UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Inženirska geologija
Course title:	Engineering Geology

Študijski programi in stopnja	**Študijska smer**	**Letnik**	**Semestri**
Geologija, prva stopnja, univerzitetni	Ni členitve (študijski program)	3. letnik	Zimski

Univerzitetna koda predmeta/University course code: 11244

Predavanja	**Seminar**	**Vaje**	**Klinične vaje**	**Druge oblike študija**	**Samostojno delo**	**ECTS**
60	0	30	0	30	120	8

Nosilec predmeta/Lecturer: Timotej Verbovšek

Vrsta predmeta/Course type: Obvezni / Compulsory

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

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	**Prerequisites:**
Vpis v 3. letnik.	Inscription to a 3rd academic year.

Vsebina:	**Content (Syllabus outline):**
Uvod. Inženirsko-geološke (IG) značilnosti slovenskega ozemlja, klasifikacije, splošne lastnosti zemljin in hribin. Geološki destruktivni procesi in inženirska geologija. Metode geoloških raziskav (vrtanje, oprema, zakonodaja, strukturno-geološko vrtanje, geomehansko vrtanje, hidrogeološke raziskave in vrtanje, globinsko vrtanje, karotaža, vzdrževanje vrtin, popisi jeder), in-situ preiskave. Izdelava inženirskogeoloških kart in napovedi. Geologija okolja v inženirski geologiji in uporaba inženirske geologije pri odlaganju odpadkov, IG pri posegih v teren. IG in potresi ter seizmična mikrorajonizacija. IG in plazovi. Masna premikanja zemljin in hribin, klasifikacija plazov, elementi plazov, metode raziskav (IG kartiranje in posnemanje, geodetske in geofizikalne meritve, meritve deformacij, nivojev vode, inklinometri, geomehanske raziskave), sanacija plazov. Pregled glavnih plazov v Sloveniji in v tujini. Modeliranje plazov. Terensko delo: ogled izbranih slovenskih in bližnjih tujih plazov ter praktičnih in-situ terenskih raziskav.	Introduction. Engineering-geological (EG) characteristics of Slovenia's territory, classifications, properties of soil and rock masses. Geological destructive processes and engineering geology. Methods of geological research (drilling, equipment, legislation, structural drilling, geomechanical drilling, hydrogeological research methods and drilling, deep drilling, well logging, borehole maintenance), in-situ investigations. Engineering geology maps, risk assessment. Environmental geology in engineering geology and use of engineering geology for waste deposits construction, EG and environmental interventions. EG, earthquakes and seizmic microzonation. EG and landslides. Soil and rock mass movements, classification and elements of landslides, investigation methods (EG mapping, geodetic and geophysical investigations, deformations, water level measurements, inclinometers, geomechanical research). Mitigation of landslides. Outline of major Slovenian and foreign landlides. Landslide modeling. Field work: major Slovenian and foreign landlides and in-situ field measurements.

Temeljna literatura in viri/Readings:

Australian Drilling Industry Training Committee Limited, 1997: Drilling. The Manual of Methods, Applications, and Management CRC Press, ZDA.
CORNFORTH, D.H., 2005: Landslides in Practice, John Wiley & Sons.
FELL, R., 2000, Geotechnical Engineering of the Stability of Natural Slopes, and Cuts and Fills in Soil, GeoEng2000, Melbourne.
HIGHLAND, L. M. & BOBROWSKY, P., 2008: The Landslide Handbook— A Guide to Understanding Landslides, Geological Survey of Canada. USGS Circular 1325.
HOEK, E., 2007: Practical Rock Engineering, http://www.rocscience.com/hoek/PracticalRock
MARJORIBANKS, R., 2010: Geological Methods in Mineral Exploration and Mining. 2nd ed., Springer.
PRICE, D. G., 2009: Engineering Geology. Principles and Practice. Springer, Berlin.
RIBIČIČ, M., 2002: Skripta Inženirska geologija I, Naravoslovnotehniška fakulteta, 231 str., Ljubljana.
Verbovšek, Timotej. Inženirska geologija : študijsko gradivo za predmet Inženirska geologija na 1. stopnji UNI BOL študija geologije. Ljubljana: Univerza v Ljubljani, NTF, Oddelek za geologijo, 2017. 161 str., ilustr. https://www.ntf.uni-lj.si/og/employee/timotej-verbovsek/studijski-material/.

Cilji in kompetence:	**Objectives and competences:**
CILJI: Študent bo osvojil osnovno znanje iz inženirske geologije za praktično delo pri inženirskogeoloških posegih na terenu in pri ugotavljanju posledic posegov v teren (odlagališča odpadkov, geologija okolja, itd.) ter obvladovanje naravnih ogrožajočih pojavov (plazovi, potresi) ter iz metod geoloških raziskav ter vrtanja. KOMPETENCE: slušatelji pridobijo osnovne sposobnosti za opravljanje del, ki jih opravlja inženirski geolog pri najrazličnejših posegih v teren, odpravi posledic naravnih nesreč, itd.	OBJECTIVES: Student will gather the basic knowledge engineering geology for a practical work at field interventions, for determination of consequences of field interventions (waste deposits, environmental geology etc.) and for understanding of natural disasters (landslides, earthquakes) plus from geological research methods and drilling. COMPETENCES: Students gather the basic capabilities for performing work, which is done by engineering geologist at various field interventions, mitigation of natural disasters etc.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Po vsebini IG študent obvlada osnovno znanje del, ki jih inženirski geolog izvaja pri gradnji različnih tipov objektov (ceste, predori, odlagališča, idr.), znanje o posledicah teh posegov v teren, znanje, kako obvladovati naravne nesreče, kot so plazovi in potresi ter znanje o metodah raziskav in vrtanja za potrebe geologije, hidrogeologije, geotehnologije in gradbeništva. Študent je usposobljen za osnovno inženirskogeološko delo v geoloških, gradbenih, rudarskih in drugih podjetjih. Obvlada orodja, s katerimi se v IG izvajajo osnovni izračuni in napovedi. Predmet omogoča, da študent pri pristopu k reševanju problemov preide k samostojnem reševanju življenjskih in konkretnih problemov in ne ostane na nivoju teoretičnih pristopov. Znanje iz osnovnih naravoslovnih predmetov in znanje iz geoloških predmetov mora študent prenesti in uporabiti kot osnovno bazo, na kateri gradi inženirski pristop, potreben pri poznavanju metod geoloških raziskav in predmetu Inženirska geologija. To znanje lahko nato uporabi pri drugih praktično usmerjenih predmetih.	Student gains the basic knowledge, which an engineering geologist uses at the object construction (roads, tunnels, deposits etc.), knowledge of environmental interventions, how to react at natural disasters (landslides, earthquakes). Student is capable of basic engineering geology work at geological, civil engineering, mining and other companies. He/she can master the tools for basic calculations and predictions in engineering geology, and the methods of research and drilling for geology, hydrogeology and geotechnology and civil engineering. The subject permits the student to deal with problems and is able to solve life and concrete problems, not to be stay at theoretical level only. Student must use the knowledge of basic subjects (mathematics, physics and chemistry) and geological subjects as the basics for further geological research methods and engineering geological work. This knowledge can then be used at other practically focused subjects.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja (60 ur), grafične/kabinetne/računalniške vaje (30 ur) terenske vaje na izbranih slovenskih in tujih plazovih ter lokacijah aktivnih terenskih raziskav (30 ur).	Lectures (60 hours), cabinet/ computer exercises (30 hours) and field exercise (30 hours) at major Slovenian and foreign landslides and practical research methods locations.

Načini ocenjevanja:	**Delež/Weight**	**Assessment:**

Pisni izpit	60,00 %	Written exam
Vaje in terenske vaje	40,00 %	Exercises and field work
Pisni izpit: teoretična vprašanja. Vaje: oddane grafične in računske vaje (praktični del). Terenske vaje: oddano terensko poročilo. Pogoji za pristop k izpitu: pozitivno opravljene vaje. Ocenjevalna lestvica: 51-60% (6); 61-70% (7); 71-80% (8); 81-90% (9); 91-100% (10) ob upoštevanju Statuta UL in fakultetnih pravil.		Written exam: theoretical questions. Exercises: positively passed work exercises. Field work: submitted field report. Prerequisites for written exam: positively graded exercises. Grades: 51-60% (6); 61-70% (7); 71-80% (8); 81-90% (9); 91-100% (10), according to University Statute and Faculty Acts.

Reference nosilca/Lecturer's references:

VERBOVŠEK, Timotej, KOŠIR, Adrijan, TERAN, Maša, ZAJC, Marjana, POPIT, Tomislav. Volume determination of the Selo landslide complex (SW Slovenia) : integrating field mapping, ground penetrating radar and GIS approaches. Landslides : Journal of the international consortium on landslides, ISSN 1612-510X. [Print ed.], 2017, vol. 14, iss. 3, str. 1265-1274, doi: 10.1007/s10346-017-0815-x.

NOVAK, Andrej, VERBOVŠEK, Timotej, POPIT, Tomislav. Heterogeneously composed Lozice fossil landslide in Rebrnice area, Vipava Valley = Heterogeni fosilni plaz Lozice na območju Rebrnic v Vipavski dolini. Geologija, ISSN 0016-7789. [Tiskana izd.], 2017, let. 60, št. 1, str. 145-155, doi: 10.5474/geologija.2017.011.

JEMEC AUFLIČ, Mateja, JEŽ, Jernej, POPIT, Tomislav, KOŠIR, Adrijan, MAČEK, Matej, LOGAR, Janko, PETKOVŠEK, Ana, MIKOŠ, Matjaž, CALLIGARIS, Chiara, BOCCALI, Chiara, ZINI, Luca, REITNER, Jürgen, VERBOVŠEK, Timotej. The variety of landslide forms in Slovenia and its immediate NW surroundings. Landslides : Journal of the international consortium on landslides, ISSN 1612-510X. [Print ed.], 2017, vol. 14, iss. 4, str. 1537-1546, ilustr., doi: 10.1007/s10346-017-0848-1