičnih izhodišč v praksi,
- seznanjenost z zakonodajo,
- komuniciranje z drugimi strokovnjaki v praksi,
- delovanje v timu, še predvsem pri pripravi strokovnih podlag v fazi priprave prostorskih načrtov,
- kritično presojanje in prilagajanje novim situacijam.

Objectives and competences:

Objectives
- To get students familiar with housing and municipal economics and their role as basis for the expert guidelines when making spatial planning documents

Competences
- To know and understand terminology in the field of housing and municipal economics
- To know and understand the key characteristics of legal, organizational and economic aspects in the field of housing and municipal economics
- Knowledge regarding legislation in the field of housing and municipal economics
- Ability to communicate with other experts in practice
- Ability to work in team with other experts when preparing spatial planning documents
- Ability of critical judgment and adjustment to new situations

Predvideni študijski rezultati:

- Študent spozna in razume bistvene značilnosti s področja komunalnega in stanovanjskega gospodarstva in razume specifičnosti delovanja na teh področjih.
- Študent svoje znanje uporabi pri pripravi strokovnih podlag za izdelavo razvojnih programov, pri izvajanju ukrepov za njihovo realizacijo ter pri odločitvah v fazi upravljanja stanovanj in komunalne infrastrukture.
- Študent na osnovi sinteze pridobljenih znanj s področja prava, ekonomije in organizacije lahko kritično presoja zahteve dnevne politike glede bodočega razvoja dejavnosti, zahteve po sodelovanju kvalificirane in laične javnosti pri sprejemanju razvojnih programov, prav tako pa tudi poskuse uvajanja pogodbenih odnosov v odločanje o javno-pravnih zadevah na področju komunalnega in stanovanjskega gospodarstva.

Intended learning outcomes:

- Student is familiar with basic characteristics in the field of housing and municipal economics.
- Acquired knowledge can be used when preparing expert basis for making spatial planning documents.
- The knowledge should help students in the decision making process in the field of housing management and public service infrastructure management.
- Synthesis of knowledge in the field of law, economy and organisation allows student to critically consider housing policy and development programs in the field of public service infrastructure. Insight into contractual relationships between stakeholders in the field of housing and municipal economics is given as well.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar in seminarske vaje se izdeluje s pomočjo gradiva v spletni učilnici in na spletu. Za poučevanje se uporablja IKT.	Lectures, seminar and tutorial are done using visual aids and materials/literature available through the E-classroom or using other publicly available data.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Dva kolokvija:		Two mid-term written exams:
teoretičen del	**40 %**	theoretical part
računski del	**30 %**	calculation exercises
Seminar	**30 %**	seminar
ali		or
Pisni izpit:		Written examination
teoretičen del	**40 %**	theoretical part
računski del	**30 %**	calculation exercises
Seminar	**30 %**	seminar
Vsak del mora biti ocenjen pozitivno.		Each part of the exam must be graded positive as well as seminar.

Reference nosilca / Lecturer's references:

RAKAR, Albin, MESNER, Andrej, MLINAR, Jurij, ŠARLAH, Nikolaj, ŠUBIC KOVAČ, Maruška. Zaščita in ohranjanje vrednosti gospodarske javne infrastrukture. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 242-252, ilustr.

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. Urban land development potential under conditions of sustainable development. V: MULLINER, Emma (ur.). Sustainability: Focus on Urban and Peri-Urban Development : 1st International and Interdisciplinary Symposium of European Academy of Land Use and Development, 1st -3st September 2011, Liverpool, UK : Synopsis of Abstracts. Liverpool: BEST: JMU, 2011, str. 22-25.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Vodovod in kanalizacija
Course title:	Water supply and sewage systems

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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	30		60		150	10

Nosilec predmeta / Lecturer:	prof. dr. Franci Steinman

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 Komunalno inženirstvo. Opravljen izpit iz predmetov Hidromehanike in Inženirske hidrotehnike oziroma ustrezna primerljiva znanja.	The course is a part of the module Municipal Engineering. Passed exams in Hydromechanics and Engineering hydraulics.

Vsebina:	**Content (Syllabus outline):**
Predavanja Uvod in zgodovinski razvoj stroke. Hidravlično modeliranje cevovodnih sistemov (poznavanje hidravličnih lastnosti različnih elementov sistemov, običajni primeri njihove uporabe in izredni dogodki, preračun in izbira ustreznih orodij za zahtevne primere uporabe). Uporaba hidravličnih modelov (načrtovanje, preverjanje obratovanja, rehabilitacija in posodabljanje sistemov ipd.). Vodni viri – pojavljanje, karakteristike, izkoriščanje, zaščita. Potrebe po vodi, načrtovanje porabe in izrabe vodnih virov; vrste odpadne vode, nastanek in načini odvodnje odpadnih in padavinskih voda. Vodne izgube – vrste, odpravljanje, rehabilitacija cevovodov. Zasnova, načrtovanje, izgradnja in obratovanje vodovodnih in kanalizacijskih sistemov. Padavine v Sloveniji in analiza nalivov. Razbremenjevanje in zadrževanje onesnaženih voda. Presoja vplivov razbremenjenih kanalskih	Lectures: Introduction and historical development of the profession. Hydraulic modeling of piping systems (knowledge of the hydraulic properties of the different elements of the systems, usual examples of their use and incidents, calculation and selection of appropriate tools for complex cases). The use of hydraulic models (design, verification operation, rehabilitation and modernization of systems, etc.). Water resources - the appearance, characteristics, utilization, protection. Water needs, consumption planning and utilization of water resources; types of waste water, the formation and methods of drainage wastewater and rainwater. Water loss – types, elimination, rehabilitation of pipelines. Design, planning, construction and operation of water supply and sewerage systems. Precipitation in Slovenia and rainfall analysis. Overflowing and retention of sewage water. Assessment of the

voda na kakovost sprejemnikov razbremenjenih vod. Vpliv zalednih voda na poplavno varnost urbaniziranih površin. Statična presoja proti porušitvi cevi in vodotesnost sistema. Objekti na vodovodnih in kanalizacijskih sistemih. Vaje: Hidravlični izračun sistemov za odvod onesnaženih voda z zadrževalniki in razbremenilniki. Statična presoja cevi proti porušitvi. Dimenzioniranje črpališča. Spoznavanje z matematičnimi modeli za dimenzioniranje vodovodnih in kanalizacijskih sistemov. Seminar Račun hidravličnih lastnosti in značilnih obratovalnih stanj izbranega zahtevnega sistema, verifikacija-umerjanje-validacija in uporaba hidravličnih modelov v načrtovanju, obratovanju ter značilnih dogodkih tekom življenjskega cikla.	effects of overflowed sewage water on recipient quality. Impact of back-water on flood security of urbanized areas. Static assessment of pipes and water tightness of the system. Facilities on water supply and sewerage systems. Exercises: Hydraulic calculation of drainage systems for sewage water with retention and overflow reservoirs Static assessment pipes burst. Dimensioning of the pumping systems. Introducing of mathematical models for designing water supply and sewerage systems. Seminar: Hydraulic properties calculation and typical operating conditions of selected complex system, verification-calibration-validation and usage of hydraulic models for designing, operation and in significant events during the life cycle.

Temeljni literatura in viri / Readings:

Steinman, F. 1999. Hidravlika – učbenik. Ljubljana, UL FGG, 295 str.
Panjan, J. 2008. Odvodnjavanje onesnaženih voda – skripta. Ljubljana, UL FGG, 198 str.
Panjan, J. 2005. Osnove zdravstveno hidrotehnične infrastrukture. Ljubljana, UL FGG, 289 str.
Kompare, B. 1991. Modeliranje deževnega odtoka iz urbaniziranih povodij. Ljubljana, FAGG Inštitut za zdravstveno hidrotehniki, 509 str.
Hosang, W., Bischof, W. 1998. Abwassertechnik. B.G. Teubner Stuttgart, 724 str.
Walski, T.M. 2001. Water distribution Modeling. Haestad Press, Waterbury, ZDA, 441 str.
Nix, S.,J. 1994. Urban Stormwater Modeling and Simulation. Lewis Publishers, 212 str.
Imhoff, K., Imhoff, K. R. 1999). Taschenbuch der Stadtentwässerung, 28. Auflage. Oldenbourg Verlag, 442 str.
e-student in spletna stran IZH.

Cilji in kompetence:	**Objectives and competences:**
- Cilj predmeta je študentom dati znanja in spretnosti za načrtovanje in izvedbo vodovodnih in kanalizacijskih sistemov. - Študent se nauči načrtovati zajem vode, pripravo pitne vode in razdelitev po naselju in odvod padavinske in odpadne vode. Razume in zna preveriti dobljene rezultate modeliranja.	- To gain knowledge and skills for designing and applying water supply and sewage systems. - Design of water catchment elements, water treatment utilities, and water distribution networks, and drain rainwater and waste water. Students are competent to understand and interpret modelling results.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Pridobljeno poglobljeno znanje za hidravlično dimenzioniranje zahtevnih primerov uporabe vodovodnih sistemov in urbani odvodnji. - Razumevanje funkcioniranja vodovodnih in kanalizacijskih sistemov. - Osvojeno znanje za dimenzioniranje in za načrtovanje sistemov. - Izdelava najzahtevnejših hidravličnih izračunov v hidrotehnični praksi ter snovanje in izgradnja	- Obtained knowledge for the design and planning systems. - Manufacturing of complex hydraulic calculations in river engineering and design and construction of water supply and sewage systems. - Understanding the physical basis of water supply and sewerage systems, the ability to analyze alternative solutions and the optimal choice. - Ability to take into account the hydraulic

vodovoda in kanalizacije. - Razumevanje fizikalnih osnov vodovodnih in kanalizacijskih sistemov, sposobnost analize variantnih rešitev in izbira optimalne. - Sposobnost upoštevanja hidravličnih lastnosti infrastrukturnih in drugih sistemov in naprav pri dimenzioniranju cevovodnih in kanalizacijskih sistemov in objektov na njih, ki jih bodo načrtovali v praksi. - Sposobnost umeščanja sistemov in naprav v urbanem okolju. - Sposobnost kritične presoje podatkov in dobljenih računskih rezultatov pri načrtovanju ukrepov.	characteristics of the infrastructure and other systems and installations in sizing water supply and sewage systems and buildings on them, they will be programmed into practice. - Ability positioning systems and devices in an urban environment. - The ability for critical analysis of data and computational results obtained when planning interventions.

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni in/ali ustni izpit	**50 %**	Written and / or oral examination
Seminarske vaje	**25 %**	Tutorials
Seminarska naloga	**25 %**	Seminar

Reference nosilca / Lecturer's references:

URŠIČ, M., KOMPARE, B. (2003). Izboljšava obrazcev za račun hidravličnih trenjskih izgub za tok pod tlakom v ceveh krožnega prereza = Improvement of the hydraulic friction losses equations for flow under pressure in circular pipes. Acta hydrotechnica 21/34, 57-74.
VAHTAR, M., KOMPARE, B. (2000). Kakovost površinskih voda v vodnogospodarskih strokovnih podlagah za potrebe usklajevanja prostorskega planiranja = Surface water quality in water management studies and plans to be used in the harmonization process in spatial development. Acta hydrotechnica 18/28, 89-106.
KOMPARE, B. (2005). Možnosti uporabe površinskih voda za pripravo pitne vode. V: ROŠ, M. (ur.). Zbornik referatov. Slovensko društvo za zaščito voda, Ljubljana, 77-85.

PANJAN, J., BOGATAJ, M., KOMPARE, B. (2005). Statistična analiza gospodarsko enakovrednih nalivov = Statistical analysis of the equivalent design rainfall. Strojniški vestnik 51/9, 600-611.
PANJAN, J. (2006). Die Messung von Partikelgrößen und ihre Anwendung bei Flockungs- und Absetzprozessen. KA – Wasserwirtschaft Abwasser Abfall 53/3, 260-264
DREV, D., VRHOVŠEK, D., PANJAN, J. (2006). Raziskave možnosti uporabe porozne keramike kot podstave ali filtrirne snovi pri čiščenju odpadnih vod = Using porous ceramics as a substrate or filter media during the cleaning of sewage. Strojniški vestnik 52/4, 250-263.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projekt iz komunalne infrastrukture
Course title:	Project from municipal infrastructure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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: izr. prof. dr. 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 Komunalno inženirstvo.	The course is a part of the module Municipal Engineering.

Vsebina:	**Content (Syllabus outline):**
Elaborat, ki ga izdela študent samostojno ali v skupini ima naslednje sestavne dele: Predstavitev obstoječega stanja in razvojnih potreb po komunalni infrastrukturi v lokalni skupnosti z opisom razlogov za obravnavano investicijo. Opredelitev razvojnih možnosti in ciljev investicije ter preveritev usklajenosti s strateškimi dokumenti. Opis in analiza variant investicije (lokacija, investicijski stroški, varstvo okolja, predvideni viri financiranja), ekonomska upravičenost projekta. Predlog najugodnejše variante s finančno konstrukcijo projekta. Ugotovitev smiselnosti in možnosti nadaljnje priprave investicijske, projektne, tehnične in druge dokumentacije s časovnim načrtom. Točna vsebina oziroma obravnavana investicija se določi vsako leto posebej glede na aktualnost in v sodelovanju z ostalimi nosilci predmetov modula.	Expert report by individual student or a group of students, including at least the following: analysis of existing condition and needs in the field of technical infrastructure within selected municipality; description of selected investment in technical infrastructure; definition of goals, alternatives to implement the goals, analysis of alternatives considering costs and benefits, locations, influence on environment, economic feasibility; proposal of most favourable alternative with financial structure of the project included; timeline of selected investment. The exact content (selected investment) is determined on an annual basis depending on the current relevance and in cooperation with other lecturers.

Temeljni literatura in viri / Readings:

Literatura s področja vsebine projekta (konkretne lokalne gospodarske javne infrastrukture).
Veljavni normativni akti, ki se nanašajo na:
- gospodarske javne službe
- prostorsko načrtovanje
- graditev objektov
- varstvo okolja
- sistem javnih financ na lokalni ravni
- javna naročila.

Cilji in kompetence:

- Cilj je naučiti študenta povezovati tehnična, prostorska in družboslovna znanja na področju gospodarske javne infrastrukture.
- Sposobnost izdelave in javne predstavitve investicijske zasnove in investicijskega programa za omrežja, objekte in naprave gospodarske javne infrastrukture.

Objectives and competences:

- The goal is to teach student how to connect technical knowledge, spatial knowledge and knowledge from social sciences in the field of municipal (technical) infrastructure.
- Capability to make and present in public the investment design and investment programme for the construction/renovation of municipal (technical) infrastructure.

Predvideni študijski rezultati:

- Študent pridobi potrebno znanje za izdelavo dokumenta identifikacije investicijskega projekta za izbran del komunalne infrastrukture v smislu: potrebe – projekt– financiranje – izvedba.

Intended learning outcomes:

- Student acquires the knowledge needed to make an identification document for the investment project for a selected part of municipal (technical) infrastructure in the following sense: needs – project – financing – implementation.

Metode poučevanja in učenja:

Nosilec predmeta razpiše teme projektov in prijavljene kandidate pri izdelavi elaborata usmerja in vodi. Študentje (posamično ali v skupini) izdelajo elaborat s predpisano obliko in vsebino ter ga javno predstavijo in zagovarjajo.

Learning and teaching methods:

The lecturer prepares various project tasks in advance and then guide students in the process of making a project. Students (individually or divided in several groups) make their project in the prescribed written form and make oral presentation of the project in public.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Projekt - pisni izdelek	**70 %**	Project - written document
ustna predstavitev projekta	**30 %**	Project - presented in public

Reference nosilca / Lecturer's references:

RAKAR, Albin, MESNER, Andrej, MLINAR, Jurij, ŠARLAH, Nikolaj, ŠUBIC KOVAČ, Maruška. Zaščita in ohranjanje vrednosti gospodarske javne infrastrukture. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 242-252, ilustr.
SITAR, Metka, LORBER, Lučka, ŠUBIC KOVAČ, Maruška. Revitalization of Industrial Zones in the Context of Sustainable Urban Land Development: Case Study of Business and Industrial Zone Tezno, Maribor. V: TIRA, Maurizio (ur.), IVANIČKA, Koloman (ur.), ŠPIRKOVÁ, Daniela (ur.).
Industrial urban land redevelopment : COST Action TU0602 - land management for urban dynamics : proceedings of Bratislava meeting. COST office: Maggiolli; Santarcangelo di Romagna, 2011, str. 89-106, 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:	Procesno modeliranje in informacijski sistemi
Course title:	Process modelling and information systems

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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	15		60	4

Nosilec predmeta / Lecturer:	doc. dr. Tomo Cerovšek

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 Organizacija – informatika.	The course is a part of the module Organisation – Building Informatics

Vsebina:	**Content (Syllabus outline):**
Predavanja Osnove modeliranja procesov in njihova uporaba. Ogrodja in metode modeliranja procesov. Mikro in makro modeliranje procesov. Ponovna uporaba procesnih modelov pri sodelovanju. Prenova poslovnih procesov: posnetek, zajem, analiza. Modeliranje as-is in to-be procesnih modelov in tranzicija. Modeliranje materialov procesnih modelov na osnovi modelov. Izdelava 4D procesnih modelom pri modeliranju stavb. Izdelava in uporaba aktivnih procesnih modelov. Izdelava integriranih 5D informacijskih modelov stavb. Vaje Izdelava procesnih modelov in simulacije za optimizacijo. Izdelava 4d procesnih modelov stavbe. Seminar Model prenove poslovnih procesov.	Lectures Introduction to process modelling and its use. Tools and methods for process modelling. Micro and macro process modelling. Process model reuse in collaboration. Business process re-engineering: modelling of AS-IS and TO-BE process models; modelling of material process models based on building information models (BIM); the development of 4D process models; the development of 5D process models. Lab work Development of process models and simulations for business process optimization. Development of 4D process models of buildings. Seminar A model for business process re-engineering.

Temeljni literatura in viri / Readings:

ECPPM, zborniki konferenc european conference on product and process modelling in the building industry. 1998–2014. Dostopno na: http://www.ecppm.org .
MUEHLEN, M. 2003. Workflow-based Process Controlling. Foundation, Design and Application of workflowbased. Berlin, Process Information Systems. Logos.
OULD M "business process management: a rigorous approach". 2005. North america, meghan-kiffer press.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

Cilji:
- Podati osnove metod in tehnik modeliranja procesov
- Podati osnove za prenovo poslovnih procesov s poudarkom na projektnih informacijskih sistemih in sistemih za sodelovanje inženirjev.

Pridobljene kompetence:
- Sposobnost zajema procesov v obliki procesnih modelov
- Sposobnost izdelave procesnih modelov za optimizacijo in izdelavo informacijskih sistemov v gradbeništvu
- Sposobnost izdelava 4D procesnih modelov stavb
- Sposobnost rabe informacijskih in komunikacijskih tehnologij za upravljanje procesov in za reinženiring tehničnih procesov.

Objectives and competences:

Objectives:
- Students shall gain knowledge about methods and techniques of process modelling
- Introduce basic concepts and methodologies for business process re-engineering with emphasis on project information systems and collaborative technologies.

Competences:
- Ability to capture processes in the form of process models
- Ability to create process models that can be used in optimization or/and information systems for construction industry
- Ability to independently create 4D process models
- Ability to make use of process models for process management and re-engineering of technical processes.

Predvideni študijski rezultati:

- Tehnike zajema, analize in modeliranjaprocesov
- Uporaba procesnih modelov pri optimizaciji
- Osvojene računske spretnosti za načrtovanje
- Sposobnost uvajanja prenove poslovnih procesov
- Optimizacija poslovnih procesov z uporabo informacijskih tehnologij
- Sposobnost modeliranja procesov je osnova za prenovo tehnologij.

Izdelki študentov:
- IDEF0 procesni model v okviru procesa graditve
- Lokacijski terminski plan vezan na modele

Seminar
- Projekt prenove poslovnih procesov z uvajanjem novih informacijskih rešitev.

Intended learning outcomes:

- Methods of process capturing, analysis and process mapping in process modelling
- Use of process models for business process optimization
- Use of process models for computational and geometrical simulation in building design
- Ability to introduce principles of business process re-engineering
- Business process optimizuation using process oriented information systems
- Ability to model business processes from relevant viewpoints

Course work:
- IDEF0 diagrams relevant for different project stages
- Location based schedule linked to models

Seminar:
- Project of business process re-engineering introducing new ICT technologies into construction sector.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Podpora pri učenju z elektronskimi vsebinami o sistemih upravljanja z interaktivno vsebino. Študent dela individualno in v skupinah.	Learning is supported by online learning content management systems with interactive content. Student work is individual as well as in groups.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Kolokvij ali izpit	**70 %**	Mid term examination or exam
Samostojno izdelana naloga	**20 %**	Individual work
Projekt	**10 %**	Project

Reference nosilca / Lecturer's references:

CEROVŠEK, Tomo, KATRANUSCHKOV, Peter. Active process reuse model for collaboration. Electronic journal of information technology in construction, ISSN 1400-6529, July 2006, letn. 11, pos. št., str. 467-488, ilustr. Dostopno na: http://www.itcon.org/2006/35.
CEROVŠEK, Tomo. A framework for CPD and 5D BIM process reuse. V: CIB W78 W102 2011, Joint Conference, 28th CIB W78 2011 International Conference, 6th CIB W102 2011 International Conference, 26-28 October, Sophia Antipolis, France. Program and proceedings : Computer Knowledge Building. Sophia Antipolis: CIB, 2011, str. 1-10, ilustr. Dostopno na: http://itc.scix.net/data/works/att/w78-2011-Paper-157.pdf.
CEROVŠEK, Tomo, KOVAČIČ, Iztok, TURK, Žiga. Computer integrated construction at the services level – first experiences. V: TURK, Žiga (ur.), SCHERER, Raimar (ur.), Fourth European Conference on Product and Process Modelling in the Building and Related Industries, Portorož/Slovenia/, 9-11 September 2002. eWork and eBusiness in architecture, engineering and construction : proceedings of the fourth European conference on product and process modelling in the building and related industries, Portorož/Slovenia/, 9-11 September 2002. Lisse [etc]: A.A. Balkema: Swets & Zeitlinger, cop. 2002, str. 593-602, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Izbrana poglavja iz gradbene informatike
Course title:	Selected chapters of building informatics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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			45		90	6

Nosilec predmeta / Lecturer: prof. dr. Žiga Turk

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 Organizacija – informatika. Opravljen izpit iz predmeta Računalniško integrirana graditev.	The course is a part of the module Organisation – Building Informatics. Passed exams in Computer Integrated Construction Course.

Vsebina:	**Content (Syllabus outline):**
Predavanja Osnove programskega inženirstva Metoda RUP. Management razvoja spletnih aplikacij. Infrastruktura. Omrežne topologije. Omrežni protokoli in standardi. Internet in svetovni splet (World Wide Web). Storitvene arhitekture (SOA). Objektni pristop. Relacijski pristop. Programski jeziki - osnovni pojmi. Programski jeziki za namizne aplikacije. Programski jeziki za spletne aplikacije. Programski jeziki za numerično intenzivne probleme. Programiranje mobilnih naprav. Standardi. Formati in varna izmenjava podatkov: EDI in XML, varnost. Vaje Načrtovanje programske opreme. Programiranje. Izdelava programske rešitve glede na siceršnje zanimanje študenta na eni od naslednjih osnov: zbirka podatkov, pisarniški program, spletna aplikacija, mobilna aplikacija, CAD/BIM aplikacija).	Lectures Introduction to Software Engineering. RUP method. Management of web application development. Infrastructure. Network topology. Network Protocols and Standards. Internet and World Wide Web. Service-oriented architectures (SOA). Object oriented approach. Relational approach. Programming languages - basic concepts. Programming languages for desktop applications. Programming Languages for Web Applications. Programming languages for numerically intensive problems. Programming mobile devices. Standards. Formats and secure data exchange: EDI and XML, Security. Tutorials Designing Software. Programming. Production of software solutions depending on the interests of student (database, Web application, mobile application, CAD/BIM/Office).

Temeljni literatura in viri / Readings:

Dough Bell, 2005, Software Engineering for Students, 4th edition, A Programming Approach, Addison-Wesley. Ivan Marsic, Software Engineering Book, Rutgers, New Jersey.
Ian Sommerville, 2007, Software Engineering, Pearson Education.
Jeff Friesen, 2014, Learn Java for Android Development, 2nd Edition, Apress.
Paul Lomax, 1999, VB & VBA in a Nutshell: The Language, O'Reilly Media.
Various Wikibooks for various languages.

Cilji in kompetence:

Cilji:
- Osnovni namen predmeta je usposobiti študenta za vodenje informacijskih projektov, bodisi tistih, kjer gre za izdelavo programske opreme kot tudi tistih, ki se specializirajo za izdelavo informacijske infrastrukture.

Pridobljene kompetence:
- Načrtovanje in izdelava programske opreme
- Izdelava spletnih aplikacij.
- Izdelava in vzpostavitev visokoprepustnih omrežij za računanje.
- Programiranje numerično intenzivnih problemov.

Objectives and competences:

Objectives:
- The primary purpose of this course is to qualify student for the participation in and management of IT projects, either those where software is developed, or those which specialize in making IT infrastructure.

Acquired competences:
- Design and construction of software
- Making Web applications
- Creating and setting up networks for high throughput computing
- Programming of database or numerically intensive problems.

Predvideni študijski rezultati:

- Razumevanje uporabe naprednih spletnih tehnologij v gradbeništvu
- Razumevanje sistemov strežnik – odjemalec in aplikacije v gradbeništvu
- Razumevanje programsko inženirskih Pristopov.
- Uporaba konceptov pri informatizaciji procesov pri strokovnem interdisciplinarnem delu
- Izdelava programske opreme
- Razumevanje sodobnih načinov dela gradbene informatike
- Sposobnost analize uporabe IKT v gradbeništvu
- Sposobnost analize komunikacijskih kanalov v okviru računalniško integrirane graditve.
- Sposobnost izboljšanja komunikacije z uporabo informacijske in komunikacijske tehnologije.
- Sposobnost identifikacije problemov, ki jih je mogoče avtomatizirati.
- Sposobnost izdelave programske opreme, bodisi samostojne, bodisi v okviru aplikacij (Google Apps, Office, AutoCAD, Revit …).

Intended learning outcomes:

- Understanding the use of advanced web technologies construction
- Understanding of client server architecture and systems in construction
- Understanding of software engineering methods.
- Using the concepts in the computerization of processes in expert interdisciplinary work
- Software Development.
- Understanding of modern methods of construction works IT.
- Ability to analyse the use of ICT in construction
- The ability of analysing communication channels within computer integrated construction.
- Ability to improve communication with information and communication technologies.
- Ability to identify problems that can be automated.
- Ability to build software, either independent, or in the context of applications (Google Apps, Office, AutoCAD, Revit ...).

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. Project based leaning. Teamwork.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretično znanje na izpitu	**40 %**	Theoretical exam
Sodelovanje na vajah in predavanjih	**20 %**	Activity and collaboration
Projektni izdelek	**40 %**	Project work quality

Reference nosilca / Lecturer's references:

MEŽA, Sebastjan, TURK, Žiga, DOLENC, Matevž. Component based engineering of a mobile BIMbased augmented reality system. Automation in construction, ISSN 09265805. [Print ed.], jun. 2014, letn. 42, št. X, str. 112, ilustr. http://www.sciencedirect.com/science/article/pii/S0926580514000363, doi: http://dx.doi.org/10.1016/j.autcon.2014.02.011.
TODOROVIĆ, Miloš, TURK, Žiga. Upoštevanje trajnostnih kriterijev pri projektiranju z orodjem BIM = Designing using sustainability criteria with BIM tools. Gradbeni vestnik, ISSN 00172774, okt. 2011, letn. 60, št. 10, str. 279284, ilustr.
KLINC, Robert, TURK, Žiga, DOLENC, Matevž. Engineering collaboration 2.0 : requirements and expectations. Journal of information technology in construction, ISSN 18744753, 2009, letn. 14, pos. št., str. 473488, ilustr. Dostopno na: http://www.itcon.org/2009/31.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Management v gradbeništvu
Course title:	Management in civil engineering

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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:	izr. prof. dr. Jana Šelih

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 Organizacija – informatika.	The course is a part of the module Organisation – Building Informatics

Vsebina:	**Content (Syllabus outline):**
Predavanja Značilnosti gradbene industrije (kompleksnost, sestava). Opredelitev poslovnih procesov in razmejitev faz v graditvi, urejanje odnosov med udeleženci graditve. Organizacija in management organizacije (cilji in funkcije Organizacije). Upravljanje v organizacijah. Človeški viri v organizaciji (kultura v organizaciji vodenje in voditeljstvo, delo v teamu, ravnanje z ljudmi pri delu). Strateško planiranje. Merjenje in presojanje uspešnosti poslovanja organizacije. Odločanje v organizaciji (večkriterijsko odločanje, analitično hierarhični proces, kvantitativne metode) Vaje Seminarske vaje (računske vaje), ki se navezujejo zlasti na kvantitativne metode odločanja, prognoziranja, ocene investicij in optimizacij proizvodnje. Terensko delo Študijski obisk izbranega gradbenega podjetja.	Lectures Specific features of construction industry (complexity, composition). Definition of business processes, definition of phases in the construction process, stakeholders management. Organisation and management of the enterprise (goals, functions of the organisation). Governance in organisations. Human resources in organisation (organisational culture, management and leadership, team work, human resource management). Strategic planning. Assessment and measurement of business success of an Organisation. Decision-making in an organisation (multi-criteria decision making, analytical hierarchy process, quantitative methods) Tutorial Tutorial (seminar type) from the area of quantitative multi-criteria decision methods, prognosis, investment assessment, production optimization Field work Study visit of a selected construction company.

Temeljni literatura in viri / Readings:

Možina in soavt. 2002. Management: nova znanja za uspeh. Didakta. (izbrana poglavja)
McGeorge, D., Palmer, A. 2002. Construction management: new directions. (izbrana poglavja)
Bohanec, M. 2006. Odločanje in modeli. DMFA. (izbrana poglavja)
Katedre za operativno gradbeništvo. Dostopno na: www.fgg.uni-lj.si.

Cilji in kompetence:

Cilji:
- Podati osnove managementa in poslovanja organizacije ter njihovo aplikacijo v gradbenem podjetju
- Podati osnove s področja operacijskih raziskav, ki se nanašajo na upravljanje gradbene proizvodnje
- Spoznati študenta z osnovami modelov za odločanje

Pridobljene kompetence:
- Razumevanje pomena organizacije in poslovanja gradbenega podjetja
- Razumevanje pomena učinkovitega sodelovanja udeležencev v procesu graditve
- Sposobnost vodenja organizacijskih enot gradbenega podjetja
- Sposobnost vodenja človeških virov v gradbenem podjetju
- Sposobnost uporabe odločitvenih modelov

Objectives and competences:

Goals:
- To provide fundamentals of management and business administration in an organisation
- To provide fundamentals of operational research (relevant for construction production management)
- To provide fundamentals of decision making models

Competences gained:
- Understanding of the importance of construction company organisation and management
- Understanding the importance of efficient cooperation of construction process stakeholders
- Ability to manage organisational units of a construction company
- Ability to lead human resources in a construction company
- Ability to use the decision support models

Predvideni študijski rezultati:

- Pridobljeno temeljno znanje o organizaciji in poslovanju gradbenega podjetja
- Razumevanje kompleksnosti procesa graditve
- Osvojene spretnosti za uporabo formalnih modelov večkriterijskega odločanja
- Razumevanje delovanja in poslovanja organizacije kot osnova za uspešno delo gradbenega podjetja
- Sposobnost abstraktne formulacije vodstvenih procesov v organizaciji
- Sposobnost kritične presoje podatkov, pridobljenih v poslovanju organizacije
- Sposobnost uporabe računalniških programov za podporo odločanju.

Intended learning outcomes:

- Acquired fundamental knowledge of construction company organisation and management
- Understanding of construction process complexity
- Acquired skills for the use of formal multicriteria decision models
- Understanding of company operation, fundamental for successful operation of a construction company Transferrable skills
- Ability for abstract formulation of management processes within an organisation
- Ability to critically assess the data acquired in business operation
- Ability to use computer aided tools for decision-making

Metode poučevanja in učenja:

Predavanja, sem.vaje, oboje z uporabo IKT.

Learning and teaching methods:

Lectures, tutorial (by using ICT tools).

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Samostojna naloga in zagovor pisni izpit	**60 %** **40 %**	Individual project work and defence Written exam

Reference nosilca / Lecturer's references:

GUMILAR, Vladimir, ŽARNIĆ, Roko, ŠELIH, Jana. Increasing competitiveness of the construction sector by adopting innovative clustering. Inžinerinąe ekonomika, ISSN 1392-2785, 2011, letn. 22, št. 1, str. 41-49.
ŠELIH, Jana. Residential building stock refurbishment design supported by a multi criteria decision support system. WSEAS transactions on systems, ISSN 1109-2777, 2007, letn. 6, št. 6, str. 1124-1131, ilustr.
SRDIČ, Aleksander, ŠELIH, Jana, BERTOK VELKAVRH, Tamara, STRAH, Bojan. The xpert concept: A comprehensive information system for construction project management and control. 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. 1-10.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Organizacijska priprava gradnje
Course title:	Organisational planning of construction

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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	15	15		90	6

Nosilec predmeta / Lecturer:	izr. prof. dr. Jana Šelih

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 Organizacija – informatika.	The course is a part of the module Organisation – Building Informatics

Vsebina:	**Content (Syllabus outline):**
Priprava projekta organizacije gradnje po posameznih fazah: preverba možnih rešitev. Priprava tehnoekonomskega elaborata. Integracija terminskega plana in finančnega načrta gradnje. Priprava programa vodenja in kontrole gradnje. Vzpostavitev sistema spremljanja in kontrole izvajanja del. Priprava terminskega plana gradnje s pomočjo ustrezne programske opreme.	Preparation of construction project organisation, in separate phases: checking of possible solutions. Preparation of site documentation. Integration of time schedule and financial plan of the construction. Construction management and control programme preparation. Monitoring and control programme for the execution of works – implementation. Preparation of time schedule for the construction by using appropriate software.

Temeljni literatura in viri / Readings:

E. Rodošek. 1998. Osnove organizacije v gradbeništvu.
Pšunder, Klanšek, Šuman. 2009. Organizacija grajenja.

Cilji in kompetence:	**Objectives and competences:**
- Samostojna uporaba predhodno pridobljenih teoretičnih in praktičnih znanj pri kompleksnem projektu s področja nizkih ali visokih gradenj (področje priprave gradnje) Kompetence - Sposobnost priprave projekta organizacije	- Independent use of previously acquired theoretical and practical knowledge within a complex project (high rise or infrastructure construction) Competences - Ability to prepare the construction organisation

gradnje, tehnoekonomskega elaborata, terminskega elaborata, finančnega načrta gradnje, sistema spremljanja in kontrole izvajanja gradbenih del.	project, technical-economic documentation, time schedule, financial plan, monitoring and control plan (execution phase).

Predvideni študijski rezultati:	**Intended learning outcomes:**
Študent spozna potek gradbenega projekta ter vsebino in pripravo spremljajoče dokumentacije.	Student gets acquainted with the content of the contraction project, as well as with the preparation and content of the accompanying documentation.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vaje, sprotne konzultacije, vodena samostojna priprava seminarske naloge.	Lectures, tutorial, consultations, independent preparation of a seminar work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit	**50 %**	Theor. exam
Ocena oddanih vaj in sem.naloge, ustni zagovor	**50 %**	Individual seminar work and its defence

Reference nosilca / Lecturer's references:

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. Dostopno na: http://dx.doi.org/10.3846/20294913.2011.603177, doi: 10.3846/20294913.2011.603177.
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.
Dostopno na: http://www.ktu.lt/lt/mokslas/zurnalai/inzeko/71/1392-2758-2011-22-1-41.pdf.
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, ilustr. Dostopno na: http://www.jcem.vgtu.lt/upload/civil_zurn/selih.pdf.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projektiranje cest
Course title:	Road design

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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			45	3

Nosilec predmeta / Lecturer:	doc. dr. Peter Lipar

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 Prometno inženirstvo.	The course is a part of the module Traffic Engineering.

Vsebina:	**Content (Syllabus outline):**
Predavanja Vrste gradbenih posegov na cestah in njihove značilnosti; vrste projektne in tehnične dokumentacije (PD in TD); obvezni in potrebni sestavni deli posamezne vrste PD in TD; tipologija označevanja posamezne vrste projektov in njegovih prilog; načini določanja prometnih obremenitev in definiranje TPP (tipskega prečnega profila); geometrijski in tehnični elementi ceste (povzetek), elementi odvodnjavanja, elementi podpornih in premostitvenih konstrukcij, elementi prometne signalizacije in opreme ter predizmere in predračun (vsebine, detajli, izračuni) v projektu; prometna varnost v projektih za ceste ugotavljanje, ocene, sanacije nevarnih mest); okoljska problematika v projektih za ceste (ukrepi, ureditve); zasnova in idejna študija variant (tehnologija in postopek primerjave); tehnologija izdelave projektne dokumentacije za novogradnje (zasnova, idejna študija, idejni projekt, PGD/PZI); tehnologija izdelave projektne dokumentacije za	Lectures Road construction and its characteristics; sub-disciplines: road planning, road design, road building and operations; road design procedures: process and documentation; contents of project and technical design documentation; spatial and structural road characteristics: classification of roads, traffic loads, factors and principles for Typical Cross Section (TCS) definition; geometrical and technical elements of the road: speed terminology, sight distances and alignment (summary), elements of roadway drainage, bridges, retaining walls and other structures, traffic signalisation and equipment, planimetric quantities and calculation support; road safety (impact assessment and audit) and road safety measures; environmental issues in road design (measures, arrangements); comparative and pre-investment studies of road infrastructure investments (principles and process of comparison); technical design documentation for new road construction (conceptual design, preliminary design,

rekonstrukcije in obnove cest; večnivojska križišča (zasnova, kriteriji, pogoji, signalizacija in oprema); prenos trase na teren in katastrski elaborat. Vaje Seminarske vaje: primeri reševanja problemov iz vsakodnevne prakse.	building permit documentation, documentation for execution); technical design documentation for reconstruction and renovation of roads; at-grade intersections and graded interchanges (design, criteria, conditions, signs and equipment); from roadway design to terrain and cadastral study. Tutorial Practical examples of road design (using appropriate computer software).

Temeljni literatura in viri / Readings:

Juvanc A. 2004. Geometrijski elementi ceste in vozišča, FGG-PTI, 2004 (elektronski vir).
Katanić, J., Andujs, V., Maletin, M. 1983. Projektovanje puteva, Beograd, GK.
Wright, Ashford. 1998. Transportation Engineering. New York, ZDA.
Garber, N. J., Hoel, L. A. 2009. Traffic and highway engineering. Toronto.
Tehnični predpisi za projektiranje cest: domači in tuji (dosegljivi na svetovnem spletu).
Različni viri na svetovnem spletu (študent išče sam po potrebi).
Gradiva za razne posamične rešitve, ureditve in detajle (sproti pripravi predavatelj).

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Usposobiti se za samostojno in skupinsko izdelavo projektne in tehnične dokumentacije za ceste. Pridobljene kompetence: - Opravljanje zahtevnejših delovnih nalog v organizacijah povezanih s projektiranjem in gradnjo cest; - Reševanje tekočih tehničnih, tehnoloških, organizacijskih in drugih problemov v procesih povezanih s cestno infrastrukturo; - Obvladovanje specifičnih postopkov v tehnologiji projektiranja, gradnje in vzdrževanja cestne infrastrukture.	Objectives: - Student is able to prepare technical road design documentation individually and/or in team Acquired competences: - Carrying out complex tasks in organizations associated with the design and construction of roads; - Solving of current technical, technological, organizational and other problems in the processes related to road infrastructure; - Managing of specific procedures in the road design process: planning, design, construction and maintenance of road infrastructure.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje voznodinamičnih zakonitosti in sistema VOZNIK-VOZILO-OKOLJE; - Elementov ceste in način njihovega usklajevanja; - Metod in postopkov pri načrtovanju cest, izdelavi projektov zanje. - Samostojna izdelava idejne študije projekta ceste; - Izdelava (skrajšane verzije) idejnega projekta za cesto – skupinsko delo. - Vsebine in detajli so podajani tako, da študent dobi celovito sliko o problematiki izdelave različnih projektov za ceste; - Pri samostojni izdelavi kompozicije elementov ceste študent pride do lastnih spoznanj o	- Knowledge and understanding of vehicle kinematics and dynamics and interaction Driver-Vehicle-Road; - Principles of 3D geometric road design; - Methods and procedures for road design, for identification of hazardous road locations including evaluation techniques and impact assessment. - Individual elaboration of conceptual road design; - Design of typical rural road or intersection using relevant road design software - teamwork. - Lectures are given in such way that student gets a comprehensive picture of the problem of road design;

smotrnosti uporabe posameznih elementov; - Študent se seznani tudi s konkretnim delom v projektivni skupini; - Študenta se usposobi za samostojno odločanje pri kombiniranju elementov cest. - Študent pridobi sposobnost samostojnega sprejemanja odločitev, kritične presoje variantnih rešitev.	- With individual work student sees the rationality of using individual geometric road elements; - Students get familiar with concrete work within project team; - Student is trained for individual and independent decision-making when combining geometric and technical elements of roads. - Student acquires the ability of independent decision-making and critical assessment of different solutions in road design.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja in vaje.	Lectures and Tutorial.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit (teoretičen del)	**70 %**	Theory exam
Seminarske vaje (samostojno delo)	**30 %**	Tutorial: practical exams

Reference nosilca / Lecturer's references:

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
LIPAR, Peter. Optično vodenje osi in geometrijsko oblikovanje cest = Optical leading of axis and geometrical forming of roads. Gradbeni vestnik, ISSN 0017-2774, 1995, 44, št. 11/12, str. 263-275, ilustr.
LIPAR, Peter, KOSTANJŠEK, Jure. Pedestrian crossings priority for pedestrian safety. Suvremeni promet, ISSN 0351-1898, 2005, letn. 25, št. 3-4, str. 215-220, graf. prikazi.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Seminar iz cest
Course title:	Road seminar

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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		45		105	7

Nosilec predmeta / Lecturer: doc. dr. Peter Lipar

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

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

Predmet je del modula Prometno inženirstvo.

Prerequisites:

The course is a part of the module Traffic Engineering.

Vsebina:

Seminar
Konceptualna zasnova cest, izbira variantnih rešitev. Napoved prometa: modeliranje in napovedi. Idejni projekt. Dimenzioniranje križišč. Dimenzioniranje vozišče konstrukcije. Presoja vplivov na okolje. Popis del in projektantski predračun.

Vaje
Izdelava projekta ceste značilne podeželske ceste z uporabo računalniške podpore, študija variant. Vpliv prometa in mere prometne ga upravljanja. Predstavitev projekta.

Content (Syllabus outline):

Seminar
Conceptual road design: variant route selection. Traffic study: modelling and prognosis. Environmental Impact Assessment. Preliminary road design, including intersections. Flexible Pavement Design. Planimetric quantities and inventory of work, costs estimation.

Tutorial
Design of typical rural road using relevant highway design software - study of variant level. Traffic impact analysis and traffic management measures. Project presentation.

Temeljni literatura in viri / Readings:

Juvanc A. 2004. Geometrijski elementi ceste in vozišča. Ljubljana, FGG PTI. (elektronski vir)
Katanić, J., Andujs, V., Maletin, M. 1983. Projektovanje puteva. Beograd, GK.
Wright, Ashford. 1998. Transportation Engineering. New York, ZDA.
Garber, N. J., Hoel, L. A. 2009. Traffic and highway engineering. Toronto.
Tehnični predpisi za projektiranje cest: domači in tuji.
Priročniki programske opreme za načrtovanje in modeliranje cest in cestnega prometa.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Samostojno je sposoben priprave tehnične dokumentacije načrtovanja ceste in izdelava projektne dokumentacije za ceste. Pridobljene kompetence: - Študent se usposobi za samostojno izdelavo projektne dokumentacije za ceste. - Reševanje trenutnih tehničnih, tehnoloških in organizacijskih izzivov v postopku vzpostavitve cestne infrastrukture. - Vodenje posebnih postopkov v postopku načrtovanja ceste: umestitev, izgled, izgradnja in vzdrževanje.	Objectives: - Student is able to prepare technical road design documentation individually and/or in team. Acquired competences: - Carrying out complex tasks in organizations associated with the design and construction of roads; - Solving of current technical, technological, organizational and other problems in the processes related to road infrastructure; - Managing of specific procedures in the road design process: planning, design, construction and maintenance of road infrastructure.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje voznodinamičnih zakonitosti in sistema VOZNIK-VOZILO-OKOLJE; - Elementov ceste in način njihovega usklajevanja; - Metod in postopkov pri načrtovanju cest, izdelavi projektov zanje. - Samostojna izdelava idejne študije projekta ceste; - Izdelava (skrajšane verzije) idejnega projekta za cesto – skupinsko delo. - Vsebine in detajli so podajani tako, da študent dobi celovito sliko o problematiki izdelave različnih projektov za ceste; - Pri samostojni izdelavi kompozicije elementov ceste študent pride do lastnih spoznanj o smotrnosti uporabe posameznih elementov; - Študent se seznani tudi s konkretnim delom v projektivni skupini; - Študenta se usposobi za samostojno odločanje pri kombiniranju elementov cest. - Študent pridobi sposobnost samostojnega sprejemanja odločitev, kritične presoje variantnih rešitev.	- Knowledge and understanding vehicle kinematics and dynamics and interaction Driver-Vehicle-Road; - Principles of 3D geometric road design; - Methods and procedures for road design, for identification of hazardous road locations evaluation techniques and impact assessment. - Individual elaboration of the conceptual road design; - Design of typical rural road or intersection using relevant road design software - teamwork. - Lectures are given in such way that student gets a comprehensive picture of the problem of road design; - With individual work student sees the rationality of using of geometric road elements; - Students get familiar with concrete work within the project team; - Student is trained for individual and independent decision-making when combining geometric and technical elements of roads; - Student acquires the ability of independent decision-making and critical assessment of different solutions in road design.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Študentje (posamično ali v skupini) izdelajo projekt za cesto s predpisano obliko in vsebino ter ga javno predstavijo in zagovarjajo. Nosilec predmeta pri izdelavi projekta študente usmerja in vodi, po potrebi tudi z izbrani poglavji predavanj.	Individual or team project, guided by lecturer. Final presentation of project.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit (teoretičen del)	**30 %**	Theory exam
Seminarska naloga	**40 %**	Seminar: practical example
Predstavitev naloge	**30 %**	Presentation of seminar

Reference nosilca / Lecturer's references:

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
LIPAR, Peter. Optično vodenje osi in geometrijsko oblikovanje cest = Optical leading of axis and geometrical forming of roads. Gradbeni vestnik, ISSN 0017-2774, 1995, 44, št. 11/12, str. 263-275, ilustr.
LIPAR, Peter, KOSTANJŠEK, Jure. Pedestrian crossings priority for pedestrian safety. Suvremeni promet, ISSN 0351-1898, 2005, letn. 25, št. 3-4, str. 215-220, graf. prikazi.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projektiranje železnic
Course title:	Railway design

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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			45	3

Nosilec predmeta / Lecturer:	izr. prof. dr. Marijan Žura, doc. dr. Peter Lipar

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 Prometno inženirstvo.	The course is a part of the module Traffic Engineering.

Vsebina:	**Content (Syllabus outline):**
Predavanja Podrobna seznanitev z elementi železniške infrastrukture (zgornju ustroj, spodnju ustroj, odvodnjavanje, kretnice …), seznanitev z načeli projektiranja železniške infrastrukture ob upoštevanju tehničnih specifikacij o interoperabilnosti železniškega sistema (značilnosti podsistemov, komponente interoperabilnosti, bistvene zahteve …), podrobno poznavanje nacionalne in EU zakonodaje. Samostojno delo Izdelava projekta železniške proge ali železniškega prometnega mesta ali vozlišča (reševanje problemov iz vsakodnevne projektantske prakse).	Lectures Thorough knowledge on the railway infrastructure elements (upper structure, substructure, switches …), principles of railway infrastructure designing considering technical specifications for interoperability (railway interoperability subsystems, interoperability constituents, essential requirements …), comprehensive knowledge on national and EU legislation. Individual work Design of railway line; computer-aided track design of railway line or railway station or marshalling yard (real-life problems).

Temeljni literatura in viri / Readings:

B. Zgonc. 1996. Železnice I. projektiranje, gradnja in vzdrževanje prog. Ljubljana, Univerza v Ljubljani FGG, 225 strani.
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:

- Poglobljeno poznavanje nacionalne in evropske tehnične zakonodaje, evropskih tehničnih specifikacij za interoperabilnost ter standardov.
- Opravljanje zahtevnejših delovnih nalog v projektantskih organizacijah.

Objectives and competences:

- Thorough knowledge on national end European technical legislation, European technical specifications for interoperability and related standards.
- Qualified for more complex tasks in railway infrastructure designing.

Predvideni študijski rezultati:

- Sposobnost izdelave projektov in reševanje problemov gradnje in vzdrževanja železniške infrastrukture
- Razumevanje osnovnih značilnosti železniške
- Infrastrukture, njenih podsistemov in komponent
- Temeljna znanja o gradnji in vzdrževanju infrastrukturnih podsistemov na področju spodnjega in zgornjega ustroja železniških prog.

Intended learning outcomes:

- Ability to solve problems of construction, maintenance and railway traffic management of railway infrastructure
- Understanding the characteristics of the railway infrastructure, its subsystems and components
- Knowledge of construction and maintenance of railway infrastructure (upper- and sub-structure of railway infrastructure).

Metode poučevanja in učenja:

Predavanja, seminarske vaje.

Learning and teaching methods:

Lectures and individual work.

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

Reference nosilca / Lecturer's references:

KASTELIC, Tomaž, VERLIČ, Peter, ŽURA, Marijan, FAJFAR, Dušan, STRAH, Bojan, RIJAVEC, Robert, KOSTANJŠEK, Jure, VELKAVRH, Jurij, REJC, Dario, ŠTURM, Janez, REPAR, Miroslav. *Vzpostavitev informacijskega sistema slovenske železniške infrastrukture : končno poročilo*. Ljubljana: Prometni inštitut, 1997.
ŠEMROV, Darja, MARSETIČ, Rok, ŽURA, Marijan, TODOROVSKI, Ljupčo, SRDIČ, Aleksander. Reinforcement learning approach for train rescheduling on a single-track railway. *Transportation research. Part B, Methodological*, ISSN 0191-2615. [Print ed.], 2016, letn. 86, št. apr., str. 250-267.
LOKAN, Iztok (avtor, fotograf). Nizke zgradbe, Ceste in železnice : učbenik za predmet Nizke zgradbe za 4. letnik srednjega strokovnega izobraževalnega programa Gradbeni tehnik ter za 2. letnik poklicno-tehniškega izobraževalnega programa Gradbeni tehnik. 1. natis. Ljubljana: Tehniška založba Slovenije, 2005. (recenzent: LIPAR, Peter).
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.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Seminar iz železnic
Course title:	Railway seminar

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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		60		105	7

Nosilec predmeta / Lecturer:	doc. dr. Tomaž Maher

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 Prometno inženirstvo.	The course is a part of the module Traffic Engineering.

Vsebina:	**Content (Syllabus outline):**
Seminar Podrobna seznanitev z naslednjimi tematikami: tehnologija železniškega prometa, propustnost železniških prog, vozni red, tehnologija dela vmesnih in ranžirnih postaj, vlečne sile lokomotiv, odpori vlakov in proge, spoznavanje postopkov za pričetek gradnje/nadgradnje ter obnove železniške infrastrukture in pridobitev uporabnega dovoljenja. Samostojno delo Reševanje praktičnih problemov iz vsakodnevne prakse (izdelava voznega reda, izračun kapacitete postaje ali odseka, priprava terminskega plana izvedbe del …).	Seminar Detailed knowledge on railway topics as: transport management and technology, railway capacity utilization, railway timetable, train scheduling at stations and shunting stations, locomotive traction, resistance of trains and railway infrastructure, knowledge on procedures for starting railway construction/upgrade and renewal, renewal of railway infrastructure. Individual work Solving of railway infrastructure related problems (timetable construction, calculation of railway infrastructure capacity utilization, construction scheduling …).

Temeljni literatura in viri / Readings:

B. Zgonc. 1996. Železnice I. projektiranje, gradnja in vzdrževanje prog. Ljubljana, Univerza v Ljubljani FGG, 225 strani.
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:

- Opravljanje zahtevnejših delovnih nalog v ministrstvu pristojnem za promet, Javni agenciji za železniški promet RS, v družbah železniške dejavnosti (pri nadzoru, pri izvajalcih gradbenih del ter pri upravljavcu železniške infrastrukture itd.).
- Reševanje zahtevnejših problemov povezanih z železniško infrastrukturo.
- Obvladovanje specifičnih postopkov, tehnologij in organizacije del pri gradnji in vzdrževanju železniške infrastrukture.

Objectives and competences:

- Qualified for more complex tasks in bodies affiliated to the Ministry of infrastructure, Railway agency and other institutions engaged in railway infrastructure (as supervisor, constructor or railway traffic manager etc.).
- Qualified for solving tasks related with railway infrastructure.
- Qualified for solving technical, technological, organizational problems related to railway infrastructure construction and maintenance.

Predvideni študijski rezultati:

- Razumevanje karakteristik železniške infrastrukture.
- Sposobnost izdelave zahtevnejših projektov na področju železniške infrastrukture.
- Sposobnost prepoznavanja različnih problemov in vplivov pri projektiranju železniških prometnic v naravnem, gospodarskem in družbenopolitičnem okolju.

Intended learning outcomes:

- Understanding the characteristics of the railway infrastructure.
- Ability to solve comprehensive problems related to railway infrastructure.
- Ability to recognize different problems related to railway infrastructureinflunece on environment, economy and socio-political objectives.

Metode poučevanja in učenja:

Seminar, vaje v laboratoriju.

Learning and teaching methods:

Seminar, exercises in laboratory.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Seminar	**60 %**	Seminar
Izdelek pri vajah	**40 %**	Excercise work

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.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projekt iz gradbene informatike
Course title:	Construction informatics project

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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: doc. dr. Tomo Cerovšek

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

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

Predmet je del modula Projekt.

Prerequisites:

The course is a part of the module Project.

Vsebina:

Predavanja
Principi računalniško integrirane graditve. Pregled topologije projektnih informacijskih sistemov. Uporaba informacijskih modelov zgradb za projektno komunikacijo. Orodja in standardi za učinkovito projektno komunikacija. Interoperabilnost in upravljanje projektnih informacij.
Vaje
Vzpostavitev informacijske infrastrukture. Uporaba modelov pri projektni komunikaciji. Izdelava digitalne projektne dokumentacije
Seminar
Vzpostavitev projektne informacijske infrastrukture. Izdelava digitalnega projektnega repozitorija. Digitalna projektna dokumentacija.

Content (Syllabus outline):

Lectures
Principles of computer integrated construction. Overview of project information systems. Use of BIM for project communication. Tools & standards for project communication. Interoperability and project information mngt.
Lab work:
Set-up of collaborative project infrastructure. The use of models for project communication. Authoring and exchange of digital project docs
Seminar work:
CDE (common data environment) for a specific building project. Development of digital repository. Digital project communication.

Temeljni literatura in viri / Readings:

OAKLAND, J., MAROSSZEKY, M. 2006. Total Quality in the Construction Supply Chain. Oxford, Butterworth-Heinemann, Elsevier.
SOMMERVILLE, J., CRAIG, N. 2006. Implementing IT in Construction. Taylor and Francis.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Podati osnovne principe računalniško podrtega sodelovanja - Podati celoten pregled nad komunikacijo v okviru gradbenega projekta skozi vse faze - Podati osnove metod in tehnik modeliranja produktov in procesov za skupinsko delo Pridobljene kompetence: - Sposobnost uporabe it za delo v skupinah - Sposobnost upravljanja projektnih skupin z uporabo informacijskih tehnologij - Sposobnost izdelave digitalne projektne dokumentacije - Sposobnost rabe informacijskih in komunikacijskih tehnologij za upravljanje procesov in za reinženiring tehničnih procesov. - Sposobnost učinkovite komunikacije na osnovi informacijskih modelov zgradb - Sposobnost izdelave digitalnega priročnika projekta.	Objective: - Student shall understand the basics of collaborative project teamwork - Student shall gain the potential of construction informatics throughout building project phases - Students shall be able to model products and process in a building project Competences: - Ability to work in groups - Ability to manage project groups using information and communication technologies - Ability to author and exchange digital project documentation - Ability to make use of building information models - Ability to effectively and efficiently communicate using BIM - Ability to create digital building project manual

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Uporaba sodobnih projektnih informacijskih rešitev na konkretnem projektu - Poznavanje standardov za izmenjavo projektnih informacij - Sposobnost vzpostavitve projektnega informacijskega sistema Izdelki študentov: - Načrt projektnega informacijskega sistema - Infrastruktura za izmenjavo projektnih informacij - Digitalna projektna dokumentacija	- The use of state-of-the-art communication channels on a building project - Standards for the exchange project information - Design and implementation principles of project information systems Student course work: - A design of project information systems - Infrastructure for project information exchange - Digital project documentation

Metode poučevanja in učenja:	**Learning and teaching methods:**
Učenje je projektno zasnovano, tako da se del vsebin poda vnaprej, del pa v odvisnosti od izbranega projekta, oziroma evidentiranih problemov.	Learning is supported by online learning content management systems with interactive content. Student work is individual as well as in groups.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Izpit (teoretičen del)	**30 %**	Exam
Seminarska naloga	**40 %**	Seminar work
Predstavitev naloge	**30 %**	Project report and presentation

Reference nosilca / Lecturer's references:

CEROVŠEK, Tomo. Building Collaborative Technologies : collaboration taxonomy, concurrent engineering, project information systems, collaborative BIM technologies : online lectures for Euromaster Course at UCC – University College Cork, Dublin Institute of Technology, Ireland, 19. 4. - 22. 5. 2013. Dublin, 2013: Institute of Technology. Dostopno na: http://www.dit.ie/, http://zuse.ucc.ie/pdf/Flyer_Master-ITinAEC_KMZ.pdf.

CEROVŠEK, Tomo, TURK, Žiga. Working together : ICT Infrastructures to Support Collaboration. V: BEUCKE, Karl E. (ur.). Xth International conference on Computing in civil and building engineering : proceedings : Weimar, June 02-04, 2004. Weimar: Bauhaus-Universität, cop. 2004, str. 1-12, graf. prikazi.

CEROVŠEK, Tomo. BIM cube and systems-of-systems framework. V: GUDNASSON, Gudni (ur.), SCHERER, Raimar J. (ur.). eWork and eBusiness in Architecture, Engineering and Construction : Proceedings of the European Conference on Product and Process Modelling 2012, Reykjavik, Iceland, 25-27 July 2012. Boca Raton: CRC Press; London: Taylor & Francis, cop. 2012, str. 421- 428, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projekt iz prometne infrastrukture
Course title:	Project from traffic infrastructure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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
	120				120	8

Nosilec predmeta / Lecturer: izr. prof. dr. 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 Projekt.	The course is a part of the module Project.

Vsebina:	**Content (Syllabus outline):**
Seminar Konceptualna zasnova cest, izbira variantnih rešitev. Napoved prometa: modeliranje in napovedi. Idejni projekt. Dimenzioniranje križišč. Dimenzioniranje voziščne konstrukcije. Presoja vplivov na okolje. Popis del in projektantski predračun. Podrobna seznanitev s projektiranjem železniške infrastrukture – spodnjega in zgornjega ustroja železniških prog (značilnosti podsistemov, komponent interoperabilnosti, elementov železniške infrastrukture, bistvenih zahtev, tehničnih specifikacij o interoperabilnosti, postopkov za pričetek gradnje in pridobitev uporabnega dovoljenja…).	Seminar Conceptual road design: variant route selection. Traffic study: modelling and prognosis. Environmental Impact Assessment. Preliminary road design, including intersections. Flexible Pavement Design. Planimetric quantities and inventory of work, costs estimation. Detailed knowledge on the design of railway lines (calculation of all parameters of railway infrastructure, e.g. static track design, curves and gradients, tack stability…) for both conventional and high speed lines; procedures for starting railway construction, renewal and upgrade works.

Temeljni literatura in viri / Readings:

Juvanc A. 2004. Geometrijski elementi ceste in vozišča. Ljubljana,FGG PTI. (elektronski vir).
Katanić, J., Andujs, V., Maletin, M. 1983. Projektovanje puteva. Beograd, GK.
Wright, Ashford. 1998. Transportation Engineering. New York, ZDA.
Garber, N. J., Hoel, L. A. 2009. Traffic and highway engineering. Toronto.
B. Zgonc. 1996. Železnice I. projektiranje, gradnja in vzdrževanje prog. Ljubljana, Univerza v Ljubljani FGG, 225 strani.
B. Zgonc. 2003. Železniški promet. Portorož, Univerza v Ljubljani, Fakulteta za pomorstvo in promet, str. 3-42, 105-130.
Predpisi in standardi s področja cestne in železniške infrastrukture.

Cilji in kompetence:

- Samostojna izdelava projektne dokumentacije za ceste ali železnice.
- Študent se usposobi za samostojno izdelavo projektne dokumentacije za ceste ali železnice.

Objectives and competences:

- Student is able to prepare technical road or railway design documentation individually and/or in team
- Carrying out complex tasks in organizations associated with the design and construction of roads or railways.

Predvideni študijski rezultati:

- Poznavanje voznodinamičnih zakonitosti in sistema VOZNIK-VOZILO-OKOLJE;
- Poznavanje elementov ceste in način njihovega usklajevanja; metod in postopkov pri načrtovanju cest ali železnice izdelavi projektov zanje.
- Samostojna izdelava idejne študije projekta ceste ali železnice
- Izdelava (skrajšane verzije) idejnega projekta za cesto ali železnice– skupinsko delo (vsebine in detajli so podajani tako, da študent dobi celovito sliko o problematiki izdelave različnih projektov za ceste ali železnice, pri samostojni izdelavi kompozicije elementov ceste ali železnice študent pride do lastnih spoznanj o smotrnosti uporabe posameznih elementov);
- Študent se seznani tudi s konkretnim delom v projektivni skupini;
- Študenta se usposobi za samostojno odločanje pri kombiniranju elementov cest ali železnice.
- Študent pridobi sposobnost samostojnega sprejemanja odločitev, kritične presoje variantnih rešitev.

Intended learning outcomes:

- Knowledge and understanding of vehicle kinematics and dynamics and interaction Driver-Vehicle-Road;
- Understanding of principles of 3D geometric road or railway design; methods and procedures for road or railway design, for identification of hazardous road locations including evaluation techniques and impact assessment
- Individual elaboration of a conceptual road or railway design; Design of typical rural road or intersection using relevant road design software – teamwork (- Lectures are given in such way that student gets a comprehensive picture of the problem of road or railway design; By individual work student sees the rational use of composition of geometric road or rail elements);
- Students get familiar with concrete work within a project team;
- Student is trained for individual and independent decision-making when combining geometric and technical elements of road or railway design;
- By individual work student sees the rational use of composition of geometric road or rail elements;

Metode poučevanja in učenja:

Študentje (posamično ali v skupini) izdelajo projekt za cesto ali železnico s predpisano obliko in vsebino ter ga javno predstavijo in zagovarjajo. Nosilec predmeta pri izdelavi projekta študente usmerja in vodi, po potrebi tudi z izbrani poglavji predavanj.

Learning and teaching methods:

Student (by himself or in a team) prepares a project of road or railway in proper form and has a presentation of his work. . Lecturer directs and guides student, if necessary, with selected sections of lectures.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit (teoretičen del)	**40 %**	Exam (theory)
Seminarska naloga	**30 %**	Seminar
Predstavitev naloge	**30 %**	Project presentation

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
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

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projekt iz komunalnega gospodarstva
Course title:	Project from municipal economics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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: izr. prof. dr. 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 Projekt.	The course is a part of the module Project.

Vsebina:	Content (Syllabus outline):
Elaborat, ki ga izdela študent samostojno ali v skupini ima naslednje sestavne dele: predstavitev obstoječega stanja in razvojnih potreb po komunalni infrastrukturi v lokalni skupnosti z opisom razlogov za obravnavano investicijo.; opredelitev razvojnih možnosti in ciljev investicije ter preveritev usklajenosti s strateškimi dokumenti; opis in analiza variant investicije (lokacija, investicijski stroški, varstvo okolja, predvideni viri financiranja), ekonomska upravičenost projekta; predlog najugodnejše variante s finančno konstrukcijo projekta; ugotovitev smiselnosti in možnosti nadaljnje priprave investicijske, projektne, tehnične in druge dokumentacije s časovnim načrtom. Točna vsebina oziroma obravnavana investicija se določi vsako leto posebej glede na aktualnost in v sodelovanju z ostalimi nosilci predmetov modula Magistrski modul – projekt.	Expert report by individual student or a group of students, including at least the following: analysis of existing condition and needs in the field of technical infrastructure within selected municipality; description of selected investment in technical infrastructure; definition of goals, alternatives to implement the goals, analysis of alternatives considering costs and benefits, locations, influence on environment, economic feasibility; proposal of most favourable alternative with financial structure of the project included; timeline of selected investment. The exact content (selected investment) is determined on an annual basis depending on the current relevance and in cooperation with other lecturers.

Temeljni literatura in viri / Readings:

Literatura s področja vsebine projekta (konkretne lokalne gospodarske javne infrastrukture).
Veljavni normativni akti, ki se nanašajo na: gospodarske javne službe, prostorsko načrtovanje, graditev objektov, varstvo okolja, sistem javnih financ na lokalni ravni in javna naročila.

Cilji in kompetence:

- Cilj je naučiti študenta povezovati tehnična, prostorska in družboslovna znanja na področju gospodarske javne infrastrukture.
- Pridobljene kompetence - sposobnost izdelave in javne predstavitve investicijske zasnove in investicijskega programa za omrežja, objekte in naprave gospodarske javne infrastrukture.

Objectives and competences:

- The goal is to teach student how to connect technical knowledge, spatial knowledge and knowledge from social sciences in the field of municipal (technical) infrastructure.
- Competences: Capability to make and present in public the investment design and investment programme for the construction/renovation of municipal (technical) infrastructure.

Predvideni študijski rezultati:

Študent pridobi potrebno znanje za izdelavo Dokumenta identifikacije investicijskega projekta za izbran del komunalne infrastrukture v smislu: potrebe – projekt– financiranje – izvedba.

Intended learning outcomes:

Student acquires the knowledge needed to make an identification document for the investment project for a selected part of municipal (technical) infrastructure in the following sense: needs – project – financing – implementation.

Metode poučevanja in učenja:

Nosilec predmeta razpiše teme projektov in prijavljene kandidate pri izdelavi elaborata usmerja in vodi. Študentje (posamično ali v skupini) izdelajo elaborat s predpisano obliko in vsebino ter ga javno predstavijo in zagovarjajo.

Learning and teaching methods:

The lecturer prepares various project tasks in advance and then guide students in the process of making a project. Students (individually or divided in several groups) make their project in the prescribed written form and make oral presentation of the project in public.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Projekt - pisni izdelek	**70 %**	Project - written document
ustna predstavitev projekta	**30 %**	Project - presented in public

Reference nosilca / Lecturer's references:

RAKAR, Albin, MESNER, Andrej, MLINAR, Jurij, ŠARLAH, Nikolaj, ŠUBIC KOVAČ, Maruška. Zaščita in ohranjanje vrednosti gospodarske javne infrastrukture. Geod. vestn.. [Tiskana izd.], 2010, letn. 54, št. 2, str. 242-252, ilustr.
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.
SITAR, Metka, LORBER, Lučka, ŠUBIC KOVAČ, Maruška. Revitalization of Industrial Zones in the Context of Sustainable Urban Land Development: Case Study of Business and Industrial Zone Tezno, Maribor. V: TIRA, Maurizio (ur.), IVANIČKA, Koloman (ur.), ŠPIRKOVÁ, Daniela (ur.). Industrial urban land redevelopment : COST Action TU0602 - land management for urban dynamics : proceedings of Bratislava meeting. COST office: Maggiolli; Santarcangelo di Romagna, 2011, str. 89-106, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projekt iz organizacijske priprave gradnje
Course title:	Project from construction organisation and contracting

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	2	4
Civil Engineering - second cycle MA	Infrastructural Engineering	2	4

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: izr. prof. dr. Jana Šelih

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

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

Predmet je del modula Projekt.

Prerequisites:

The course is a part of the module Project.

Vsebina:

Predavanja
Prikazi in analiza primerov iz prakse; sodelujejo tudi predavatelji iz prakse (izkušnje pri organizaciji gradbišča, spremljanju in usklajevanju gradnje, variantni načini proizvodnje).
Seminar
Vsak študent na osnovi projektantskega popisa del izdela tehnoekonomski elaborat oz. projekt organizacije gradnje - vsebina vsakega od projektov: študija različnih variantnih izvedb, gradbena kalkulacija, terminski plan izvedbe, plan porabe virov, plan porabe in dobave materiala plan ter shema ureditve gradbišča. Strokovne ekskurzija (zanimiva gradbišča, oddelki za planiranje v večjih podjetjih).

Content (Syllabus outline):

Lectures
Presentation and analysis of case studies; also by invited lecturers form the industry (experience with site organisation, monitoring and coordination of construction, alternative ways of production).
Seminar
Each student prepares, on the basis of a bill of quantities (prepared by the design engineer), a techno-economic project: study of various alternative execution ways, calculation of unit prices, time schedule, resources plan, material consumption and supply plan, site organisation scheme. Site visit (representative construction sites, planning departments in large companies)

Temeljni literatura in viri / Readings:

Pšunder M. 2008. Ekonomika grajenja. Maribor.
Žemva Š. 2006. Gradbene kalkulacije in obračun gradbenih objektov.
Hegazy, T. 2002. Computer-based construction project management.
Trbojević B. 1981. Organizacija gradjevinskih radova. Beograd.
Project management for construction. Dostopno na: http://www.ce.cmu.edu/pmbook/index.html.

Spletna stran katedre za operativno gradbeništvo

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Sinteza znanja, pridobljenega med študijem in uporaba tega znanja na praktičnih primerih - Pridobiti znanja, ki bodo v pomoč pri pridobitvi licence pooblaščenega inženirja pri Inženirski Zbornici Slovenije. Pridobljene kompetence: - Sposobnost celovitega pristopa k pripravi dokumentacije, potrebne za pripravo gradnje - Razumevanje procesa priprave projekta organizacije gradnje in njegovega vpliva na uspešnost izvedbe in kakovost objekta - Pridobitev posameznih funkcionalnih inženirskih znanj (npr. o izdelavi sheme ureditve gradbišča).	Goals: - Synthesis of knowledge acquired during studies, application of this knowledge for solving practical case studies - To acquire knowledge to be used when professional licence of the Slov. Chamber of Engineers is sought. Acquired competencies: - Ability to approach in a comprehensive way to the documentation preparation (required for the preparation of construction) - Understanding the process of the preparation of project organisation and its influence upon success of the execution, and quality of the structure - Acquisition of certain functional engineering skills (e.g. how to prepare the construction site layout).
Predvideni študijski rezultati:	**Intended learning outcomes:**
- Spoznati in razumeti proces priprave projekta organizacije gradnje in njegovega vpliva na uspešnost izvedbe in kakovost objekta. - Pridobiti posamezna funkcionalna inženirska znanja (npr. o izdelavi sheme ureditve gradbišča). - Študent se bo naučil teoretična znanja, pridobljena med študijem, uporabiti v inženirski praksi. - V fazi priprave na gradnjo in pri kasnejši izvedbi se sprejema veliko število odločitev. Na osnovi pridobljenega teoretičnega in praktičnega znanja bo študent sposoben kritične presoje posameznega problema, izločitve neustreznih rešitev in utemeljene izbire ene od ustreznih rešitev. - Sposobnost analitične obravnave problema in sintezne obdelave rešitev. - Sposobnost uporabe računalniškega programa za simulacijo.	- To get acquainted and understand the process of the construction project organisation and its influence upon success of the execution and quality of the structure - To acquire functional engineering skills (e.g. how to prepare the construction site layout) - Student will learn how to use theoretical knowledge gained during the studies in engineering practice - In the stage of site preparation and consequent execution, many decisions have to be taken. On the basis of the acquired theoretical and applied knowledge, student will be able to critically assess individual problem, eliminate non- adequate solutions and justify the selection of the alternative - Ability to analytically solve problems, synthesis of the solutions - Ability to use computer simulation tools.
Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminar.	Lectures, seminar.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Samostojna seminarska naloga	**100 %**	Individual seminar work

Reference nosilca / Lecturer's references:

ŠELIH, Jana. International markets and slovenian construction industry. V: RADUJKOVIĆ, Mladen (ur.), 8th International conference (5th SENET conference), Umag, 17-20 September 2008. Organization, technology and management in construction : proceedings. Zagreb: Croatian Association for Organization in Construction, 2008, str. 1- 6, ilustr

SRDIČ, Aleksander, ŠELIH, Jana. Labour hours utilization analysis : a case study. V: RADUJKOVIĆ, Mladen (ur.), 8th International conference (5th SENET conference), Umag, 17-20 September 2008. Organization, technology and management in construction : proceedings. Zagreb: Croatian Association for Organization in Construction, 2008, str. 1- 6, ilustr.

SRDIČ, Aleksander, ŠELIH, Jana, BERTOK VELKAVRH, Tamara, STRAH, Bojan. The xpert concept: A comprehensive information system for construction project management and control. 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. 1-10

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Teorija prometnega toka in analiza kapacitativnosti
Course title:	Traffic flow theory and capacity analysis

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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: doc. dr. Tomaž Maher

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):**
Osnove o teoriji prometnega toka (zgodovinski pregled, osnovni namen in problemi s katero se ukvarja ta znanost, področja uporabe). Gibanje posameznega vozila. Osnovni parametri prometnega toka. Značilne karakteristike prometnega toka. Teoretični in empirični odnosi med parametric prometnega toka. Matematični modeli medsebojnih odvisnosti v prometnem toku. Matematični modeli za opisovanje zakonitosti gibanja vozil pri različnih pogojih v prometnem toku. Osnove teorije strežbe v prometnem inženirstvu. Kapaciteta različnih prometnih rešitev (območja oviranih prometnih tokov – nivojska križišča , območja delno oviranih prometnih tokov – izven nivojska križišča, območja neoviranih prometnih tokov – odseki cest.	Basics about traffic flow theory (historic overview, basic purpose and problems dealt with by this area of science, areas of use), movement of individual vehicle, basic traffic flow parameters, traffic flow characteristics, theoretical and empirical relations between traffic flow parameters, mathematical models of interdependencies in traffic flow, mathematical models for the description of vehicle flow laws in different traffic flow conditions, basic theories of queuing theory in traffic engineering, capacity of different traffic solutions (areas of hindered traffic flows – road intersections, areas of partially hindered traffic flows freeway facilities, areas of unhindered traffic flow – road sections).

Temeljni literatura in viri / Readings:

Maher T. 2008. Teorija prometnega toka – skripta, dopolnjena verzija. Ljubljana, UL FGG, Prometnotehniški inštitut, 180 str.
Maher T. 2008. Kapacitetna prometnih površin, skripta, dopolnjena verzija. Ljubljana, UL FGG, Prometnotehniški inštitut, 190 str.
Kerner B.S. 2004. The physics of traffic. Springer.
Učno gradivo v spletni učilnici UL FGG.

Cilji in kompetence:

- Nadgraditi osnovno znanje prometnega inženirstva
- Podati teoretične osnove v teoriji prometnega toka in spoznati kapacitetne modele kot osnovo za načrtovanje in dimenzioniranje prometnih objektov (križišča, odseki cest, ostale prometne površine)
- Podati pregled ukrepov in metod pridobljene
- Sposobnost izdelave zahtevnih analiz, študij in projektov za prometne objekte
- Sposobnost izvajanja nadzora nad izvajanjem zahtevnih prometnih objektov

Objectives and competences:

-To upgrade basic knowledge of transportation engineering
- To provide the theoretical basis of the theory of traffic flow and to meet performance-based models as a basis for planning and design of traffic facilities (junction segments, roads, other traffic surfaces)
- To give an overview of the measures and methods of acquired competencies
- Ability to manufacture complex analyses, studies and projects for transport facilities
- Ability to exercise control over the implementation of complex transport facilities

Predvideni študijski rezultati:

- Pridobljeno poglobljeno znanje iz teorije prometnega toka
- Razumevanje procesov ki potekajo v prometu
- Osvojene računske spretnosti za načrtovanje prometnih objektov
- Doseženo znanje uporabljajo pri izdelavi magistrske naloge oz. v inženirski praksi
- Dobro razumevanje zakonitosti v prometnem toku so osnova za načrtovanje in dimenzioniranje ustreznih prometno tehničnih rešitev in objektov v prometnem inženirstvu
- Sposobnost abstraktne formulacije procesov v cestnem prometu
- Sposobnost kritične presoje vhodnih podatkov in dobljenih računskih rezultatov pri načrtovanju ukrepov
- Sposobnost upoštevanja dinamike prometnih procesov pri načrtovanju dejavnosti v prostoru
- Sposobnost uporabe računalniških modelov v prometnem inženirstvu

Intended learning outcomes:

- Acquired in-depth knowledge of traffic flow theory
- Understanding of the processes taking place in the road transport
- Mastered computational skills for planning of transportation infrastructure
- Achieved knowledge used in the preparation of master thesis or in engineering practice
- Good understanding of the laws of traffic flow is the basis for planning and design of appropriate transport facilities and technical solutions in the transportation engineering
- Ability of abstract formulation processes in road traffic
- Ability for critical analysis of input data and computational results obtained in the planning of measures
- Ability to take into account the dynamics of transport processes in the planning of activities in space
- Ability to use computer models in the transportation engineering

Metode poučevanja in učenja:

Predavanja, seminarske in laboratorijske vaje, terensko delo.

Learning and teaching methods:

Lectures, tutorials and laboratory work, field work.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Izpit	**50 %**	Theory - oral or written exam
Zagovor vaj	**50 %**	Exercise defense

Reference nosilca / Lecturer's references:

MAHER, T. Simulation methods in queuing theory. Promet, Suppl. (Zagreb), 2003, vol. 15, no. 1, Supplement, str. 25-31.
MRGOLE, S., MAHER, T. Primerjava uspešnosti različnih tipov križišč glede na kriterij čakalnih časov = Effectiveness comparison based on criteria of waiting times for different intersection types. Gradb. vestn., okt. 2005, letn. 54, str. 249-254.
TOLLAZZI, T., MAHER, T., RENČELJ, M., ZAVAŠNIK, Z. Analiza značilnosti krožnih križiščna državnem cestnem omrežju. Gradb. Vestn., avgust 2005, letn. 54, str. 178-183.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Prometna ekologija
Course title:	Traffic ecology

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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	15		60	4

Nosilec predmeta / Lecturer: doc. dr. Tomaž Maher

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):**
Osnove o varstvu okolja (zgodovinski pregled, pojem varstva okolja, varstvo okolja in urejanje prostora, oblike okoljevarstvenega delovanja, vplivi prometa na okolje). sestavine okolja in prostora:zrak in podnebje (emisije prometa), tla (reliefne posebnosti), vode (prometne ureditve in varstvo pred poplavami, prečenje vodotokov), rastlinstvo, živalstvo, varovana območja, obremenitev s hrupom, kulturna dediščina, kakovost krajine, gozdarstvo in gozd, kmetijstvo in kmetijske površine, poselitev, turizem. Presoje vplivov na okolje: pojem in pomen, vpogled v zgodovino, oblike presoje, zakonski okvir in postopek, izvedba presoje (opredelitev cilja, orodja, metode dela …). Urejanje obcestne krajine: umeščanje ceste v krajino, relief, uporaba rastlinja, urejanje spremljevalnih objektov, urejanje voda, ureditve za živali. Omilitveni ukrepi: prometni hrup, živali. Vaje Seminarske vaje (računske vaje, umestiti traso ceste v prostor z upoštevanjem vseh predhodno pridobljenih znanj)in laboratorijske vaje	Basic engineering concepts of environmental protection due to road traffic (historic overview, the term of environmental protection, environmental protection measures and spatial planning, forms of activities within environmental protection, influences of traffic on environment), components of environment and space (mostly traffic noise reduction), environmental impact study (concept and importance, historic overview, forms of impact studies, legal framework and procedure, execution of impact study), arrangement of road-side landscape (positioning of road into space, relief, use of vegetation, arrangement of accompanying structures, water regulation, arrangements for animals), mitigation measures (traffic noise, animals), seminar work (placement of road alignment into space by taking into account all previously acquired knowledge), laboratory work (demonstrational work at computer models).

(demonstracijske vaje na računalniških modelih,) Terensko delo - Zbiranje in analiza podatkov.	

Temeljni literatura in viri / Readings:

Maher T. 2008. Prometni hrup in zaščita pred njim – skripta, dopolnjena verzija. Ljubljana, UL FGG, Prometnotehniški inštitut, 132 str. 132.
Maher T. 2008. Živalim prijazne ceste, skripta, dopolnjena verzija. Ljubljana, UL FGG, Prometnotehniški inštitut, 103 str.

Cilji in kompetence:	**Objectives and competences:**
Cilji: - Podati osnovne opredelitve, vpogled v zgodovino, oblike dejavnosti in pojavne oblike varstva okolja, oziroma okoljevarstvene zahteve - Podati pregled ukrepov in metod prostorskega načrtovanja kot oblike varstva okolja v prometnem inženirstvu Pridobljene kompetence: - Sposobnost izdelave osnovnih analiz in študij iz področja prostorskega načrtovanja - Sposobnost sodelovanja in izdelovanja celovitih presoj vplivov prometa na okolje - Razumeti in upoštevati okoljevarstvene zahteve v prometnem inženirstvu (preventive in/ali sanacija)	Objectives: - Provide basic definitions insight into the history, design activities and forms of protection of the environment, or environmental requirements - Give an overview of the actions and methods of spatial planning as a form of environmental protection in transportation engineering Acquired competences: - Ability to build basic analyses and studies in the field of spatial planning - Ability to work and make comprehensive assessments of the impact of transport on the environment - Understand and comply with environmental requirements of traffic engineering (prevention and / or rehabilitation)

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Pridobljeno poglobljeno znanje iz prometne ekologije - Razumevanje procesov pri umeščanju prometnic v prostor, metod varovanja okolja zaradi škodljivih vplivov prometnic na okolje, - Osvojene računske spretnosti za načrtovanje ureditvenih in omilitvenih ukrepov v prometnem inženirstvu - Doseženo znanje uporabljajo pri izdelavi diplomskega dela oz. v inženirski praksi - Dobro razumevanje zakonitosti v prometnem toku so osnova za načrtovanje in dimenzioniranje ustreznih prometno tehničnih rešitev in objektov v prometnem inženirstvu - Sposobnost abstraktne formulacije procesov v cestnem prometu - Sposobnost kritične presoje vhodnih podatkov in dobljenih računskih rezultatov pri načrtovanju ukrepov - Sposobnost upoštevanja dinamike prometnih procesov pri načrtovanju dejavnosti v prostoru - Sposobnost uporabe računalniških modelov v	- Acquired in-depth knowledge of road ecology - Understanding of the processes in the siting of roads in space, methods to protect the environment from harmful effects of road traffic on the environment, - Getting familiar with numeracy planning of regulatory and mitigation measures in the transport engineering - Achieved knowledge used in the preparation of the thesis or in engineering practice - Good understanding of the legality of the traffic flow is the basis for planning and design of appropriate transport facilities and technical solutions in the transport engineering - Ability of abstract formulation processes in road traffic - Ability for critical analysis of input data and computational results obtained in the planning of measures - Ability to take into account the dynamics of transport processes in the planning of activities in space

prometnem inženirstvu	- Ability to use computer models in traffic engineering

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

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretični izpit (ustni ali pisni)	**50 %**	Theory - oral or written exam
Zagovor vaj	**50 %**	Exercise defence

Reference nosilca / Lecturer's references:

MAHER, T., RIJAVEC, R., PARADIŽ, B. Potrošnja goriva i emisije cestovnoga motornog prometa na državnoj mreži cesta u Republici Sloveniji. Suvremeni promet, 2002, god. 22, br. 1/2, str. 115-122.

KASTELIC, T., MAHER, T., ČUČEK, M. Road construction and ETC in Slovenia. Traffic technol. int., Annu. rev., 1997, str. 230-234

KASTELIC, T., MAHER, T. Electronic toll collection system in Slovenia. V: Modern traffic, (Suvremeni promet, Special issue, Vol. 18). Mostar: Institutes for Mechanical Engineering University of Mostar, 1998, str. 21-24.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Planiranje gradnje in vzdrževanja prometnic
Course title:	Planning of construction and maintenance of transport infrastructure

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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	15		60	4

Nosilec predmeta / Lecturer: izr. prof. dr. Marijan Žura

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

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

Prerequisites:

Vsebina:

Predavanja
Pristopi k planiranju izgradnje prometne infrastrukture. Zbiranje podatkov (štetja, ankete, meritve). Matematični modeli (štirifazni model: generacija, distribucija, izbira prometnega sredstva, obremenjevanje mreže). Vrednotenje variant (cost-benefit analiza, multikriterialna analiza). Modeli za upravljanje z vozišči.
Vaje
Seminarske vaje (računske vaje) in računalniške vaje (uporaba programa VISUM za izdelavo transportnih modelov).

Content (Syllabus outline):

Lectures:
Approaches to planning the construction of transport infrastructure. Collection of data (counting, surveys, measurements). Mathematical models (four-phase model: generation, distribution, mode choice, assignment). Evaluation of variants (cost-benefit analysis, multi-criteria analysis). Models for Pavement Management.
Tutorials
Use of Visum program for making transport models.

Temeljni literatura in viri / Readings:

Žura M. 2008. Prometno planiranje – študijsko gradivo
Bruton M. 1975. Introduction to transportation planning.
Banks J. 1998. Introduction to transportation engineering.

Cilji in kompetence:

Cilji
- Spoznati metode zbiranja podatkov
- podati teoretične osnove modelov za

Objectives and competences:

Objectives
- Understand the methods of data collection
- Give the theoretical basis of models for traffic

napoved prometnih obremenitev - na praktičnih primerih pridobiti sposobnost modeliranja Pridobljene kompetence - Sposobnost organizacije zbiranja in obdelave podatkov - Sposobnost izdelave transportnih modelov - Sposobnost interpretacije rezultatov	forecasting - In practical situations obtain the ability of modelling Acquired competences - Ability to organize data collection and processing - Ability to develop transport models - Ability to interpret results

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Poznavanje odvisnosti števila in vzorcev potovanj od rabe površin in socialnoekonomskih karakteristik - Poznavanje osnov matematičnih modelov posameznih faz - Sposobnost izdelave računalniškega modela prometnega omrežja - Sposobnost organizacije zbiranja in obdelave potrebnih podatkov - Sposobnost interpretacije rezultatov	- Knowledge of influence of land use and socio-economic characteristics on traffic volumes and patterns - Knowledge of basic mathematical models of individual phases - The ability to build a computer model of the transport network - Ability to organize the collection and processing of the necessary data - Ability to interpret results

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, seminarske in računalniške vaje.	Lectures and exercises.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Teoretični del	**50 %**	Theoretical exam
Računski del	**50 %**	Practical assignment

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
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

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Stvarno pravo
Course title:	Property law

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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:	prof. dr. Miha Juhart

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):**
Pojem prava in delitev na javno in zasebno pravo. Pravni viri, ki urejajo nepremičnine. Temelji lokalne samouprave. Temelji prava Evropske unije Temeljni pojmi nepremičninskega prava (nepremičnina, sestavina, pritiklina, parcela, pripadajoče zemljišče, javno dobro idr.). Načela stvarnega prava. Lastninska pravica, solastnina in skupna lastnina. Etažna lastnina, kataster stavb in vpis etažne lastnine v zemljiško knjigo, vzpostavitev etažne lastnine. Omejene stvarne pravice (stvarne služnosti, osebne služnosti, stvarno breme, nujna pot, hipoteka in zemljiški dolg, stavbna pravica). Nepremičninske evidence in zemljiška knjiga. Omejitve lastninske pravice v javnem interesu in drugi javnopravni režimi na zemljiščih.	Notion of law, delimitation of public and private law. Sources of law regulating immovable property. Basics of local self-government. Basics of EU law Basic notions of law of immovables (immovable, element, appurtenance, parcel, corresponding plot, property in public domain, etc.). Principles of property law. Ownership, co-ownership, joint ownership. Divided co-ownership, building cadastre, entry of divided co-ownership in the land register, creation of divided co-ownership. Limited proprietary rights (real easements, personal easements, encumbrance, way of necessity, mortgage, land debt, right of superficies). Real estate and other cadastres, land register. Limitation of ownership in the public interest and other public regimes on immovables.

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)
Veljavna zakonodaja, ki ureja nepremičnine (Dostopno na: www.dz-rs.si in www.pisrs.si), seznam se sproti oblikuje in dopolnjuje. / Relevant legislation regulating immovables (Dostopno na: www.dz-rs.si and www.pisrs.si), the list is updated regularly.
Drugo gradivo, sporočeno na predavanjih in na vajah ter v ŠIS. / Other study material is disseminated at the lectures and tutorials as well as via the student information system.

Cilji in kompetence:

Cilji:
- Osnovni cilj predmeta je študenta na vsebinsko celovit način seznaniti z osnovami stvarnega prava, s poudarkom na pravni ureditvi nepremičnin.

Študent pridobi naslednje kompetence:
- Pozna osnove stvarnega prava in zemljiške knjige.
- Nadaljnja uporaba znanja stvarnega prava omogoča študentu razumevanje pri praktičnem delu pri izpeljavi strokovnih geodetskih del pri evidentiranja nepremičnin in sodnih postopkih.

Objectives and competences:

Objectives:
- The basic objective of the course is to introduce student the complete contents of basic property law, with the emphasis on legal system for real estate.

Student acquires the following competences:
- Knowledge of basic property law, and land register.
- Further use of knowledge on property law enables student to understand practical work related to the implementation of geodetic work in the sense of real estate recording and in legal procedures.

Predvideni študijski rezultati:

- Študent mora poznati osnove prava ter povezovati zakonodajo na področju upravljanja z nepremičninami.
- Poznati mora osnove zakonodaje o geodetski dejavnosti, poznavanje področja urejanja prostora, evidentiranja nepremičnin, varstva okolja ter gradnje objektov.

Intended learning outcomes:

- Student must know the basics of law and connect legislation in the area of administration with real estate.
- Student must know the basics of legislation related to geodetic activity, knowledge from the area of spatial planning, recording of real estate, environmental protection and construction.

Metode poučevanja in učenja:

Predavanja, vaje teoretične, delno v računalniški učilnici.

Learning and teaching methods:

Lectures, theoretical tutorials, partly in computer classroom.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (teoretičen del)	**80 %**	Writen exam (theoretical part)
Naloge in sprotno delo	**20 %**	Homework and on-going work

Reference nosilca / Lecturer's references:

JUHART, Miha, TRATNIK, Matjaž, VRENČUR, Renato. Stvarno pravo. 1. natis. Ljubljana: GV založba, 2007. 714 str.
JUHART, Miha, TRATNIK, Matjaž, VRENČUR, Renato, BERDEN, Andrej, KERESTEŠ, Tomaž, RIJAVEC, Vesna, VLAHEK, Ana. Stvarnopravni zakonik (SPZ) : s komentarjem, (Zbirka Nova slovenska zakonodaja). 1. natis. Ljubljana: GV založba, 2004. 1077 str. ISBN 86-7061-351-4.
BERDEN, Andrej, TRATNIK, Matjaž, VRENČUR, Renato, RIJAVEC, Vesna, FRANTAR, Tone, KERESTEŠ, Tomaž, JUHART, Miha, VRENČUR, Renato (ur.). Novo stvarno pravo, (Zbirka Codex Iuris). Maribor: Studio Linea: Zavod Codex Iuris, 2002. 306 str.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Urbanistično načrtovanje
Course title:	Urban planning

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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: doc. dr. Alma Zavodnik Lamovšek

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

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

Prerequisites:

Vsebina:

Predavanja
Osnovni pojmi in terminologija v urejanju urbanega prostora; trajnostna načela razvoja mest, razvoj naselij, tipologija naselij, urbani sistem, urbanizacija in urbane rabe tal, urbanistična dokumentacija in upravne službe; inšpekcija, razvoj urbanih zemljišč: parcelacija v stavbne namene, pridobivanje, zemljišč. Izvajanje urbanističnih dokumentov, podatkovne osnove, mestni informacijski sistemi in njihova uporaba, urbana ekologija, presoja vplivov na okolje v mestih, mestna prenova. Predavanja o naselitveni, proizvodni, centralni rabi tal, o zelenih, prometnih in komunalnih površinah in o infrastrukturnih sistemih
Obiski urbanističnih zavodov in mestne uprave za urejanje prostora.
Vaje
Na osnovi urbanističnega načrta ali regulacije zasnovati izvedbeni načrt (OPPN, načrt prenove) analizirati posestno stanje, parcelirati prostor in ga urbano opremiti (tekstovni in grafični elaborat). Za isti projekt obdelati strokovne podlage

Content (Syllabus outline):

Lectures
Basic notions and terminology in urban spatial planning; sustainable principles of urban development, development of settlements, settlement, typology, urban system, urbanisation and urban land use, planning documentation and administrative services; inspection, development of urban areas: land allotment for building development, land acquisition, urban planning, implementation of urban planning documents, and their application, urban ecology, environmental impact assessment in urban areas, urban renovation. Lectures on housing, production and central land uses; green, transport and municipal areas, and infrastructure systems.
Visits to urban planning institutions and the Urban Planning Department of the City Administration.
Tutorials
Design of the implementation plan (municipal detailed spatial plan or renovation plan), based on the town plan or other regulations; analysis of land ownership; land allotment and urban infrastructure (textual and graphical report). To analyse and work

pridobivanje podatkov, način pridobivanja zemljišča, izvajanje plana ter trženje.	on evidence bases for the project in question; data acquisition, land acquisition, plan implementation, and marketing.

Temeljni literatura in viri / Readings:

Pogačnik, A. 1998. Urbanistično planiranje; učbenik FGG.
Vrišer, I. 1984. Urbana geografija, UL-FGG, Ljubljana.
Taylor, N. 1998. Urban Planning Theory since 1945. Sage. Ponatisi 1999, 2001, 2003, 2004.
Crane, R., Weber, R. (ur.) 2012. The Oxford Handbook of Urban Planning. Oxford university Press.
Zavodnik Lamovšek, A. 2015. Gradiva za predmet Urbanistično načrtovanje. Spletna učilnica UL FGG.

Cilji in kompetence:	**Objectives and competences:**
Cilji - Podati geodetskim strokovnjakom celovita znanja o urejanju urbanih zemljišč, izgradnji naselij, varstvu okolja na urbanih območjih - Razumeti možnosti urbanizma v urejanju mest in drugih naselij - Razumeti stanje in procese razvoja zemljišč. Kompetence: - Poznavanje in razumevanje izvedbenih prostorskih dokumentov in planov razvoja stavbnih zemljišč, - Povezovanje z geoinformatiko, komunalnimi predmeti, sposobnosti teamskega in interdisciplinarnega dela. Navezava na področje upravljanja nepremičnin, razvoja zemljišč, urbanizma, rurizma.	Objectives - To provide the surveyors with comprehensive knowledge of urban planning, construction of settlements, and environmental protection in urban areas, - Understand of spatial conditions and land development processes, - Understand the options of urban design in town planning. Competences: - Knowledge and understanding of implementing spatial planning documents, and development of building plots, - Connections with geoinformation, courses on municipal management, capability of team and interdisciplinary work. Affiliation to the areas of real estate management, land development, urban design, rural studies.

Predvideni študijski rezultati:	**Intended learning outcomes:**
- Osnovno poznavanje vede urbanizma in obvladovanje procesov v urbanem prostoru, znanja iz načrtovanja na lokalni ravni – rabe tal, lokalne infrastrukture, izvedbenih načrtov, lokacijskih delov PGD, sodelovanje z javnostjo - V gospodarskih družbah za urbanistično načrtovanje, za pridobivanje in opremljanje zemljišč, znanja, ki so potrebna upravnim delavcem v urbanizmu., - Uporaba znanj na občinah, upravnih enotah, pri izdelavi SPRO, UN, lokacijskih načrtov in projektov - Lastno razumevanje, kritično vrednotenje procesov v urbanem prostoru, kritičnost pri prenosu vzorov urbanega razvoja iz EU in sveta. Lastna opažanja procesov v lokalnem okolju in njihovem razreševanju, kritičen odnos do nelegalnih posegov v prostor.	- Basic knowledge of urban design and understanding of processes in urban areas, know-how of planning at the local level – land use, local infrastructures, implementation plans, site-specific part of the project for acquisition of building permit (PGD), public engagement - In companies for urban planning, acquisition and development of land; know-how needed by administration staff in urban planning. Use of the knowledge in municipalities, administrative units, in elaboration of spatial development strategies, urban plans, detailed site plans and projects. - Students' own understanding, critical evaluation of processes in urban areas, critical approach to transfer of urban development models from the EU and elsewhere. Students' own observations regarding the processes in the local environment and

	their solving, critical approach to illegal spatial interventions.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja Učenje s projektnim delom Terensko delo Seminar (Vsako temo seminarja se obrazloži, razdeli gradiva in prouči na terenu (ekskurzija). Po delu v skupinah s konzultacijami mentorjev se izdelki individualno predstavijo in zagovarjajo. V diskusiji sodelujejo vsi udeleženci seminarja.	Lectures Project based learning Field work Seminar work (Each seminar topic is explained, materials are handed out, and site visits are organised (excursion). Group work and consultations by mentors are followed by individual presentation and defence of work. All seminar participants take part in discussions.)

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (teoretičen del)	**50 %**	Written examination (theoretical part)
Naloge in sprotno delo	**50 %**	Coursework and regular work

Reference nosilca / Lecturer's references:

ZAVODNIK LAMOVŠEK, Alma, DROBNE, Samo, ŽAUCER, Tadej. Small and medium-size towns as the basis of polycentric urban development = Majhna in srednje velika mesta kot ogrodje policentričnega urbanega razvoja. Geod. vestn.. [Tiskana izd.], 2008, letn. 52, št. 2, str. 290-312, ilustr. http://www.geodetski-vestnik.com/52/2/gv52-2_290-312.pdf.

ZAVODNIK LAMOVŠEK, Alma, ČEH, Marjan, KOŠIR, Uroš. Analiza dostopnosti prebivalcev do javnih dejavnosti z medkrajevnim avtobusnim potniškim prometom. V: PERKO, Drago (ur.), ZORN, Matija (ur.). Geografski informacijski sistemi v Sloveniji 2009-2010, (GIS v Sloveniji, 10). Ljubljana: Založba ZRC, 2010, str. 251-260.

ZAVODNIK LAMOVŠEK, Alma, FOŠKI, Mojca, ČEH, Marjan. Urban Development and Planning Tools in Slovenia. V: LAMI, Isabella M. (ur.). An overview on planning systems and urban markets in Europe, (AO8, 50). Roma: Aracne editrice, 2005, str. 147-161, ilustr.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Projektiranje in gradnja jeklenih stavb
Course title:	Design and construction of steel buildings

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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:	doc. dr. Primož Može

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 Globalna analiza jeklenih konstrukcij (metode, začetne nepopolnosti, modeliranje, dimenzioniranje elementov, presoja rezultatov); osnove projektiranja potresno odpornih jeklenih konstrukcij (zasnova, duktilnost, ukrepi za zagotavljanje potresne odpornosti); korozijska zaščita jeklenih konstrukcij; požarna zaščita jeklenih konstrukcij; tolerance izdelave in montaže jeklenih; konstrukcij; tehnologija izdelave in montaže jeklenih; konstrukcij s poudarkom na stavbah; vzdrževanje jeklenih konstrukcij. Seminar Izdelava projekta enostavne jeklene stavbe (statična zasnova, obtežbe, izračun notranjih sil, dimenzioniranje elementov in spojev, risanje načrta konstrukcije in podatki za izdelavo konstrukcije).	Lectures Global analysis of steel structures (methods, initial imperfections, modelling, design of the elements, and assessment of the results). Seismic design of steel structures (structural design, ductility, measures to ensure seismic resistance). Corrosion protection of steel structures Fire protection of steel structures. Manufacture and construction tolerances. Manufacture and construction technologies of steel buildings. Maintenance of steel structures. Seminar: Each student has to draw a project of a simple steel building (conceptual design, definition of loads, calculation of internal forces and displacements, design of elements and joints, drawing plans by using appropriate software).

Temeljni literatura in viri / Readings:

B. Beg. 1999. Projektiranje jeklenih konstrukcij po env 1993-1-1. Ljubljana, UL FGG.
D. A. Nethercot. 1991. Limit states design of structural steelwork, chapman and hall. London.
D. Beg. 2002. Potresnoodporno projektiranje jeklenih konstrukcij - učimo se na napakah. Gradb. vestn., let. 51, str. 50-59, graf. prikazi.

Cilji in kompetence:

Cilji:
- Nadgraditi osnovno znanje s področja projektiranja jeklenih konstrukcij z znanjem o projektiranju stavb ter njihovi izdelavi in montaži,
- Pridobiti znanja , ki bodo v pomoč pri pridobitvi licence pooblaščenega inženirja pri Inženirski zbornici Slovenije.

Pridobljene kompetence:
- Sposobnost projektiranja jeklenih konstrukcij na nivoju sistemov (stavb)
- Sposobnost vodenja izdelave in montaže jeklenih stavb.

Objectives and competences:

Objectives:
- To upgrade the basic knowledge on steel structures with the knowledge of design, manufacturing and construction of steel buildings
- Acquire skills necessary to obtain a license for authorized engineer at the Slovenian Chamber of Engineers.

Competences:
- Ability to design steel structures (buildings).
- Ability to manage manufacturing and construction of steel buildings.

Predvideni študijski rezultati:

- Spoznati in razumeti metode analize in dimenzioniranja sistemov ter
- Spoznati in razumeti obnašanje jeklenih konstrukcij med potresom,
- Spoznati in razumeti metode izdelave in montaže jeklenih konstrukcij,
- Študent se bo naučil teoretična znanja uporabiti v inženirski praksi,
- 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,
- Sposobnost uporabe računalniških programov za analizo konstrukcij,
- Sposobnost kritične presoje rezultatov računalniških analiz,
- Sposobnost kritične presoje strokovnih problemov,
- Pridobivanje spretnosti za uporabo literature, interneta in drugih informacijskih tehnologij.

Intended learning outcomes:

- To know and understand the methods of analysis and the design of systems.
- To know and understand the behaviour of steel structures subjected to earthquake
- Student should learn to use theoretical knowledge in engineering practice.
- To know and understand the manufacturing and the construction methods of steel buildings.
- Student should learn to use the theoretical knowledge in engineering practice.
- 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 the inappropriate solutions and to justify the choice of possible solutions.
- Ability to use computer programs for structural analysis.
- Ability to critically judge the results of numerous numerical analyses.
- Ability for critical judgement of technical problems.
- Acquisition of skills for the use of literature, internet and other information technologies.

Metode poučevanja in učenja:

Predmet se izvaja v obliki predavanj in seminarja.

Learning and teaching methods:

The course will consist of lectures and seminars.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
Samostojna naloga	**40 %**	Approved project work
Zagovor naloge	**30 %**	Defence of the approved project work
Ustni izpit	**30 %**	Oral exam
Študenti, ki za samostojno nalogo in njen ustni zagovor dosežejo vsaj 57 točk od 70 so oproščeni ustnega izpita.		If student gets more than 57 pt./70 pt. at approved project work, he can skip the oral exam

Reference nosilca / Lecturer's references:

SINUR, Franc, BEG, Darko. Moment-shear interaction of stiffened plate girders -Tests and numerical model verification. Journal of Constructional Steel Research, ISSN 0143-974X. [Print ed.], jun. 2013, letn. 85, str. 116-119, ilustr., doi: 10.1016/j.jcsr.2013.03.007.
SINUR, Franc, BEG, Darko. Moment-shear interaction of stiffened plate girders - Numerical study and reliability analysis. Journal of Constructional Steel Research, ISSN 0143-974X. [Print ed.], sept. 2013, letn. 88, str. 231-243, ilustr., doi: 10.1016/j.jcsr.2013.05.016.
KUHLMANN, Ulrike, BEG, Darko, ZIZZA, Antonio, SINUR, Franc. Beulverhalten längsausgesteifter Platten unter Interaktion von Biegung und Querkraft : Experimentelle und numerische Untersuchungen. Der Stahlbau, ISSN 0038-9145, nov. 2012, letn. 81, št. 11, str. 820-827, ilustr., doi: 10.1002/stab.201201609.
SINUR, Franc, BEG, Darko. Intermediate transverse stiffeners in plate girders. Steel construction, ISSN 1867-0520. [Print ed.], feb. 2012, letn. 5, št. 1, str. 23-32, ilustr., doi: 0.1002/stco.201200004.

UČNI NAČRT PREDMETA / COURSE SYLLABUS	
Predmet:	Vrednotenje nepremičnin
Course title:	Real estate valuation

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Gradbeništvo - druga stopnja MA	Nizke gradnje	1, 2	1–4
Civil Engineering - second cycle MA	Infrastructural Engineering	1, 2	1–4

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:	izr. prof. dr. 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):**
Predavanja: Trg in tržno vrednotenje nepremičnin: predmet ocenjevanja, ocenjevana vrednost in načini ocenjevanja vrednosti nepremičnin; ocenjevanje vrednosti zemljišč, ocenjevanje vrednosti nepremičnin v postopku komasacije, ocenjevanje vrednosti nepremičnin v primerih stvarne služnosti in v primerih drugih omejitev lastninske pravice, ocenjevanje vrednosti v specifičnih primerih. Upoštevanje elementov trajnostnega razvoja v postopku ocenjevana vrednosti nepremičnin. Postopek posamičnega vrednotenja nepremičnin in uporaba standardov. Javno dostopni podatki za izdelavo cenitvenega poročila. Samostojna izdelava cenitvenega poročila. Vaje Seminarske vaje.	Lectures: Real estate market and market real estate valuation: valuation subject, value and real estate valuation approaches: land valuation in specific cases, real estate valuation in the process of consolidation, real estate valuation in cases of easement and other restrictions of rights. Real estate valuation in specific cases, taking into account elements of sustainable development. Process of individual real estate valuation and application of standards. Public records for real estate valuation. Real estate valuation reporting, starting points for individual work on real estate report (seminar). Acquisition of data, analysis of the real estate market. Seminar Making a real estate report.

Temeljni literatura in viri / Readings:

JUHART, Miha, TRATNIK, Matjaž, VRENČUR, Renato. Stvarno pravo. 1. natis. Ljubljana: GV založba, 2007. 714 str.
JUHART, Miha, TRATNIK, Matjaž, VRENČUR, Renato, BERDEN, Andrej, KERESTEŠ, Tomaž, RIJAVEC, Vesna, VLAHEK, Ana. Stvarnopravni zakonik (SPZ) : s komentarjem, (Zbirka Nova slovenska zakonodaja). 1. natis. Ljubljana: GV založba, 2004. 1077 str. ISBN 86-7061-351-4.
BERDEN, Andrej, TRATNIK, Matjaž, VRENČUR, Renato, RIJAVEC, Vesna, FRANTAR, Tone, KERESTEŠ, Tomaž, JUHART, Miha, VRENČUR, Renato (ur.). Novo stvarno pravo, (Zbirka Codex Iuris). Maribor: Studio Linea: Zavod Codex Iuris, 2002. 306 str.

Cilji in kompetence:

Cilji
Spoznavanje izrazoslovja in procesa vrednotenja nepremičnin ter razumevanje različnih načinov vrednotenja.

Kompetence
- Pozna in razume izrazoslovje, proces in načine posamičnega vrednotenja nepremičnin.
- Pozna in razume različne metode vrednotenja nepremičnin.
- Sposobnost pridobivanja in analiziranja podatkov o trgu nepremičnin.
- Sposobnost samostojno izdelati cenitveno poročilo.
- Sposobnost prilagajanje novim razmeram pri razvoju stroke.

Objectives and competences:

Objective
To acquire knowledge regarding terminology and the process of real estate valuation; understanding various real estate valuation methods.

Competences:
- To know and understand the terminology and the process of real estate valuation
- To know and understand various methods of real estate valuation
- Ability to acquire and analyse data regarding real estate market
- Ability to make an individual real estate report
- Ability to adjust to changing conditions in the field of real estate valuation.

Predvideni študijski rezultati:

- Študent pridobi znanje o načinih vrednotenja nepremičnin in jih zna uporabiti v praksi ter pri razvoju stroke.
- Študent na osnovi pridobljenih znanj in spoznanj pri tem predmetu lahko kritično presoja razvoj vrednotenja nepremičnin, zahteve strank pri izdelavi cenitvenega poročila.

Intended learning outcomes:

- Student acquires knowledge about various methods of real estate valuation and knows how to use them in practice and in the process of development of the field of real estate valuation.
- Student has the ability to critically consider developments in the field of real estate valuation and customers' requirements when making real estate report.

Metode poučevanja in učenja:

Predavanja, seminar, seminarske vaje z uporabo IKT.

Learning and teaching methods:

Lectures, seminar using visual aids.

Načini ocenjevanja:	Delež (v %) / Weight (in %)	**Assessment:**
Pisni izpit (teoretičen in računski del)	**60 %**	Written exam (theory, calculation tasks)
Projekt (samostojna naloga)	**40 %**	Project (individually done by each student)

Reference nosilca / Lecturer's references:

ŠUBIC KOVAČ, Maruška, RAKAR, Albin. Information required for single real estate valuation = Informacijske podlage za posamično vrednotenje nepremičnin. Geod. vestn.. [Tiskana izd.], 2008, letn. 52, št. 4, str. 706-715, ilustr.
RAKAR, Albin, ČERNE, Tomaž, ŠUBIC KOVAČ, Maruška. Fiskalna in usmerjevalna vloga javnih dajatev pri izvajanju aktivne zemljiške politike = Fiscal and guiding role of public duties in land policy implementation. Geod. vestn.. [Tiskana izd.], 2008, letn. 52, št. 4, str. 743-757, 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.