Letopis Fakultete za gradbeništvo in geodezijo Univerze v Ljubljani, 2015/16 in 2016/17

Yearbook of Faculty of Civil and Geodetic Engineering, University of Ljubljana, 2015/16 and 2016/17

2015 16 17

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

KAZALO

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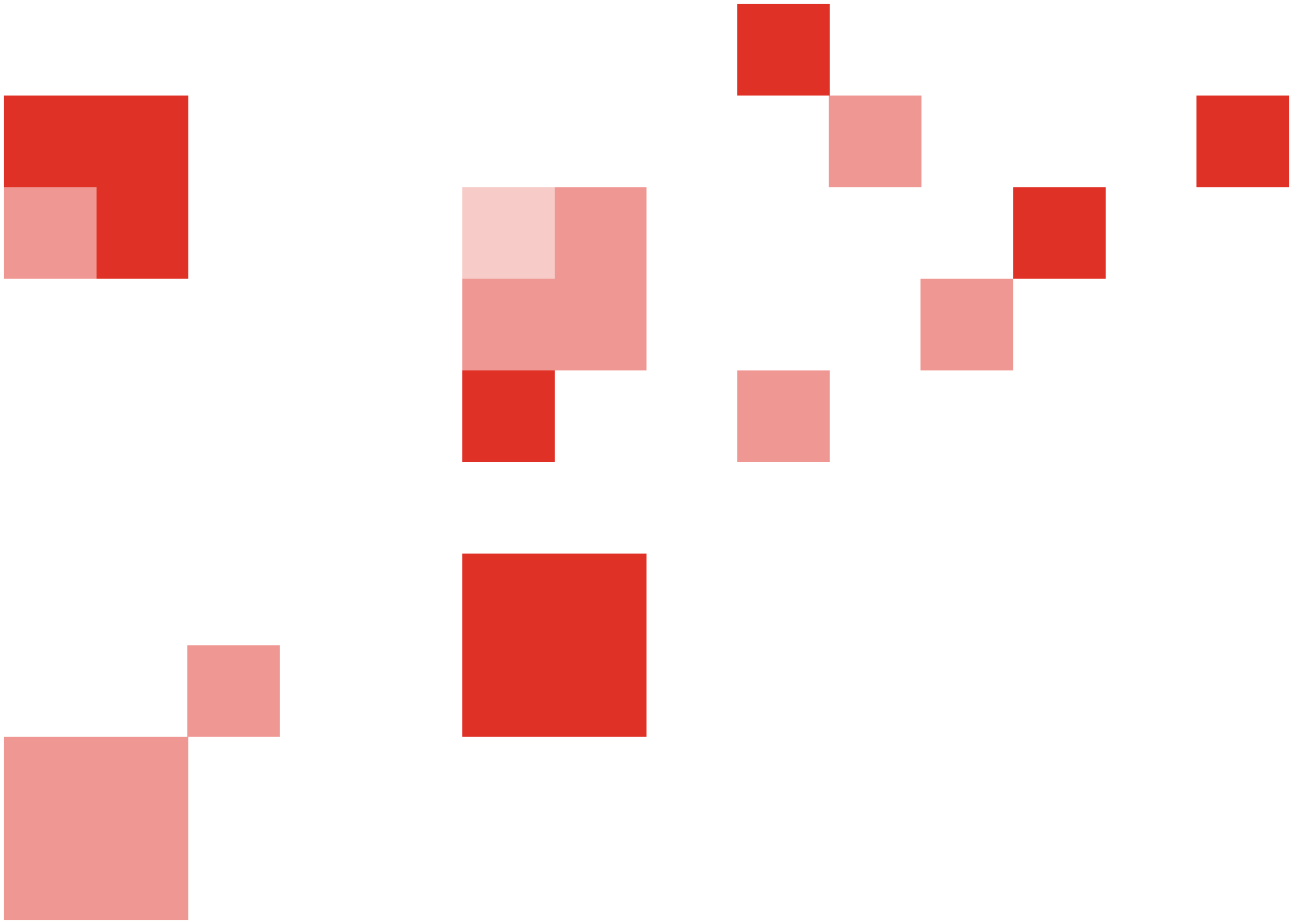

DEKANOV NAGOVOR

Pred Vami je dvoletni letopis UL FGG, ki v zgoščeni obliki ponuja prerez življenja in dela v letih od 2015 do 2017 – gospodarska kriza v Sloveniji in svetu je mimo in fakulteta ostaja vitalna, a ob tem marsikateri kazalnik ostaja obrnjen navzdol.

Za nami so izgubljena leta, ki jih bomo morali nadomestiti, če bomo želeli izpolniti zastavljeno vizijo razvoja fakultete do leta 2025.

Glavno sporočilo je, da smo po več letih ustavili finančno nazadovanje, a nismo uspeli ustaviti upadanja števila vpisanih študentov. Posledično se je zmanjšal tudi kolektiv zaposlenih, ki se stara.

Skupaj z drugimi članicami Univerze v Ljubljani pričakujemo, da bo družba končno prepoznala vlogo, ki jo imamo v družbi, in zagotovila solidne delovne pogoje ter možnosti razvoja in prilaganja fakultete novim smerem razvoja.

Zadnja leta nas zaznamuje intenzivna promocija fakultete in poklicev, za katere izobražujemo. Žal so za mladino zanimivi le določeni inženirski poklici, vse manj klasični poklici in vse bolj poklici prihodnosti, med katere bi lahko uvrstili gradbene inženirje digitalnega (računalniškega) modeliranja stavb in inženirskih gradenj, infrastrukturnega inženirja, geoinformatika, okoljskega inženirja, stavbenika pametnega grajenega okolja (stavb, mest in zelene infrastrukture). Pred nami so številni izzivi, ki jih zahteva digitalizacija družbe in industrija 4.0.

dekan, red. prof. dr. Matjaž Mikoš

DEAN'S FOREWORD

This biennial yearbook is a condensed cross-section of UL FGG's life and work between 2015 and 2017. The economic crisis in Slovenia and in the world is behind us and our Faculty has managed to preserve its vitality, although many indices remain pointing downwards.

To make up for the lost years we will need to make some compensations to meet the goals of UL FGG's vision for its development until 2025. The main message is that, after several years, we have managed to stop our financial setback, but have not been able to reverse the falling numbers of the students enrolled. As a consequence, the number of our employees has decreased as well; our staff is also growing older.

Together with other members of the University of Ljubljana we expect from society to finally recognise our role in society and to ensure sound working conditions as well as possibilities to grow and adapt to new development directions.

Over the last few years we have put a lot of effort to promoting our Faculty and the professions that we educate. Unfortunately, young generations show interest only in specific engineering professions rather in classical professions, i.e. professions of the future, such as building engineers of digital (computer) modelling of buildings and engineering constructions, infrastructural engineers, geoinformation professionals, environmental engineers, engineers of smart built environment (buildings, cities and green infrastructure). We are facing numerous challenges brought about by the digitalisation of society and Industry 4.0.

Dean, Professor Matjaž Mikoš, dr. sc. techn. ETH

FOREWORD

UL FGG annually published its Activity Report to provide an overview of its activities through statistical data and compile the publications of its staff. The Activity Report ceased publication in 2010 as the public increasingly gained access to such information. All information of course cannot be obtained from publicly available databases, as the pulse of UL FGG is created both by its staff and students with various activities. In 2014 we decided to bring the idea of the Activity Report back. The first UL FGG's Yearbook for 2013/14 and 2014/15 was born; UL FGG is first shown in facts and figures, which is followed by presentations of teaching, professional, and scientific work of all three departments and chairs, doctoral programmes, and other activities. We particularly highlighted extracurricular activities, operation of student organisations and societies, and the achievements of staff and students.

The purpose of UL FGG's Yearbook is first and foremost to preserve the (historical) memory of study and scientific research activity of the Faculty. This purpose of the Yearbook is even more important now, at a time of fast technological, scientific, and social changes, as it collects and presents in one place the diversity of the work at the Faculty, which often stays hidden to us and the general public. As Dean, Prof. Dr. Matjaž Mikoš, wrote in his foreword to the Yearbook's first edition, "diversity in our activities also brings us together and unites us."

The second edition of UL FGG's Yearbook for 2015/16 in 2016/17 is now here. We hope that you will enjoy browsing it, whether in print or online, now or in a few years time when the memory of students, your colleagues, or work from this period will have faded.

Editors:
Doc. Dr. Alma Zavodnik Lamovšek
Doc. Dr. Mitja Košir

UVODNIK

Na UL FGG je vsako leto izšlo Poročilo o delu, namenjeno pregledu delovanja fakultete skozi statistične podatke in zbiru objav zaposlenih. Zaradi vedno boljše javne dostopnosti do tovrstnih informacij pa je izdajanje Poročila o delu z letom 2010 zamrlo. Vseh informacij pa vendarle ne moremo pridobiti le iz javno dostopnih podatkovnih baz, saj utrip fakultete sooblikujemo zaposleni in študentje z različnimi aktivnostmi. V letu 2014 smo se zato odločili, da idejo Poročila o delu obudimo. Tako je nastal prvi Letopis UL FGG za šolski leti 2013/14 in 2014/15, v katerem je UL FGG najprej predstavljena v številkah in dejstvih, nato sledijo predstavitve pedagoškega, strokovnega in znanstvenega dela vseh treh oddelkov in kateder, doktorskega študija in vseh ostalih dejavnosti fakultete. Posebej smo izpostavili tudi obštudijske dejavnosti, delovanje študentskih organizacij in društev ter dosežke zaposlenih in študentov.

K temu dodajava, da je namen Letopisa UL FGG v prvi vrsti ohranjati (zgodovinski) spomin na izvajanje študijskega in znanstveno raziskovalnega dela celotne fakultete. Prav ta namen letopisa pa je v sedanjem času hitrih tehnoloških, znanstvenih in družbenih sprememb še toliko bolj pomemben, saj na enem mestu zbere in predstavi raznolikost dela na fakulteti, ki mnogokrat ostaja skrita tako nam samim, kot tudi širši javnosti. A vseeno nas prav raznolikost našega delovanja povezuje in dela enotne, kot je v svojem nagovoru zapisal dekan prof. dr. Matjaž Mikoš že ob izidu prve številke Letopisa UL FGG.

Pred vami je druga številka Letopisa UL FGG za šolski leti 2015/16 in 2016/17. Upava, da jo boste z veseljem vzeli v roke ali prebirali v elektronski obliki, če ne zdaj, pa čez nekaj let, ko bo spomin na študente, sodelavce in delo iz tega obdobja že nekoliko zbledel.

Urednika:
doc. dr. Alma Zavodnik Lamovšek
doc. dr. Mitja Košir

UL FGG V ŠTEVILKAH IN DEJSTVIH

UL FGG FACTS AND FIGURES

VSEBINA / CONTENT

PORTRAIT

UL FGG Mission Statement

To teach, create new knowledge and develop innovative solutions in the areas of civil engineering, environmental engineering and geodesy.

Research work intertwined in international environment, professional excellence and excellent teaching enable us to educate innovative engineers of the future.

In cooperation with the economy and society we solve development and professional issues, develop sustainable construction and co-create conditions for a healthy and safe environment.

UL FGG Vision

Until 2025, to be among the best departments in the areas of civil engineering, environmental engineering and geodetic engineering in Central Europe.

To raise the quality of research work to the highest international level.

To continuously improve and modernise study programmes and the quality of educational work.

To raise the importance and quality of engineering education and engineering profession in modern society.

To get better involved in the solving of developmental and professional issues in Slovenia and internationally.

PORTRET

Poslanstvo UL FGG

Učimo, ustvarjamo nova znanja in razvijamo inovativne rešitve na področju gradbeništva, okoljskega inženirstva in geodezije.

Raziskovalno delo, vpeto v mednarodno okolje, strokovna odličnost in odlično izobraževanje nam omogočajo izobraževanje inovativnih inženirjev prihodnosti.

V sodelovanju z gospodarstvom in družbo rešujemo razvojna in strokovna vprašanja, razvijamo trajnostno gradnjo in soustvarjamo pogoje za zdravo in varno okolje.

Vizija UL FGG

Do leta 2025 se uvrstiti med najboljše fakultete na področju gradbeništva, okoljskega inženirstva in geodezije v Srednji Evropi.

Dvig kakovosti raziskovalnega dela na najvišjo mednarodno raven.

Stalno izboljševanje in posodabljanje študijskih programov in kakovosti pedagoškega dela.

Dvig pomena in kakovosti inženirskega izobraževanja in poklica v sodobni družbi.

Večja vključenost v reševanje razvojnih in strokovnih vprašanj v Sloveniji in tujini.

LOKACIJA

Univerza v Ljubljani
Fakulteta za gradbeništvo in geodezijo
p.p. 3422,
1000 Ljubljana,
Slovenija

- T: 01 476 85 00
- F: 01 425 06 81
- E: fgg@fgg.uni-lj.si
- W: http://www3.fgg.uni-lj.si/

Oddelek za gradbeništvo, Oddelek za geodezijo, dekanat, referat za študijske zadeve, služba za mednarodno in raziskovalno dejavnost, knjižnica, računalniški center
Jamova cesta 2

- leto izgradnje: 1968
- uporabna površina stavbe: 9755,9 m^2

Podporne službe - računovodska služba
Groharjeva cesta 2b

- leto izgradnje: 1937
- uporabna površina stavbe: 285,7 m^2

Oddelek za okoljsko gradbeništvo, knjižnica
Hajdrihova ulica 28

- leto izgradnje: 1949
- uporabna površina stavbe: 2245,1 m^2

LOCATION

University of Ljubljana
Faculty of Civil and Geodetic Engineering
p.p. 3422,
1000 Ljubljana,
Slovenia

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W: http://www3.fgg.uni-lj.si/

Department of Civil Engineering, Department of Geodetic Engineering, Dean's Office, Study Affairs Office, International and Research Activity Office, Library, Computer Centre
Jamova cesta 2

construction year: 1968
effective surface area: 9755.9 m^2

Supporting services – Accounting Department
Groharjeva cesta 2b

construction year: 1937
effective surface area: 285.7 m^2

Department of Environmental Engineering, Library
Hajdrihova ulica 28

construction year: 1949
effective surface area: 2245,1 m^2

Groharjeva cesta 2b

Jamova cesta 2

Hajdrihova ulica 28

ORGANIZIRANOST / VODENJE

ORGANISATION / MANAGEMENT

ORGANI UL FGG

DEKAN

- PRODEKANI
  - Prodekan za gospodarske zadeve
  - Prodekan za izobraževalno področje
  - Prodekan za raziskovalno in mednarodno področje
  - Prodekan za razvojno področje
  - Prodekan za študentske zadeve
- Kolegij dekana
- Razširjeni kolegij dekana
- Komisija za kakovost in razvoj
- Komisija za reševanje vlog študentov

UPRAVNI ODBOR

AKADEMSKI ZBOR

SENAT

- Študijski odbori
- Kadrovska komisija
- Komisija za znanstveno raziskovalno delo
- Komisija za informatiko, knjižničarstvo in založništvo
- Odbor za Prešernove nagrade študentom UL FGG

ŠTUDENTSKI SVET

UL FGG ORGANISATIONAL CHART

DEAN

- VICE DEANS
  - Vice-Dean for Economic Affairs
  - Vice-Dean for Education
  - Vice-Dean for Research and International Activity
  - Vice-Dean for Development
  - Vice-Dean for Student Affairs
- Dean's Consulting College
- Expanded Dean's Consulting College
- Quality Assurance and Development Commission
- Processing Student Applications

GOVERNING BOARD

ACADEMIC ASSEMBLY

SENATE

- Study Boards
- Personnel Commission
- Research Commission
- IT, Library and Publishing Committee
- Commitee for Prešeren Awards to UL FGG Students

STUDENT COUNCIL

ORGANIZACIJSKE ENOTE UL FGG

TAJNIŠTVO

- Kadrovska služba
- Referat za študijske zadeve
- Finančno-računovodska služba
- Služba za gospodarske zadeve
- Služba za mednarodno in raziskovalno dejavnost
- Center za informatiko
  - Promocijsko karierni center
  - Knjižnica
  - Računalniški center

PEDAGOŠKO RAZISKOVALNE ENOTE

- ODDELEK ZA GRADBENIŠTVO
  - Inštitut za komunalno gospodarstvo (IKG)
  - Katedra za gradbeno informatiko (KGI)
  - Katedra za mehaniko (KM)
  - Katedra za matematiko in fiziko (KMF)
  - Katedra za metalne konstrukcije (KMK)
  - Katedra za masivne in lesene konstrukcije (KMLK)
  - Katedra za geotehniko (KGT)
  - Katedra za operativno gradbeništvo (KOG)
  - Katedra za preskušanje materialov in konstrukcij (KPMK)
  - Katedra za stavbe in konstrukcijske elemente (KSKE)
  - Katedra za konstrukcije in potresno inženirstvo (KKPI)
  - Prometnotehniški inštitut (PTI)
- ODDELEK ZA GEODEZIJO
  - Katedra za geodezijo (KG)
  - Katedra za geoinformatiko in katastre nepremičnin (KGKN)
  - Katedra za inženirsko geodezijo (KIG)
  - Katedra za kartografijo, fotogrametrijo in daljinsko zaznavanje (KKFDZ)
  - Katedra za matematično in fizikalno geodezijo ter navigacijo (KMFGN)
  - Katedra za prostorsko planiranje (KPP)
- ODDELEK ZA OKOLJSKO GRADBENIŠTVO
  - Inštitut za zdravstveno hidrotehniko (IZH)
  - Katedra za mehaniko tekočin z laboratorijem (KMT)
  - Katedra za splošno hidrotehniko (KSH)

LABORATORIJI

- Hidrotehniški laboratorij (HTL)
- Konstrukcijsko-prometni laboratorij (KPL)

INŠTITUTI

- Inštitut za konstrukcije, potresno inženirstvo in računalništvo (IKPIR)
- Vodnogospodarski Inštitut (VGI)
- Raziskovalni inštitut za geo in hidro tveganja (RIGHT)

UL FGG ORGANISATIONAL UNITS

SECRETARIAT

- Personnel Office
- Office for Study Affairs
- Financial and Accounting Services
- Office for International and Research Activity
- Office for Economic Affairs
- IT Services
  - Promotion and Career Centre
  - Library
  - Computer Centre

TEACHING AND RESEARCH UNITS

- DEPARTMENT OF CIVIL ENGINEERING
  - Municipal Economics Institute
  - Chair of Construction IT
  - Chair of Structural and Earthquake Engineering
  - Chair of Concrete, Masonry and Timber Structures
  - Chair of Mathematics and Physics
  - Chair of Mechanics
  - Chair of Geotechnical Engineering
  - Chair for Metal Structures
  - Chair of Construction Management
  - Chair of Testing in Materials and Structures
  - Chair of Buildings and Constructional Complexes
  - Traffic Technical Institute
- DEPARTMENT OF GEODETIC ENGINEERING
  - Chair of Geodesy
  - Chair of Geoinformation and Real Estate Cadastres
  - Chair of Engineering Geodesy
  - Chair of Cartography, Photogrammetry and Remote Sensing
  - Chair of Mathematical and Physical Geodesy and Navigation
  - Chair of Spatial Planning
- DEPARTMENT OF ENVIRONMENTAL CIVIL ENGINEERING
  - Institute of Sanitary Engineering
  - Chair of Fluid Mechanics with Laboratory
  - Chair of Hydraulic Engineering

LABORATORIES

- Hydraulic Laboratory
- Laboratory of Structural and Traffic Division

INSTITUTES

- Institute of Structural Engineering, Earthquake Engineering and Construction IT
- Research Institute for Geo and Hydro Threats
- Water Management Institute

MEDNARODNO SODELOVANJE / INTERNATIONAL COOPERATION

DRŽAVA Country	MESTO City
Albanija	Tirana
Avstrija	Gradec
Avstrija	Dunaj
Avstrija	Salzburg
Bolgarija	Sofia
Ciper	Limassol
Češka	Praga
Češka	Brno
Češka	Usti nad Labem
Češka	Paradubice
Danska	Horsens
Danska	Lyngby
Francija	Compiéegne Cedex
Finska	Kajaani
Finska	Kuopio
Grčija	Solun
Hrvaška	Reka
Hrvaška	Zagreb
Hrvaška	Split
Italija	Salerno
Italija	Pescara
Italija	Firence
Italija	Cosenza
Italija	Brescia
Italija	Bologna
Kosovo	Priština
Latvija	Vilna
Madžarska	Budimpešta
Nemčija	Hamburg
Nemčija	Dresden
Nemčija	München
Nemčija	Weimar
Nemčija	Aachen
Norveška	Bergen
Poljska	Szczecin
Poljska	Varšava
Poljska	Olsztyn
Poljska	Gdansk
Poljska	Krakov
Portugalska	Coimbra
Portugalska	Porto
Romunija	Bukarešta
Romunija	Oradea
Slovaška	Bratislava
Srbija	Novi Sad
Španija	Jaén
Španija	Valencia
Španija	Leioa
Španija	Madrid
Španija	Barcelona
Španija	Cartagena
Švedska	Borås
Turčija	Istanbul
Turčija	Gebze
Turčija	Samsun

RAZISKOVALNA DEJAVNOST / RESEARCH ACTIVITY

RAZISKOVALCI, RAZISKOVALNE SKUPINE IN RAZISKOVALNI PROJEKTI / RESEARCHERS, RESEARCH GROUPS AND RESEARCH PROJECTS

	2015	2016	2017
SPLOŠNO / GENERAL			
Programske skupine	/	7	7
Število raziskovalcev	100	110	96
DOMAČI PROJEKTI / NATIONAL PROJECTS			
Temeljni raziskovalni projekti	6	9	13
Aplikativni raziskovalni projekti	3	5	4
Ciljni raziskovalni projekti	3	5	5
	12	**19**	**22**
MEDNARODNI PROJEKTI / INTERNATIONAL PROJECTS			
EU raziskovalni projekti 7. OP in H2020	11	11	9
Drugi raziskovalni projekti EU	9	8	11
Projekti COST	9	8	8
Bilateralni raziskovalni projekti	3	7	6
	32	**34**	**34**

OBJAVE RAZISKOVALCEV UL FGG / PUBLICATIONS OF UL FGG RESEARCHERS

	2015	2016	2017
ZNANSTVENE OBJAVE UL FGG PO TIPOLOGIJI COBISS / SCIENTIFIC PUBLICATIONS ACCORDING TO COBISS TYPOLOGY			
Izvirni znanstveni članek	132	130	112
Pregledni znanstveni članek	11	12	7
Kratki znanstveni prispevek	2	2	1
Objavljeni znanstveni prispevek na konferenci (vabljena predavanja)	4	11	4
Objavljeni znanstveni prispevek na konferenci	111	77	56
Samostojni znanstveni sestavek v monografiji	18	16	11
Znanstvena monografija	3	2	4
Patent ali patentna prijava	0	3	4
	2294	**2267**	**2214**
STROKOVNE OBJAVE UL FGG / PROFESSIONAL PUBLICATIONS OF UL FGG			
Strokovni članek	21	14	19
Vabljeni objavljeni strok. prispevek na konferenci	9	5	1
Objavljeni strokovni prispevek na konferenci	16	23	13
Samostojni strokovni sestavek v monografiji	5	13	5
Strokovna monografija	5	5	2
	56	**60**	**40**
UČBENIKI IN UČNA GRADIVA / TEXTBOOKS AND STUDY MATERIALS	21	9	7
STROKOVNA POROČILA IN ELABORATI / EXPERT REPORTS	106	55	41
OSTALA ZNANSTVENA IN STROKOVNA DEJAVNOST / OTHER SCIENTIFIC AND PROFESSIONAL ACTIVITY	86	93	116

ŠTUDENTI / STUDENTS

	2015/16	2016/17
SPLOŠNO / GENERAL		
Študenti na UL FGG / Students at UL FGG	957	837
Novo vpisani študenti / New enrolments	208	183
Tuji študenti in izmenjave / Foreign students and exchanges	42	73
Moški / Male	68 %	67 %
Ženske / Female	32 %	33 %
PROGRAMI I. STOPNJE / 1st CYCLE STUDY PROGRAMS		
Prvostopenjski univerzitetni študijski program gradbeništvo / Academic study program Civil Engineering	167	152
Prvostopenjski univerzitetni študijski program geodezija in geoinformatika / Academic study program Geodesy and Geoinformation	81	73
Prvostopenjski univerzitetni študijski program vodarstvo in okoljsko inženirstvo / Academic study program Water Science and Environmental Engineering	65	58
Prvostopenjski visokošolski strokovni študijski program operativno gradbeništvo / Higher education professional study program Construction Management	152	124
Prvostopenjski visokošolski strokovni program tehnično upravljanje nepremičnin / Higher education professional study program Technical Real Estate Management	65	68
	530	**475**
PROGRAMI II. STOPNJE / 2nd CYCLE STUDY PROGRAMS		
Magistrski študijski program gradbeništvo / Master study program Civil Engineering	141	103
Magistrski študijski program geodezija in geoinformatika / Master study program Geodesy and Geoinformation	77	75
Magistrski študijski program stavbarstvo / Master study program Buildings	50	39
Magistrski študijski program vodarstvo in okoljsko inženirstvo / Master study program Water Science and Environmental Engineering	63	56
Magistrski študijski program prostorsko načrtovanje / Master study program Spatial Planning	30	18
	361	**291**
PROGRAMI III. STOPNJE / 3rd CYCLE STUDY PROGRAMS		
Doktorski študijski program grajeno okolje / Doctoral study program Built Environment	40	53
Doktorski študijski program varstvo okolja / Doctoral study program Environmental Protection	26	18
	66	**71**
ZAKLJUČNA DELA / FINAL THESES		
diplome I. stopnje (UN) / 1st cycle theses (academic)	88	68
diplome I. stopnje (VS) / 1st cycle theses (higher education)	48	29
diplome II. stopnje (MAG) / 2nd cycle theses (master)	57	87
doktorati III. stopnje (DR) / 3rd cycle theses (doctoral)	17	16
	210	**200**
DIPLOME NA PREDBOLONJSKIH PROGRAMIH / FINAL THESES ON PRE-BOLOGNA PROGRAMS		
diplome I. stopnje (UN) / Academic study programs	175	/
diplome I. stopnje (VS) / Higher education study programs	123	/
diplome II. stopnje (MAG) / Scientific masters	86	/
doktorati III. stopnje (DR) / Doctoral degrees	9	/

ZAPOSLENI / EMPLOYEES

	2015/16	2016/17
SPLOŠNO / GENERAL		
zaposleni na UL FGG	190	189
moški (%)	60 %	61 %
ženske (%)	40 %	39 %
PEDAGOŠKO / RAZISKOVALNO OSEBJE / TEACHERS / RESEARCHERS		
redni profesorji	18	20
izredni profesorji	15	14
docenti	23	21
višji predavatelji	3	3
asistenti z doktoratom	37	41
asistenti	44	39
mladi raziskovalci	8	9
NEPEDAGOŠKO OSEBJE / ADMINISTRATION	42	42
DINAMIKA ZAPOSLOVANJA / EMPLOYMENT DYNAMICS		
novo zaposleni	23	23
upokojeni	4	5

PEDAGOŠKO / RAZISKOVALNO OSEBJE 2016/17

20	redni profesorji / full profesors
14	izredni profesorji / associate profesors
21	docenti / assistant profesors
3	višji predavatelji / senior lecturers
41	asistenti z doktoratom / assistants with PhDs
39	asistenti / assistants
9	mladi raziskovalci / young researchers
147	skupaj / total

PRORAČUN / BUDGET

	2015	2016	2017
PRIHODKI (€) / REVENUES			
MIZŠ	5.731.509	5.990.334	5.932.968
programske skupine AARS, projekti, CRP, MR	1.476.361	1.558.955	1.746.868
drugi proračunski viri	268.022	133.794	80.233
izredni študij	499.902	656.685	615.480
tržna dejavnost	1.454.021	1.204.550	1.367.967
projekti EU	1.063.108	923.456	1.154.253
	10.492.923	**10.467.774**	**10.597.769**
ODHODKI (€) / EXPENDITURES			
stroški dela	6.767.918	7.018.352	7.253.082
stroški blaga, materiala, storitev	2.844.127	2.715.674	2.636.987
amortizacija	391.837	265.326	288.201
drugi odhodki	168.208	163.347	140.614
	10.172.090	**10.162.698**	**10.318.884**
REZULTAT presežek prihodkov nad odhodki (€) / RESULT - surplus of reveneus	320.833	305.076	278.886

MEJNIKI RAZVOJA FAKULTETE

1919

1. 2. 1919 je bilo izvedeno prvo predavanje.

23. 7. 1919 so bili z Zakonom o univerzi kraljevine SHS dokončno ustanovljeni tehniški visokošolski tečaji, ki so s tem pridobili status tehniške fakultete v okviru Univerze v Ljubljani. Ustanovljen je bil gradbeni oddelek.

Prvi dekan Tehniške fakultete je bil prof. dr. K. Hinterlechner.

Na pobudo ing. L. Novaka, profesorja na takratni Državni obrtni šoli, so bili ustanovljeni zemljemerski tečaji.

Leta 1921 odbor za izgradnjo tehniške fakultete pod vodstvom ing. M. Štukljeta uresniči Plečnikov načrt provizorija Tehniške fakultete na današnji Aškerčevi cesti 7, kasneje imenovana »Stara tehnika«. V njej so imeli prostore trije oddelki Tehniške fakultete: gradbeni oddelek, oddelek za arhitekturo in oddelek za elektrotehniko. V tej zgradbi je potekalo tudi poučevanje geodezije.

1931

Študij gradbeništva je bil organiziran kot skupnost Inštituta za tehnično mehaniko in Inštituta za gradbeno inženirstvo. Leta 1931 se inštituta razdelita na šest zavodov:

- Zavod za tehnično mehaniko in preiskavo materiala,
- Zavod za ojačen beton in gradbeno mehaniko,
- Zavod za visoke stavbe,
- Zavod za ceste in železnice,
- Zavod za mostne zgradbe in
- Zavod za vodne zgradbe.

1945

Po 2. svetovni vojni je postala Fakulteta za gradbeništvo in geodezijo samostojna članica Univerze v Ljubljani. Od leta 1945 do jeseni 1950 jo je kot dekan vodil prof. A. Hrovat.

Na Oddelku za gradbeništvo so bile ustanovljene tri študijske smeri: hidrotehnična (HS), konstrukcijska (KS) in prometna (PS).

Pobuda za ustanovitev Oddelka za geodezijo je prišla z Zavoda za geodezijo takratne Geodetske uprave LR Slovenije in od posameznikov iz prakse.

Leta 1949 je bil dograjen stavbni kompleks na Hajdrihovi ulici. Zasnoval ga je prof. dr. ing. M. Goljevšček, arhitektonsko pa ga je izoblikoval docent ing. arh. J. Valentinčič. Imenoval se je Vodogradbeni laboratorij Univerze v Ljubljani. Po drugi svetovni vojni je bila to v Sloveniji prva zgradba, namensko postavljena za izobraževanje. Danes so v tej zgradbi prostori Oddelka za okoljsko gradbeništvo.

MILESTONES IN THE FACULTY'S DEVELOPMENT

On February 1, 1919, the first lecture was held.

On July 23, 1919, the Kingdom of Serbs, Croats and Slovenians, adopted the Act on University, finally establishing the technical higher education courses, which thus acquired the status of technical faculty within the University of Ljubljana. The Civil Engineering Department was established.

The first dean of the Technical Faculty was Prof. Dr. K. Hinterlechner.

On the initiative of engineer L. Novak, Professor at the then National Trade School, the land surveying courses were established.

In 1921, the Committee for the Construction of the Technical Faculty, managed by an engineer, M. Štuklje, managed to realise Plečnik's plan of temporary Technical Faculty on today's 7 Aškerčeva Street, later on called »Old Technical School«. It housed three departments of the Technical Faculty: Civil Engineering, Architecture and Electrical Engineering. In the same building geodesy was also taught.

The civil engineering study was organised in cooperation between the Institute of Technical Mechanics and the Institute of Building Engineering. In 1931, the institutes split into six institutes: Institute of Technical Mechanics and Material Research, Institute of Reinforced Concrete and Building Mechanics, Institute of Buildings, Institute of Roads and Railroads, Institute of Bridge Structures, and Institute of Water Buildings.

After World War II, the Faculty of Civil and Geodetic Engineering became an independent member of the University of Ljubljana. From 1945 to the autumn of 1950, its dean was Prof. A. Hrovat.

At the Department of Civil Engineering, three study orientations were established: hydrotechnical, structural and traffic.

The initiative to establish the Department of Geodesy came from the Institute of Geodesy, which was at the time Geodetic Administration of Slovenia, and from individuals active in the profession.

In 1949, the complex at Hajdrihova Street was finished. It was designed by Prof. Dr. Eng. M. Goljevšček, according to architectural drawings of Assist. Prof. Eng. Arch. J. Valentinčič. The building was called Water Building Laboratory of the University of Ljubljana. It was the first building after World War II constructed in Slovenia specifically for education. Today, the Department of Environmental Engineering is located in the building.

During the academic years 1950/51 and 1953/54, the study of engineering was implemented at the independent Technical Higher Education School, which was separated from the University of Ljubljana. The Faculty of Civil and Geodetic Engineering was member of the independent Technical Higher Education School.

Then, it became Department of Civil and Geodetic Engineering at the Technical Faculty of the University of Ljubljana.

On June 28, 1957, the Act on University of Ljubljana was adopted. Based on its Article 2, the Faculty of Architecture, Civil and Geodetic Engineering (FAGG) was established. It had three departments: Department of Architecture, Department of Civil Engineering, and Geodetic-Municipal Department.

The first Dean was Prof. E Mihevc (architect), and its vice dean was J. Sketelj (civil engineer).

In 1969, the new building at 2 Jamova Street was built according to the design of Prof. Eng. Arch. E. Ravnikar.

With a Decree on Reorganisation of the University of Ljubljana from December 31, 1994, FAGG ceased to exist. Two new faculties were formed: Faculty of Architecture (FA) and Faculty of Civil and Geodetic Engineering (FGG).

The last dean of FAGG was Dr. J. Duhovnik, and the last head of the Department of Civil and Geodetic Engineering was Dr. B. Majes.

On January 1, 1995, the Faculty of Civil and Geodetic Engineering became an independent member of the University of Ljubljana.

Med študijskima letoma 1950/51 in 1953/54 je študij tehnike potekal na samostojni Tehniški visoki šoli, ki je bila ločena od ljubljanske univerze. Tudi Fakulteta za gradbeništvo in geodezijo je bila članica samostojne Tehniške visoke šole.

Fakulteta za gradbeništvo in geodezijo je postala Oddelek za gradbeništvo in geodezijo Tehniške fakultete Univerze v Ljubljani.

28. 6. 1957 je bila na podlagi Zakona o univerzi v Ljubljani (2. člen) ustanovljena Fakulteta za arhitekturo, gradbeništvo in geodezijo (FAGG). Ta je imela tri oddelke:

- Oddelek za arhitekturo,
- Oddelek za gradbeništvo in
- Geodetsko-komunalni oddelek.

Prvi dekan FAGG je bil prof. E Mihevc (arhitekt), prodekan pa J. Sketelj (gradbenik).

Leta 1969 je bila po načrtih prof. ing. arh. E. Ravnikarja zgrajena nova stavba na Jamovi cesti 2.

31. 12. 1994 je FAGG z Odlokom o preoblikovanju Univerze v Ljubljani prenehala obstajati. Nastali sta dve novi fakulteti: Fakulteta za arhitekturo (UL FA) in Fakulteta za gradbeništvo in geodezijo (UL FGG).

Zadnji dekan FAGG je bil dr. J. Duhovnik, zadnji predstojnik Oddelka za gradbeništvo in geodezijo pa dr. B. Majes.

1. 1. 1995 je Fakulteta za gradbeništvo in geodezijo postala samostojna članica Univerze v Ljubljani.

1950

1954

1957

1995

NAGRADE IN PRIZNANJA / AWARDS AND PRIZES

UNIVERZITETNA PRIZNANJA / UNIVERSITY AWARDS

- Zlata plaketa Univerze v Ljubljani
  - 2015/2016 prof. dr. Matej Fischinger

PRIZNANJA ZAPOSLENIM NA UL FGG / AWARDS TO UL FGG EMPLOYEES

- 2014/2015 Rajko Bezlaj
- 2016/2017 Sonja Karakaš, doc. dr. Teja Koler Povh, Andrej Vitek, asist. dr. Robert Klinc in asist. dr. Gašper Mrak

PREŠERNOVE NAGRADE / PREŠEREN AWARDS

- Univerzitetne Prešernove nagrade
  - 2015/2016 Blaž Barič za raziskovalno nalogo *»Izdelava zbirke poplavnih dogodkov za oceno poplavnega tveganja z uporabo funkcije kopula« mentorica doc. dr. Mojca Šraj, somentor Giovanni Maccioni*
- Fakultetne Prešernove nagrade
  - 2015/2016 Urška Dolinar za raziskovalno nalogo *»Vpliv viskoznega lezenja na mehansko obnašanje jeklenih konstrukcij v primeru požara« mentor doc. dr. Tomaž Hozjan, somentor prof. dr. Igor Planinc*
  - 2015/2016 Jan Možina za raziskovalno nalogo *»Kontrolne meritve žerjavne proge s terestričnim laserskim skeniranjem« mentor izr. prof. dr. Tomaž Ambrožič, somentor asist. Klemen Kregar*
  - 2015/2016 Monika Dolinšek za raziskovalno nalogo *»Degradirana območja v Zasavski regiji« mentorica doc. dr. Alma Zavodnik Lamovšek, somentorica viš. pred. mag. Mojca Foški*
  - 2016/2017 Damjan Lisec za raziskovalno nalogo *»Numerično modeliranje polno nosilnih vijačenih momentnih spojev«, mentor doc. dr. Primož Može*

GOLJEVŠČKOVA NAGRADA / GOLJEVŠČEK AWARDS

- 2015/2016 Sara Grobljar za delo *»Modeliranje odtočnih razmer na poplavnih urbanih površinah« mentor prof. dr. Franc Steinman, somentor viš. pred. mag. Gašper Rak*
- 2015/2016 Žiga Žibert za delo *»Sodobni načini prikazovanja hidroloških meritev in napovedi« mentorica doc. dr. Mojca Šraj, somentorja doc. dr. Matevž Dolenc in mag. Nejc Pogačnik*

- 2016/2017 Janij Oblak za delo *»Analiza sezonske spremenljivosti pretokov rek v Sloveniji«, mentorica izr. prof. dr. Mojca Šraj*
- 2016/2017 Tilen Koranter za delo *»Načrtovanje ukrepov za zagotovitev prehodnosti za vodne organizme na Savi Bohinjki pri jezu HE Soteska« mentor doc. dr. Andrej Kryžanowski*

NAJBOLJŠI ŠTUDENTI UL FGG (PROGRAMI I. STOPNJE) / BEST UL FGG STUDENTS 1ST CYCLE PROGRAMS

Univerzitetni študijski program Gradbeništvo
- 2015/2016 Urban Kavka , 1. letnik (UN)
- 2015/2016 Gregor Udovč, 3. letnik (UN)
- 2016/2017 Mario Farič, 3. letnik (UN)

Univerzitetni študijski program Geodezija in geoinformatika
- 2015/2016 Anja Šinkovec, 1. letnik (UN)
- 2015/2016 Jošt Rakovec, 2. letnik (UN)
- 2015/2016 Tadeja Vok, 3. letnik (UN)
- 2016/2017 Lidija Dugon, 3. letnik (UN)
- 2016/2017 Anja Šinkovec, 2. letnik (UN)
- 2016/2017 Jernej Vipavec, 1. letnik (UN)

Univerzitetni študijski program Vodarstvo in okoljsko inženirstvo
- 2015/2016 Vasja Hodnik, 1. letnik (UN)
- 2016/2017 Vasja Hodnik, 2. letnik (UN)

Visokošolski strokovni program Operativno gradbeništvo
- 2015/2016 Jernej Gortnar, 2. letnik (VS)
- 2016/2017 Rok Razinger, 3. letnik (VS)

Visokošolski strokovni program Tehnično upravljanje nepremičnin
- 2016/2017 Katarina Jamnik, 3. letnik (VS)

NAJBOLJŠI ŠTUDENTI UL FGG (PROGRAMI II. STOPNJE) / BEST UL FGG STUDENTS 2ND CYCLE PROGRAMS

Magistrski študijski program Gradbeništvo
- 2015/2016 Marko Lavrenčič, 2. letnik
- 2015/2016 Aleš Jamšek, 2. letnik
- 2016/2017 Filip Andolšek, 2. letnik
- 2016/2017 Gregor Udovč, 1. letnik
- 2016/2017 Dejan Bolarič, 2. letnik

Magistrski študijski program Geodezija in geoinformatika
- 2016/2017 Tadeja Vok, 1. letnik

- Magistrski študijski program Stavbarstvo
  - 2015/2016 Mateja Uršič, 1. letnik
  - 2016/2017 Blaž Hribar, 2. letnik

- Magistrski študijski program Vodarstvo in okoljsko inženirstvo
  - 2015/2016 Miha Tallarini, 1. letnik
  - 2016/2017 Miha Tallarini, 2. letnik

- Magistrski študijski program Prostorsko načrtovanje
  - 2015/2016 Ajda Kafol Stojanović, 1. letnik
  - 2016/2017 Ajda Kofol Stojanović, 2. letnik

POHVALE NAJBOLJŠIM PEDAGOGOM UL FGG PODELJUJE ŠTUDENTSKI SVET UL FGG / PRIZES TO BEST UL FGG TEACHERS AWARDED BY UL FGG STUDENT COUNCIL

- 2015/2016 prof. dr. Matej Fischinger
  doc. dr. Tomaž Hozjan
  prof. dr. Zvonko Jagličić
  izr. prof. dr. Anka Lisec
  doc. dr. Dušan Petrovič
  asist. Tilen Urbančič
  izr. prof. dr. Dušan Žagar
  višji pred. dr. Leon Hladnik
  doc. dr. Mojca Šraj
  izr. prof. dr. Janko Logar

- 2016/2017 izr. prof. dr. Janko Logar
  doc. dr. Mateja Dovjak
  asist. dr. Matej Kušar
  doc. dr. Mitja Košir
  prof. dr. Vlatko Bosiljkov
  asist. dr. Tilen Urbančič
  prof. dr. Krištof Oštir
  asist. Jernej Tekavec
  izr. prof. dr. Mojca Šraj
  izr. prof. dr. Dušan Žagar

DRUGO / OTHER

- 2015/2016 Prvo mesto na natečaju za Rektorjevo nagrado za naj inovacijo Univerze v Ljubljani je v letu 2016 prejela inovacija »Piezoelektrično deformabilno zrcalo«. Zrcalo je izdelala skupina, med katerimi je tudi Jan Pribošek, študent 2. letnika univerzitetnega programa BA Gradbeništvo.

- 2015/2016 Ljubljanska mestna občina je doc. dr. Alojziju Juvancu, upokojenemu profesorju UL FGG, podelila Plaketo glavnega mesta.

- 2015/2016 Trije študentje UL FGG: Urban Kavka, Gašper Antolin in Jure Česnik, so se uvrstili na državno tekmovanje Kenguru za študente. Poleg njih so dobili priznanje še Tilen Lovše, Vesna Bertoncelj, Andraž Starc in Žan Luka Šumečki.

- 2016/2017 Prof. dr. Matjaž Mikoš je bil na skupščini 23. februarja 2017 izvoljen za rednega člana Inženirske akademije Slovenije (IAS).

- 2016/2017 Nina Vidic, študentka magistrskega študijskega programa Geodezija in geoinformatika, je bila dobitnica prestižne štipendije Univerzitetne ustanove ing. Lenarčič Milana, namenjene nadpovprečno nadarjenim študentkam in študentom Univerze v Ljubljani.

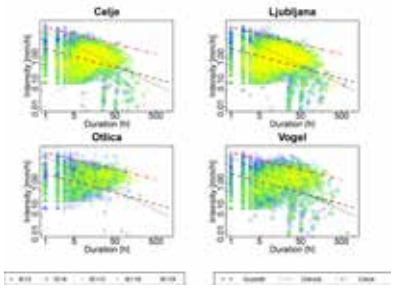
- 2016/2017 Doc. dr. Janez Reflak, upokojeni profesor UL FGG, je prejel nagrado za življenjsko delo, najvišjo nagrado Inženirske zbornice Slovenije.

- 2016/2017 Izr. prof. dr. Mojca Šraj je v prestižni reviji Science v soavtorstvu z raziskovalci številnih evropskih raziskovalnih ustanov objavila članek o vplivu podnebnih sprememb na čas nastopa poplav v Evropi.

- 2016/2017 Prof. dr. Zvonko Jagličić je v prestižni reviji Nature Physics v soavtorstvu z raziskovalci Instituta Jožef Stefan in Fakultete za matematiko in fiziko Univerze v Ljubljani objavil članek o odkritju kvantne spinske tekočine, s čimer so razrešili 40 let odprto vprašanje v fiziki.

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Matjaž Mikoš
- Namestnik predstojnika
  Deputy head
  doc. dr. Dušan Petrovič
- Pedagogi
  Educators
  prid. prof. dr. Marko Komac
  izr. prof. dr. Tomaž Podobnikar
  viš. pred. mag. Jošt Sodnik
  izr. prof. dr. Blaž Stres
- Asistent
  Assistant
  asist. dr. Nejc Bezak
- Strokovni sodelavci
  Professional Associates
  Mateja Klun
  dr. Sašo Petan
  Katarina Zabret



Vpliv izbire časa med dvema padavinskima dogodkoma (IE) v urah na položaj empirične krivulje intenziteta–trajanje padavin za oceno praga proženja zemeljskih plazov
Influence of the inter-event time (IETD) selection on empirical rainfall threshold curves evaluation for triggering of landslides

INŠTITUT ZA GEO IN HIDRO TVEGANJA (RIGHT)

Inštitut za geo in hidro tveganja (RIGHT) so 2014 ustanovile Katedra za kartografijo, fotogrametrijo in daljinsko zaznavanje (KKFDZ), Katedra za matematično in fizikalno geodezijo ter navigacijo (KMFGN), Katedra za mehaniko tal z laboratorijem (KMTal) in Katedra za splošno hidrotehniko (KSH), da bi v njem opravljale raziskovalno delo na področju nevarnosti, tveganj in nesreč v geo in hidro okolju. Predstojnik inštituta je dr. Matjaž Mikoš, redni profesor za hidrologijo in redni profesor za inženirsko hidrotehniko, namestnik predstojnika je dr. Dušan Petrovič, docent za področje geodezije in geoinformatike.

Pri delu inštituta sodelujejo pedagogi ustanovnih kateder, zunanji dopolnilno zaposleni raziskovalci drugih raziskovalnih ustanov in podjetij v Sloveniji ter nekateri mladi raziskovalci, ki raziskujejo v programski skupini P2-0180 Vodarstvo in geotehnika: orodja in metode za analize in simulacije procesov ter razvoj tehnologij. Inštitut je na UL FGG samostojna raziskovalna skupina s šifro ARRS 0792-022.

UL FGG je od leta 2008 redno pridobivala naziv svetovnega centra odličnosti za zmanjševanje tveganja zaradi zemeljskih plazov (WCoE – World Centre of Excellence on Landslide Risk Reduction), ki ga ja na rednih trienalnih svetovnih forumih o zemeljskih plazovih podeljeval Mednarodni program za zemeljske plazove (IPL). Inštitut je po ustanovitvi postopno prevzel večino raziskovalnega dela na UL FGG in je fakulteti tudi v obdobju 2014–2017 pridobil naziv svetovnega centra odličnosti.

Inštitut od ustanovitve redno sodeluje z Mednarodnim konzorcijem za zemeljske plazove (ICL) s sedežem v Kjotu na Japonskem. Predstojnik RIGHT je bil podpredsednik ICL v letih od 2015 do 2017, sodeluje tudi v uredniškem odboru revije Landslides, ki ga izdaja založba Springer Verlag – gre za revijo z najvišjim faktorjem vpliva na področju inženirske geologije v bazi SCI-Expanded.

Inštitut s svojim delom in rezultati podpira delo Unescove Katedre za zmanjševanje tveganj zaradi vodnih ujm, ki jo je 2016 ustanovila Univerza v Ljubljani in deluje v okviru UL FGG.

Raziskovalna dejavnost

Na inštitutu potekajo različni mednarodni, bilateralni in nacionalni raziskovalni projekti, npr. raziskovalni projekt s Hrvaško »SoLiFlyD – Zemeljski plazovi v flišu: mehanizmi plazenja in geotehnične lastnosti za modeliranje plazenja in varstvo pred plazenjem tal (SoLiFlyD – Study of landslides in flysch deposits: sliding mechanisms and geotechnical properties for landslide modeling and landslide mitigation)« (2014–2015) in raziskovalni projekt s Hrvaško »Laboratorijske preiskave in numerično modeliranje zemeljskih plazov v flišu na Hrvaškem in v Sloveniji (Laboratory investigations and numerical modelling of landslides in flysch deposits in Croatia and Slovenia)« (2016–2017).

RESEARCH INSTITUTE FOR GEO AND HYDRO THREATS (RIGHT)

Research Institute for Geo and Hydro Threats was founded by Chair of Cartography, Photogrammetry and Remote Sensing, Chair of Mathematical and Physical Geodesy and Navigation, Chair of Soil Mechanics with Laboratory and Chair of Hydrology and Hydraulic Engineering. The purpose was to implement research work in the areas of threats, risks and disasters in geo and hydro environment. The Institute is chaired by Matjaž Mikoš, PhD, full professor of hydrology and hydraulic engineering. His deputy is Dušan Petrovič, PhD, associate professor of the areas of geodesy and geoinformation.

Teachers of the founding chairs, external partners and researchers from other research institutions and companies in Slovenia and some young researchers involved in the work of the core research group P2-0180 Water Science and Technology, and Geotechnical Engineering: Tools and Methods for Process Analyses and Simulations, and Development of Technologies, all participate in the Institute's work. The Institute is an independent research group of UL FGG with ARRS code 0792-022.

Since 2008, UL FGG has been regularly awarded with the title WCoE – World Centre of Excellence on Landslide Risk Reduction, conferred at its regular triennial world forums on landslides by the International Program for Landslides (IPL). Since its foundation, the Institute has gradually taken over most of the research of UL FGG, and won the title of World Centre of Excellence also for the period 2014–2017.

Since its establishment, the Institute has been regularly cooperating with the International Consortium for Landslides (ICL) with its seat in Kyoto, Japan. In the time from 2015 to 2017, the Head of RIGHT was Vice-Chairman of ICL, and he also cooperates in the Editorial Board of the journal Landslides, published by Springer Verlag – this journal has the highest impact factor in the area of engineering geology in the SCI-Expanded base.

With its work and results, the Institute supports the work of Unesco Chair on Water-related Disaster Risk Reduction, founded in 2016 by the University of Ljubljana and active within UL FGG.

Research activity

Members of the Institute are involved in several international, bilateral and national research projects, e.g. research project with Croatia »SoLiFlyD – Study of landslides in flysch deposits: sliding mechanisms and geotechnical properties for landslide modeling and landslide mitigation« (2014–15) and research project with Croatia »Laboratory investigations and numerical modelling of landslides in flysch deposits in Croatia and Slovenia« (2016–17).

In 2017, basic ARRS project on the topic of resistance of Alpine landscapes from the aspect of natural disasters was successfully concluded, where the Institute cooperated with the Geographical Institute of Anton Melik, Scientific Research Centre of the Slovenian Academy of Science and Art and the Faculty of Arts, UL.

In 2017 the Institute's researchers won two national basic projects: J7-8273 »Recognition of potentially hazardous torrential fans using geomorphometric methods and simulating fan formation« and J1-8513 »Studying landslide movements from source areas to zone of deposition using a deterministic approach«.

Educational activity

Research is the basis for quality teaching, especially in the 2nd and 3rd Bologna cycles. The Institute's research achievements are being implemented into educational contents of various courses at the 2nd cycle study programs and at the doctoral study programs Built Environment and Environment Protection. Quality research work of the Institute and supervision of young researchers are important guidelines for its activities.

PhD student Jošt Sodnik and young researchers Katarina Zabret and Mateja Klun continued their work on their PhD theses. In 2016, Assist. Dr. Nejc Bezak finished his PhD studies.

Between 2016 and 2017, the Institute cooperated in the implementation of the ERASMUS+ project Environmental Protection and Natural Disasters, within which two summer schools were organised at the University of Ljubljana.

The Institute's researchers actively cooperate in various promotional activities of UL FGG, mainly within technical days for secondary school population, in the Faculty's Open Day and in the Information Days for secondary school population.

Exceptional achievements

The Institute and its members contributed considerably to successful implementation of the 4th World Landslide Forum from May 29 to June 4, 2017 in Ljubljana; it was an event that provided excellent promotion for Slovenia, University of Ljubljana and UL FGG, as well as for the Slovenian knowledge on protection against landslides. Another achievement is also publication from the area of rainfall-induced landslides in the leading journal from the field of hydrology:

- Bezak, N., Mikoš, M., Šraj, M. (2016). Copula-based IDF curves and empirical rainfall thresholds for flash floods and rainfall-induced landslides. Journal of Hydrology 541, 272–284.

Leta 2017 se je končal temeljni projekt ARRS na temo prožnosti (odpornosti) alpskih pokrajin z vidika naravnih nesreč, kjer smo sodelovali z Geografskim inštitutom Antona Melika ZRC SAZU in UL FF.

V letu 2017 so raziskovalci inštituta pridobili dva temeljna projekta ARRS, in sicer J7-8273 »Prepoznavanje potencialno nevarnih hudourniških vršajev z metodami geomorfometrije in simulacijami nastanka vršajev« in J1-8513 »Preučevanje premikanja plazov od izvornih območij do mesta odlaganja z deterministčnim pristopom«.

Pedagoška dejavnost

Raziskovanje je temelj kakovostnega poučevanja, predvsem na 2. in 3. bolonjski stopnji. Raziskovalni dosežki inštituta se prelivajo v pedagoške vsebine različnih predmetov na drugostopenjskih študijskih programih ter na doktorskih študijskih programih Grajeno okolje in Varstvo okolja. Kakovostno raziskovalno delo na inštitutu in mentorsko delo z mladimi raziskovalci je pomembna usmeritev dela inštituta.

Z raziskovalnim delom na doktorski disertaciji so nadaljevali mag. Jošt Sodnik in mladi raziskovalki Katarina Zabret in Mateja Klun. Leta 2016 je doktoriral asist. dr. Nejc Bezak.

Inštitut je v letih 2016 in 2017 sodeloval pri izvedbi projekta ERASMUS+ Environmental Protection and Natural Disasters, v okviru katerega smo na Univerzi v Ljubljani organizirali dve poletni šoli.

Raziskovalci inštituta aktivno sodelujejo v različnih promocijskih aktivnostih fakultete, predvsem pri tehniških dnevih za srednješolce, dnevu odprtih vrat fakultete in pri informativnih dnevih za dijake srednjih šol.

Izjemni dosežki

Inštitut je s svojimi sodelavci bistveno pripomogel k uspešni izvedbi 4. Svetovnega foruma o zemeljskih plazovih od 29. maja do 4. junija 2017 v Ljubljani. Dogodek je odlično promoviral Slovenijo, Univerzo v Ljubljani in UL FGG ter tudi slovensko znanje na področju varstva pred zemeljskimi plazovi. Dosežek je tudi objava s področja raziskovanja zemeljskih plazov, ki se prožijo ob padavinah, in sicer v vodilni reviji s področja hidrologije:

- Bezak, N., Mikoš, M., Šraj, M. (2016). Copula-based IDF curves and empirical rainfall thresholds for flash floods and rainfall-induced landslides. Journal of Hydrology 541, 272–284.

Fakulteta za gradbeništvo in geodezijo Univerze v Ljubljani prejema na 4. Svetovnem forumu o zemeljskih plazovih junija 2017 v Ljubljani plaketo Svetovnega centra odličnosti na področju zmanjševanja tveganj zaradi zemeljskih plazov
Faculty of Civil and Geodetic Engineering, University of Ljubljana is receiving the certificate for the World Centre of Excellence on Landslide Risk Reduction at the 4th World Landslide Forum in June 2017 in Ljubljana, Slovenia

Na dan ustanovitve Unescove Katedre za zmanjševanje tveganja vodnih ujm, ki deluje na Univerzi v Ljubljani, 1. decembra 2016
On the inauguration day of the UNESCO Chair on Water-related Disaster Risk Reduction at the University of Ljubljana, December 1, 2016

Sodelovanje pri raziskovalnem projektu o odpornosti (prožnosti) alpske pokrajine z vidika naravnih nesreč je z geografi na terenu lažje kot v pisarni
Collaboration with geographers on the research project on the resilience of the alpine environment from the perspective of natural hazards is easier in the field than in the office

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Matjaž Mikoš
- Pedagogi
  Educators
  prof. dr. Mitja Brilly
  izr. prof. dr. Mojca Šraj
  doc. dr. Andrej Kryžanowski
  doc. dr. Simon Rusjan
  viš. pred. mag. Jošt Sodnik
  viš. pred. mag. Andrej Vidmar
- Asistent
  Assistant
  asist. dr. Nejc Bezak
- Strokovni sodelavci
  Professional Associates
  dr. Lidija Globevnik
  asist. Mateja Klun
  dr. Mira Kobold
  Klaudija Sapač
  Katarina Zabret

Na dan ustanovitve Unesco katedre za zmanjševanje tveganja ob vodnih vodnih ujmah, ki deluje na Univerzi v Ljubljani, 1. decembra 2016
On the inauguration day of the UNESCO Chair on Water-related Disaster Risk Reduction at the University of Ljubljana, December 1, 2016

UNESCOVA KATEDRA ZA ZMANJŠEVANJE TVEGANJ OB VODNIH UJMAH (UNESCO WRDRR)

Unescova Katedra za zmanjšanje tveganj ob vodnih ujmah (UNESCO Chair on Water-related Disaster Risk Reduction – WRDRR) je bila ustanovljena leta 2016 in častno umeščena na Univerzi v Ljubljani 1. decembra 2016. S tem je Slovenija pridobila tretjo Unescovo katedro in prvo katedro na Univerzi v Ljubljani.

Katedra nadaljuje bogato tradicijo na področju inženirske hidrotehnike in hidrologije, ki jo je na Fakulteti za gradbeništvo in geodezijo Univerze v Ljubljani (UL FGG) desetletja razvijala Katedra za splošno hidrotehniko (KSH) v okviru Hidrotehnične smeri Oddelka za gradbeništvo in kasneje v okviru Oddelka za okoljsko gradbeništvo. Prav zato je Unescova katedra na Univerzi v Ljubljani dobila domovanje na UL FGG, za predstojnika za obdobje 4 let (2016–2020) pa je bil na predlog Univerze v Ljubljani s strani Unesco imenovan dr. Matjaž Mikoš, redni profesor za področje inženirske hidrotehnike (2006) in redni profesor za področje hidrologije (2010).

Škode zaradi vodnih ujm, kot so poplave ali s padavinami sproženi zemeljski plazovi, se po svetu povečujejo, na drugi strani pa se razpoložljivi vodni viri zmanjšujejo in prav tako povzročajo škode, kot so škode zaradi suše. Raziskovalne dejavnosti novoustanovljene katedre bodo sestavni del skupnih svetovnih naporov za zmanjšanje tveganja nesreč in za odpravo njihovih neogibnih posledic.

Načrtovane dejavnosti so usmerjene v zmanjšanje tveganj ob vodnih ujmah zaradi poplav in z njimi povezanih erozijskih procesov. Problematika je pereča tako v Sloveniji kot širše v svetu. Dandanes občutimo vplive podnebnih sprememb in človekovih dejavnosti kot odgovor na nevarnosti in spremenjen način življenja, podvržen kulturološkim in razvojnim izzivom, povezanim z družbeno občutljivostjo, razvojem novih tehnologij in ukrepi za zmanjšanje tveganj.

S celostnim raziskovanjem in v okviru doktorskih študijev bomo na katedri razvijali nove rešitve, primerne za lokalne naravne in kulturne pogoje.

Katedra o svojem delu obvešča preko lastne spletne strani www.unesco-floods.eu.

Raziskovalna dejavnost

Na Unescovi katedri smo v letu 2017 raziskovali v okviru dela na raziskovalnem programu P2-0180 »Vodarstvo in geotehnika: orodja in metode za analize in simulacije procesov ter razvoj tehnologij«, ki ga financira Javna agencija za raziskovalno dejavnost Republike Slovenije (ARRS).

Člani katedre smo vzpostavili stike z drugimi naravoslovno usmerjenimi katedrami v Evropi – bolj neposredno sodelovanje se je najprej vzpostavilo z Univerzo v Brescii v Italiji.

UNESCO CHAIR ON WATER-RELATED DISASTER RISK REDUCTION (UNESCO WRDRR)

UNESCO Chair on Water-related Disaster Risk Reduction – WRDRR was founded in 2016 and honourably installed at the University of Ljubljana on 1 December 2016. Thus, Slovenia got the third UNESCO chair and the first one at the University of Ljubljana.

The Chair continues its rich tradition in the area of hydraulic engineering and hydrology, developed at the Faculty of Civil and Geodetic Engineering, University of Ljubljana (UL FGG) for decades by the Hydrology and Hydraulic Engineering within the Hydrotechnical Division of the Department of Civil Engineering, and later on within the Department of Environmental Civil Engineering. For this reason, the UNESCO Chair found its domicile at the UL FGG. On the proposal of the University of Ljubljana, UNESCO appointed Prof. Dr. Matjaž Mikoš, full professor of hydraulic engineering (2006) and full professor of hydrology (2010), as the head of the chair for a period of 4 years (2016–2020).

Throughout the world, the damage of water-related disasters, such as floods or rainfall-induced landslides, is growing. On the other hand, the available water resources are decreasing, which causes damage comparable to droughts. Research activities of the newly founded UNESCO Chair on Water-related Disaster Risk Reduction will be part of joint global efforts to reduce disaster risks and repair their unavoidable consequences.

Planned activities are focused on the reduction of water-related damages due to floods and the related erosion processes. This is a considerable problem in Slovenia as well as globally. Today, the world faces the impacts of climate changes and human activities as a response to threats, as well as changed way of life due to cultural and development challenges related to the social sensibility, development of new technologies and measures to reduce risks.

With holistic research within doctoral studies, the Chair plans to develop new solutions that will be appropriate for local natural and cultural conditions.

The Chair disseminates its achievements through its web page www.unesco-floods.eu.

Research activity

In 2017, the Unesco Chair performed its research work within the core research program P2-0180 Water Science and Technology, and Geotechnical Engineering: Tools and Methods for Process Analyses and Simulations, and Development of Technologies, financed by the Slovenian Research Agency (ARRS).

Members of the Unesco Chair established contacts with other natural and technical science chairs from Europe; the first direct forms of cooperation were established with the University of Brescia in Italy.

Within its workplan, the Chair actively cooperated in the organisation and/or implementation of several international expert events, such as the 4th triennial scientific conference on Natural Disasters in Slovenia (Ig near Ljubljana, March 2017), the 2nd Slovenian

Congress on Waters (April 2017) and the 4th World Landslide Forum (Ljubljana, May/June 2017).

With a presentation of its activities, the Chair actively participated at the 1st International Conference on Mobilisation of Unesco Chairs from natural-technical areas, organised at the occasion of the 25th anniversary of the program of UNITWIN/ UNESCO Chairs in Geneva, Switzerland, in July 2017.

Educational activity

Research is the basis for quality teaching, especially in the 2nd and 3rd Bologna cycles. The Chair's research achievements are being implemented into educational contents of various courses at the 2nd cycle study programs and at the doctoral study programs Built Environment and Environment Protection.

In the time from 2016 to 2017, the Chair cooperated in the implementation of the ERASMUS+ project Environmental Protection and Natural Disasters, within which two summer schools were organised at the University of Ljubljana.

The Chair is actively involved in the implementation of the international master's study programme Flood Risk Management, in cooperation with universities from Dresden, Delft and Barcelona.

Exceptional achievements

At the occasion of the 4th World Landslide Forum, taking place in Ljubljana from 29 May to 4 June 2017, where the Chair and its members participated and significantly contributed to the successful global event, an exceptional achievement is the co-authorship of an article with great response, published in the prestigeous journal Science, where the author, Assoc. Prof. Dr. Mojca Šraj, shared with the public her rich hydrological knowledge:

- Blöschl, G., Hall, J., Parajka, J., Perdigão, R. A. P., Merz, B., Arheimer, B., Bilibashi, A., Bonacci, O., Borga, M., Castellarin, A., Claps, P., Fiala, K., Frolova, N. L., Gorbachova, L., Aronica, G. T., Čanjevac, I., Chirico, G. B., Gül, A., Hannaford, J., Harrigan, S., Kireeva, M., Kiss, A., Kjeldsen, T. R., Kohnová, S., Koskela, J., Ledvinka, O., Macdonald, N., Mavrova-Guirguinova, M., Mediero, L., Merz, R., Molnar, P., Montanari, A., Murphy, C., Osuch, M., Ovcharuk, V., Radevski, I., Rogger, M., Salinas, J. L., Sauquet, E., Šraj, M., Szolgay, J., Viglione, A., Volpi, E., Wilson, D., Zaimi, K., Živković, N. (2017) Changing Climate Shifts Timing of European Floods. Science 357, No. 6351, 588–590, http://Science.Sciencemag.Org/Content/357/6351/588.

Katedra je v okviru svojega delovnega načrta aktivno sodelovala pri organizaciji in/ali izvedbi več mednarodnih strokovnih dogodkov, in sicer 4. trienalnega znanstvenega posveta Naravne nesreče v Sloveniji (Ig pri Ljubljani, marec 2017), 2. Slovenskega kongresa o vodah (april 2017) in 4. Svetovnega foruma o zemeljskih plazovih (Ljubljana, maj/junij 2017).

Katedra se je aktivno, s predstavitvijo svojega delovanja na plakatu, udeležila 1. mednarodne konference za mobilizacijo Unescovih kateder s področja naravoslovja, ki je potekala ob praznovanju 25. obletnice programa kateder UNITWIN/UNESCO v Ženevi v Švici julija 2017.

Pedagoška dejavnost

Raziskovanje je temelj kakovostnega poučevanja, predvsem na drugi in tretji bolonjski stopnji. Raziskovalni dosežki dela na katedri se prelivajo v pedagoške vsebine različnih predmetov na drugostopenjskih študijskih programih ter na doktorskih študijskih programih Grajeno okolje in Varstvo okolja.

Katedra je v letih 2016 in 2017 sodelovala pri izvedbi projekta ERASMUS+ Environmental Protection and Natural Disasters, v okviru katerega smo na Univerzi v Ljubljani organizirali dve poletni šoli.

Katedra sodeluje pri izvedbi mednarodnega magistrskega študijskega programa Upravljanje poplavnega tveganja (Flood Risk Management), skupaj z univerzami iz Dresdna, Delfta in Barcelone.

Izjemni dosežki

Ob organizaciji 4. Svetovnega foruma o zemeljskih plazovih (4th World Landslide Forum) od 29. maja do 4. junija 2017 v Ljubljani, kjer je katedra s svojimi sodelavci odigrala bistveno vlogo in pripomogla k uspešnemu svetovnemu dogodku, kot izjemni dosežek navajamo soavtorstvo odmevnega članka, objavljenega v prestižni reviji Science, kjer je svoje bogato hidrološko znanje prispevala izr. prof. dr. Mojca Šraj:

- Blöschl, G., Hall, J., Parajka, J., Perdigão, R. A. P., Merz, B., Arheimer, B., Bilibashi, A., Bonacci, O., Borga, M., Castellarin, A., Claps, P., Fiala, K., Frolova, N. L., Gorbachova, L., Aronica, G. T., Čanjevac, I., Chirico, G. B., Gül, A., Hannaford, J., Harrigan, S., Kireeva, M., Kiss, A., Kjeldsen, T. R., Kohnová, S., Koskela, J., Ledvinka, O., Macdonald, N., Mavrova-Guirguinova, M., Mediero, L., Merz, R., Molnar, P., Montanari, A., Murphy, C., Osuch, M., Ovcharuk, V., Radevski, I., Rogger, M., Salinas, J. L., Sauquet, E., Šraj, M., Szolgay, J., Viglione, A., Volpi, E., Wilson, D., Zaimi, K., Živković, N. (2017) Changing Climate Shifts Timing of European Floods. Science 357, št. 6351, 588–590, http://Science.Sciencemag.Org/Content/357/6351/588.

Medijska prisotnost ob slavnostni umestitvi Unescove katedre na Univerzi v Ljubljani (december 2016)
Media presence at the inauguration of the UNESCO Chair at the University of Ljubljana (December 2016)

Udeleženci doktorske poletne šole na Univerzi v Ljubljani na temo naravnih nesreč na terenu (junij 2017)
Participants of the University of Ljubljana Summer School on Natural Disasters in the field (June 2017)

Hidrometrične meritve hitrosti vode
Hydrometric field measurements of flow velocities

VSEBINA / CONTENT

ODDELEK ZA GRADBENIŠTVO

Oddelek za gradbeništvo je največji oddelek na Fakulteti za gradbeništvo in geodezijo, ki združuje dvanajst kateder ter inštitutov: Inštitut za komunalno gospodarstvo, Katedra za gradbeno informatiko, Katedra za konstrukcije in potresno inženirstvo, Katedra za masivne in lesene konstrukcije, Katedra za matematiko in fiziko, Katedra za mehaniko, Katedra za mehaniko tal z laboratorijem, Katedra za metalne konstrukcije, Katedra za operativno gradbeništvo, Katedra za preizkušanje materialov in konstrukcij, Katedra za stavbe in konstrukcijske elemente ter Prometno tehniški inštitut.

Celotni oddelek zaposluje 110 oseb, od tega 33 učiteljev, 21 asistentov, 3 tehniške in administrativne sodelavce, 46 raziskovalcev in 7 mladih raziskovalcev.

DEPARTMENT OF CIVIL ENGINEERING

Department of Civil Engineering is the largest department within the Faculty of Civil and Geodetic Engineering. It is comprised of 12 Chairs and Institutes: Municipal Economics Institute, Chair of

Structural and Earthquake Engineering, Chair of Concrete, Masonry and Timber Structures, Chair of Mathematics and Physics, Chair of Mechanics, Chair of Geotechnical Engineering with Laboratory, Chair for Metal Structures, Chair of Construction Management, Chair for Testing in Materials and Structures, Chair of Buildings and Constructional Complexes and Traffic Technical Institute.

The whole department employs 110 people, of which 33 are teachers, 21 assistants, 3 technical and administrative associates, 46 researchers and 7 young researchers.

Gradbeni objekti so unikati. Zato je gradbeništvo izredno široka panoga, ki zahteva ustvarjalne, inovativne in predane strokovnjake, kjer ni prostora za napake, kjer je enako pomembno dobro temeljno znanje kot poznavanje materialov in tehnologij in kjer je končni izdelek rezultat usklajenega dela interdisciplinarno sestavljene skupine strokovnjakov. Na Oddelku za gradbeništvo skrbimo za razvoj znanja in za ustrezno izobraževanje kadrov s področja gradbeništva.

Pouk poteka na štirih študijskih programih:

- univerzitetni študijski program prve stopnje Gradbeništvo,
- visokošolski strokovni študijski program Operativno gradbeništvo,
- magistrski študijski program druge stopnje Gradbeništvo in
- magistrski študijski program druge stopnje Stavbarstvo.

Poučujemo tudi predmete s področja gradbeništva na študiju tretje stopnje Grajeno okolje. Poleg tega sodelujemo v študijskih programih Vodarstvo in okoljsko inženirstvo na 1. in 2. stopnji ter v nekoliko manjši meri v študijskih programih s področja geodezije.

Building structures are unique. For this reason, civil engineering is a profession with extremely wide scope that requires creative, innovative and dedicated professionals. There is no room for error and solid basic knowledge is as important as knowledge about materials and technologies. The final product is a result of joint work of an interdisciplinary group of experts. The Department of Civil Engineering is in charge of the development of knowledge and education for the field of civil engineering.

Teaching activities are provided within four study programs:

- academic first cycle study program Civil Engineering,
- higher education professional study program Construction Management,
- second cycle master study program Civil Engineering, and
- second cycle master study program Buildings.

We also teach courses from the area of civil engineering in the third cycle doctoral study program Built Environment. Further on, out teachers are involved significantly in the 1st and 2nd cycle study programs Water Science and Environmental Engineering, and to a lesser degree in the study programs of Geodesy.

PEDAGOŠKO DELO

Gradbeništvo je zelo široko strokovno področje. Vključuje skrb za stabilnost, varnost in trajnost gradbenih konstrukcij pa tudi energetsko učinkovitost stavb ter skrb za zdravo in ugodno bivanje v njih. Gradbeništvo seveda ni omejeno le na stavbe, saj so v domeni gradbeništva tudi projektiranje in gradnja prometnic, energetskih objektov, drugih inženirskih objektov za urejanje vodotokov, preprečevanje ali sanacijo plazov in podobno.

Pri pedagoškem delu redno uporabljamo sodobno informacijsko-komunikacijsko tehnologijo: v spletni učilnici najdejo študentje večino gradiva za študij, pri strokovnih predmetih se študentje spoznavajo tudi z rabo programov, ki jih bodo uporabljali v praksi. Ta del pouka poteka v računalniških učilnicah s sodobno strojno in programsko opremo. Pomemben del pedagoškega dela poteka v laboratorijih. Študentje najprej obiskujejo konstrukcijsko prometni laboratorij, kjer spoznavajo gradbene materiale, njihove lastnosti in načine preskušanja materialov pa tudi konstrukcijskih elementov. Del pouka poteka tudi v laboratorijih za mehaniko tal in mehaniko tekočin. Pri nekaterih predmetih poteka poučevanje delno na terenu, pri drugih organiziramo vsebinsko usmerjene ekskurzije, na katerih obiskujemo aktualna gradbišča, obrate za proizvodnjo gradbenih materialov in gradbenih polizdelkov, laboratorije inštitutov.

Tradicionalno je študij gradbeništva v prvih letih namenjen pridobivanju osnovnega znanja iz matematike, fizike, statike, trdnosti, hidromehanike, mehanike tal in osnovnim strokovnim predmetom, kot so Gradiva, Geodezija, Ceste, Tehnologija gradnje, Stavbarstvo… Ob koncu študija študentom ponujamo poglobljeno spoznavanje posameznih področij gradbeništva v obliki modulov ali smeri: komunalna, konstrukcijska, prometna, geotehnična, hidrotehnična, organizacijska in stavbarstvo.

Študentje komunalne smeri podrobneje spoznavajo urejanje prostora kot celote, gospodarjenje z nepremičninami, še posebej komunalno in stanovanjsko gospodarstvo, ter management in vrednotenje nepremičnin.

Na konstrukcijski smeri je poudarjeno zagotavljanje varnosti nosilnih konstrukcij stavb iz vseh gradbenih materialov. Študentje spoznavajo načela pravilne zasnove stavb in inženirskih gradbenih konstrukcij, metode statične in dinamične analize konstrukcij ter postopkov gradnje in detajlov lesenih, kovinskih in armiranobetonskih konstrukcij. Za naš prostor je posebej pomembno tudi temeljito poznavanje potresnega inženirstva.

Cilj predmetov v sklopu prometnega inženirstva je razumeti značilnosti in zakonitosti cestnega in železniškega prometa, pridobiti znanje o postopkih načrtovanja, gradnje in vzdrževanja prometne infrastrukture ter o napovedovanju in modeliranju prometa.

Diplomant stavbarstva je specialist za gradbeno fiziko, učinkovito rabo energije v stavbah in zagotavljanje bivalnega udobja.

EDUCATIONAL ACTIVITIES

Civil engineering is a very wide professional area. It includes care for stability, safety and durability of building structures, as well as energy efficiency of buildings and care for healthy and comfortable living conditions. Of course, civil engineering is not limited only to buildings, but includes also design and construction of roads, power structures and other engineering structures for managing rivers, preventing landslides or repair after landslides, etc.

In our educational work, we consistently use modern ICT technology: in our web classroom students find most of the materials required for their studies; within professional courses students are also introduced to the use of software that they will need in practice. This part of the teaching activities is implemented in computer rooms with modern hardware and software equipment. An important part of teaching activities is held in laboratories. Students first attend classes in the structural and traffic laboratory, where they are introduced to building materials, their properties and principles of testing materials as well as structural elements. Part of the teaching activities is organised also in soil mechanics and fluid mechanics laboratories. Some courses are implemented partly in the field, for others we organise expert field trips, visiting currently active building sites, factories manufacturing building materials and prefabricated products, and laboratories of institutes.

Traditionally, in the first few years the study of civil engineering is focused on providing basic knowledge from mathematics, physics, stability, strength, hydromechanics, soil mechanics and basic professional courses, such as Materials, Geodesy, Roads, Construction Technology, Buildings, etc. Towards the end of the studies, students are offered in-depth knowledge of individual areas of civil engineering in the form of modules or orientations: municipal engineering, structural, traffic, geotechnical, hydrotechnical, construction management orientations and buildings.

Students of the municipal orientation learn the details about spatial interventions as a whole, real estate management, especially municipal and housing economics, and real estate valuation.

At the structural division, the focus is on providing safety of load-carrying structures of buildings made of all building materials. Students learn about the principles of correct building design and engineering structures, methods of static and dynamic analysis of structures, construction procedures and details of timber, steel and reinforced concrete structures. For our territory, it is of special importance that engineers are also experts of earthquake engineering.

The purpose of the courses within traffic engineering is to teach students about characteristics and laws of road and railway traffic, to give knowledge on the procedures in the design, construction and maintenance of traffic infrastructure as well as the prediction and modelling of traffic.

Graduates from the orientation Buildings are specialists for building physics, efficient energy use in buildings and providing living comfort.

An increasing number of our students use the opportunities offered by European projects, intended to internationalisation, and do part of their obligations at foreign universities. In exchange, we host a considerable number of foreign students.

RESEARCH WORK

Research and professional work within the Department takes place in Pedagogical Research Units (Chairs) that represent links to each other as well as to external Slovenian and international partners. In various forms, we cooperate with distinguished international institutes and universities.

We also cooperate with national construction industry carrying out demanding expert tasks in Slovenia and abroad, in the development of norms and other technical regulations in civil engineering, and in the transfer of European norms into national practice. We frequently appear as reviewers of designs for demanding building projects. The cooperation with the industry in developing new products and technologies in civil engineering has been intensifying as well, of which we are particularly proud.

Research work in the department is currently taking place in 5 Research Programs: E-construction, Structures and Building Physics, Mechanics of Structures, Earthquake Engineering, Water Engineering and Geotechnical Engineering. In the last several years, we have led, or participated in, numerous research projects funded by the National Research Agency. Especially worth mentioning are three, with members of the Department of Civil Engineering appearing as leaders: Seismic Resilience and Strengthening of Precast Industrial Buildings with Concrete Claddings, Model of the Integration of Slovenian Bicycle Network and Design of Structures for Tolerable Seismic Risk Using Non-Linear Methods of Analysis.

Individual researchers from the area of civil engineering are also active in working bodies of the European Standardisation Organisation. This cooperation is also a source of ideas for research work and provides relevancy and up-to-date nature of such research, and at the same time allows transfer of our research achievements into current norms.

The increasing involvement of researchers in international projects can be perceived in the pulse of our faculty, because a growing number of research consortia meetings and various international working body meetings are held in English. We are involved in the organisation of international workshops and conferences. In the last few years, we have cooperated in six H2020 projects, two FP7 projects, and seven other European projects financed by various European commissions. We also actively cooperate in different research actions, such as COST projects.

Researchers regularly publish the results of their research work in international journals. The achievements of our researchers are recognisable and visible on the international scale, which is evident from the citation rate of our published works increasing each year. Many of us actively and regularly review articles for distinguished international journals as reviewers or members of editorial boards.

Vse več naših študentov med študijem izkoristi možnosti, ki jih ponujajo evropski projekti, namenjeni internacionalizaciji, in del svojih obveznosti opravi na tujih univerzah. V zameno pri nas gostimo podobno število tujih študentov.

RAZISKOVALNO DELO

Raziskovalno in strokovno delo na oddelku poteka po pedagoško raziskovalnih enotah (inštitutih in katedrah), ki se na raziskovalnih programih in projektih povezujejo med seboj in z zunanjimi domačimi ter tujimi partnerji. V različnih oblikah delujemo skupaj z uglednimi inštituti in univerzami v tujini.

Pri zahtevnih strokovnih problemih doma in v tujini, pri razvoju standardov in drugih tehničnih predpisov v gradbeništvu ter pri prenosu evropskih standardov v domači prostor sodelujemo tudi z domačo gradbeno industrijo. Pogosto nastopamo kot recenzenti načrtov zahtevnih gradbenih konstrukcij, pa tudi sicer je sodelovanja z industrijo pri razvoju novih proizvodov in tehnologij v gradbeništvu vedno več, kar nas še posebej veseli.

Raziskovalno delo na oddelku trenutno poteka v petih raziskovalnih programih: E-gradbeništvo, Gradbene konstrukcije in gradbena fizika, Mehanika konstrukcij, Potresno inženirstvo, Vodarstvo in geotehnika. V tem obdobju smo vodili ali sodelovali tudi v različnih raziskovalnih projektih v okviru ARRS. Naj izpostavimo le tri, ki so jih vodili sodelavci Oddelka za gradbeništvo: Potresna žilavost in utrjevanje montažnih industrijskih stavb z betonskimi fasadami, Izdelava modela povezanosti celotne Slovenije s kolesarskimi potmi ter Načrtovanje konstrukcij na sprejemljivo potresno tveganje z uporabo nelinearnih metod analize.

Raziskovalci s področja gradbeništva delujejo tudi v delovnih telesih evropske organizacije za standardizacijo. To sodelovanje je tudi vir idej za raziskovalno delo ter zagotavlja relevantnost in aktualnost teh raziskav, sočasno pa prav tako prenos naših raziskovalnih dosežkov v sodobne standarde.

Vse večja vpetost raziskovalcev v mednarodne projekte se čuti tudi v utripu fakultete, saj vse pogosteje pri nas potekajo sestanki raziskovalnih konzorcijev in raznih mednarodnih delovnih teles. Vključeni smo v organizacijo mednarodnih delavnic in posvetovanj. V tem obdobju smo sodelovali kar pri šestih projektih H2020, dveh FP7 in vsaj sedmih drugih evropskih projektih, ki so financirani s strani različnih evropskih komisij. Aktivno sodelujemo tudi v različnih raziskovalnih akcijah, kakršni so projekti COST.

Raziskovalci redno objavljamo rezultate svojega raziskovalnega dela v mednarodnih revijah. Dosežki naših raziskovalcev so prepoznavni in cenjeni v mednarodnem merilu, kar izpričuje vsakoletna rast citiranosti naših objavljenih del. Mnogi smo aktivno in redno vključeni v recenzije člankov v uglednih mednarodnih revijah kot recenzenti ali kot člani uredniških odborov.

UNIVERZITETNI ŠTUDIJSKI PROGRAM PRVE STOPNJE GRADBENIŠTVO

Prva stopnja univerzitetnega študija gradbeništva ima dva poglavitna cilja: ponuditi osnovna temeljna in strokovna znanja in poudariti interdisciplinarnost gradbeništva ter tako motivirati študenta k nadaljevanju študija. Študijski program *Gradbeništvo* traja tri leta (šest semestrov) in obsega 180 kreditnih točk. Študijski program ne vključuje smeri. V šestem semestru študija so izbirni predmeti organizirani v petih modulih: Hidrotehnika, Komunala, Konstrukcije, Promet in Stavbarstvo.

Diplomanti so po končanem univerzitetnem dodiplomskem študijskem programu Gradbeništvo sposobni razumevanja, ustvarjalnega reševanja strokovnih problemov samostojno in v skupinah, kritičnega razmišljanja, upoštevanja sodobnih standardov in načel, strokovnega sporazumevanja, interdisciplinarnega povezovanja ter profesionalne odgovornosti in etike. Dokončan študij nudi pregledno znanje širokega področja gradbeništva in zaposljivost na vseh področjih, v vseh podjetjih in ustanovah, ki se ukvarjajo z gradbeništvom v širšem pomenu. Predvsem pa bodo diplomanti s pridobljenim temeljnim znanjem lahko uspešno nadaljevali študij na različnih programih druge stopnje, v Sloveniji ali tujini, ki so neposredno ali posredno povezani z grajenim okoljem, prvenstveno pa na specializiranih drugostopenjskih študijih Gradbeništva.

1ST CYCLE ACADEMIC STUDY PROGRAM CIVIL ENGINEERING (BA)

The 1st cycle academic study of Civil Engineering has two main goals: to offer basic knowledge and fundamental professional skills and knowledge, as well as to build on interdisciplinarity of civil engineering and thus motivate student to continue studies in the 2nd cycle. Academic bachelor degree programme *Civil Engineering* consists of 3 years (6 semesters) and amounts to 180 ECTS points. The study programme does not include any orientations. In the 6th semester, the study programme is organised in 5 modules: Buildings, Hydraulics, Municipal Engineering, Structures and Traffic.

General competences of the graduate after the finished university bachelor degree programme of Civil Engineering are the ability to understand and solve professional challenges independently and as members of working groups, the ability of critical thinking, taking into account contemporary standards and principles, skills related to professional communication and interdisciplinary connections, professional responsibility and ethics. The study programme Civil Engineering offers comprehensive knowledge within the wide area of Civil Engineering, employability in all fields, companies and institutions that deal with Civil Engineering in a broad sense. The graduate will be able, on the basis of the acquired knowledge, to successfully continue the studies in various 2nd cycle programmes that are directly or indirectly related to the built environment.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Fizika / Physics | ECTS 9
- Gradiva / Building Materials | ECTS 8
- Matematika I / Mathematics I | ECTS 10
- Uvod v gradbeništvo / Introduction to Civil Engineering | ECTS 3
- Inženirska komunikacija / Engineering Communication | ECTS 3
- Matematika II / Mathematics II | ECTS 8
- Osnove statike in dinamike / Introduction to Statics and Dynamics | ECTS 9
- Računalništvo in informatika / Computer Science and Informatics | ECTS 4
- Stavbarstvo I / Buildings I | ECTS 6

2. letnik / 2nd year

- Ceste / Roads | ECTS 6
- Hidromehanika / Hydromechanics | ECTS 5
- Tehnologija / Technologies in Civil Engineering | ECTS 5
- Trdnost / Strength of Materials | ECTS 10
- Urejanje prostora / Spatial Development | ECTS 4
- Geodezija / Geodetic Engineering | ECTS 4
- Mehanika tal in inženirska geologija / Soil Mechanics and Engineering Geology | ECTS 7
- Organizacija gradbenih del in poslovanje / Organisation and Management of Construction Works | ECTS 6
- Statika linijskih konstrukcij / Structural Analysis | ECTS 6
- Stavbarstvo II / Buildings II | ECTS 3
- 1. izbirni predmet FGG ali zunanji / 1st Elective Course (FGG or External) | ECTS 4

3. letnik / 3rd year

- Betonske konstrukcije / Concrete Structures | ECTS 8
- Geotehnika / Geotechnics | ECTS 6
- Inženirska hidrotehnika / Engineering Hydraulics | ECTS 6
- Jeklene konstrukcije / Steel Structures | ECTS 6
- Osnove potresnega inženirstva / Fundamentals of Earthquake Engineering | ECTS 4
- 2. izbirni predmet FGG ali zunanji / 2nd Elective Course (FGG or External) | ECTS 5
- Predmeti izbranega modula / Module Elective Courses | ECTS 13
- Praktično usposabljanje / Practical Training | ECTS 4
- Diplomsko delo / Diploma Work | ECTS 8

Izbirni predmeti / Elective Courses

- Športna vzgoja / Sports Education | ECTS 4
- Angleščina za gradbeništvo in geodezijo / English for Civil and Geodetic Engineering | ECTS 4
- Podjetništvo / Entrepreneurship | ECTS 4
- Pravica gradnje in gradbena pogodba / Building Right and Building Contract | ECTS 4
- Upravni postopek in upravni spor / Administrative Procedure and Administrative Dispute | ECTS 4
- Digitalno načrtovanje / Digital Design | ECTS 4
- Od ideje do gradbenega objekta / From Idea to Construction Work | ECTS 5

Moduli / Modules

Konstrukcije / Constructions

- Ploskovne konstrukcije / Plane Structures | ECTS 5
- Masivne konstrukcije / Concrete and Masonry Structures | ECTS 4
- Lesene konstrukcije / Timber Structures | ECTS 4

Hidrotehnika / Hydrotechnology

- Hidravlika / Hydraulics | ECTS 5
- Hidrologija / Hydrology | ECTS 4
- Osnove zdravstvene hidrotehnike / Introduction to Sanitary Engineering | ECTS 4

Promet / Traffic

- Železnice / Railways | ECTS 5
- Prometno inženirstvo / Transportation Engineering | ECTS 4
- Geografski informacijski sistemi / Geographical Information System | ECTS 4

Komunala / Communal

- Komunalno gospodarstvo / Municipal Economics | ECTS 5
- Upravljanje stavbnih zemljišč / Building Land Development | ECTS 4
- Komunalne naprave / Communal Technical Infrastructure | ECTS 4

Stavbarstvo / Building

- Uvod v načrtovanje stavb / Introduction to Building Design | ECTS 5
- *Elementi gradbene fizike / Elements of Building Physics | ECTS 4
- *Bioklimatsko načrtovanje / Bioclimatic Design | ECTS 4
- *Prenova stavb / Building Renovation | ECTS 4
- *Vodenje projektov / Project Management | ECTS 4

*) Izmed 4 označenih predmetov se izbereta dva
/ Among the 4 marked courses, two are selected

VISOKOŠOLSKI STROKOVNI ŠTUDIJSKI PROGRAM PRVE STOPNJE OPERATIVNO GRADBENIŠTVO

Visokošolski strokovni študijski program prve stopnje Operativno gradbeništvo traja tri leta in skupaj obsega 180 kreditnih točk. Nudi pridobivanje strokovnih znanj ter kompetenc predvsem s področja projektiranja, organiziranja, upravljanja in vodenja gradbenih del ter gradbene proizvodnje, gradbene informatike, prostorskega načrtovanja in okoljske politike ter poznavanja prostorskih evidenc.

Gradbeništvo temelji na poznavanju fizike ter dinamike naravnega in družbenega okolja, zato med temeljnimi predmeti najdemo še Inženirsko matematiko, Inženirsko komunikacijo, Mehaniko, Geodezijo, Stavbarstvo, Gradiva in z vsemi povezano Računalništvo. Eksperimentalno delo, tako na terenu kakor tudi v laboratoriju, se začne na začetku študija in se nadaljuje do diplomskega dela. Za strokovno in odgovorno snovanje funkcionalno in ekonomsko optimalnih, varnih in atraktivnih gradbenih konstrukcij so potrebna znanja s področja materialov, mehanike, zasnove in modeliranja konstrukcij, uporabe računalnikov ter tehnologije gradnje.

Študijske vsebine programa podrobno seznanjajo z načrtovanjem, gradnjo, ekonomiko in organizacijskimi vidiki delovanja infrastrukturnih sistemov, komunalno in urbano ekonomiko, vodenjem projektov od sprejemanja prostorskih planov pa do izdaje ustreznih dovoljenj. Poseben poudarek je namenjen organizaciji dela ter programiranju, načrtovanju in izvedbi gradbenih objektov.

Utrjevanju celovite strokovne usposobljenosti sta namenjena sprotni praktični pouk in štiritedensko praktično usposabljanje v gradbenih in sorodnih podjetjih, ki predstavljajo tudi ciljna zaposlitvena področja s prepletom pisarniškega in terenskega dela, npr. na gradbiščih.

Program izbirno ponuja module Konstruktiva, Organizacija in Promet.

HIGHER EDUCATION PROFESSIONAL 1ST CYCLE STUDY PROGRAM CONSTRUCTION MANAGEMENT

Higher education professional 1st cycle study program Construction Management consists of three years and amounts to 180 credit points. It offers professional knowledge and competences, mainly from the areas of design, organization and management of construction works, as well as building production, construction IT, spatial planning and spatial policy, including knowledge about spatial records.

Civil engineering is based on the knowledge of physics and dynamics of natural and social environment. For this reason, the basic courses include Engineering Mathematics, Engineering Communication, Mechanics, Geodesy, Buildings, Materials and the all connecting Computer Science. Experimental work, in the field as well as in our laboratory, starts at the very beginning of the studies and continues all the way to the final thesis. For professional and responsible design of functional and economically optimum, safe and attractive building structures, one needs knowledge from the areas of materials, mechanics, design and modelling of structures, computer use and construction technology.

The contents of the study program provide students with knowledge about planning, construction, economical and organizational aspects of infrastructural system functioning, municipal and urban economics, as well as project management from the phase of monitoring spatial plans up to issuing adequate permits. Special emphasis is on the organization of work and programming, design and implementation of building structures.

Continuous practical tutorials and the four-week practical training in construction companies, which are also the targeted employers, ranging from office work to field work, for example at construction sites, are aimed at strengthening the students' professional qualifications.

The programme offers elective modules Structures, Organisation and Traffic.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Fizika / Physics | ECTS 6
- Inženirska komunikacija / Engineering Communication | ECTS 3
- Inženirska matematika I / Engineering Mathematics I | ECTS 6
- Komunalno gospodarstvo in gradbena zakonodaja / Municipal Economics and Construction Legislation | ECTS 4
- Stavbarstvo / Buildings | ECTS 8
- Uvod v gradbeništvo / Introduction to Civil Engineering | ECTS 3
- Geodezija / Geodetic Engineering | ECTS 3
- GIS in prostorske evidence / GIS and Spatial Records | ECTS 3
- Gradiva / Building Materials | ECTS 6
- Hidromehanika in hidravlika / Hydromechanics and Hydraulics | ECTS 6
- Računalništvo / Computer Science | ECTS 4
- Statika / Statics | ECTS 8

2. letnik / 2nd year

- Inženirska matematika II / Engineering Mathematics II | ECTS 5
- Osnove mehanike tal / Fundamentals of Soil Mechanics | ECTS 5
- Površinska odvodnja (kanalizacija) / Surface Drainage (Urban Drainage) | ECTS 4
- Trdnost / Strength of Materials | ECTS 7
- Projektiranje in gradnja cest / Design and Construction of Roads | ECTS 6
- 1. zunanji izbirni predmet / 1st External Elective Course | ECTS 3
- Geotehnične gradnje / Geotechnical Constructions | ECTS 8
- Lesene konstrukcije / Timber Structures | ECTS 4
- Osnove masivnih konstrukcij / Fundamentals of Concrete and Masonry Structures | ECTS 8
- Statika gradbenih konstrukcij / Structural Analysis | ECTS 4
- 2. zunanji izbirni predmet / 2nd External Elective Course | ECTS 6

3. letnik / 3rd year

- Tehnološki procesi / Technological Processes | ECTS 5
- Masivni objekti / Concrete Objects | ECTS 4
- Organizacija in vodenje gradbenih del / Organisation and Management of Construction Works | ECTS 6
- Osnove jeklenih konstrukcij / Fundamentals of Steel Structures | ECTS 7
- 1 predmet izbranega modula / Module Elective Course | ECTS 4
- Izbirni strokovni predmet / Professional Elective Course | ECTS 4
- 3 predmeti izbranega modula / Module Elective Courses | ECTS 12
- Praktično usposabljanje (4 tedni) / Practical Training (4 weeks) | ECTS 8
- Diplomsko delo / Diploma Work | ECTS 10

Izbirni predmeti / Elective Courses

- Požarna odpornost konstrukcij / Fire Resistance of Structures | ECTS 5

Moduli / Modules

Konstruktiva / Constructions

- Osnove potresnega inženirstva / Fundamentals of Earthquake Engineering | ECTS 4
- * Bioklimatske zgradbe / Bioclimatic Buildings | ECTS 4
- * Jeklene stavbe / Steel Buildings | ECTS 4
- * Računalniško projektiranje konstrukcij / Computer-Aided Design | ECTS 4
- * Masivni mostovi / Concrete Bridges | ECTS 4

*) Izmed 4 označenih predmetov se izberejo trije / Among the 4 marked courses, three are selected

Organizacija / Organisation

- Zagotavljanje in kontrola kakovosti / Quality Assurance and Quality Control | ECTS 4
- Urejanje stavbnih zemljišč in cenilstvo / Building Land Development and Valuation | ECTS 4
- Planiranje gradbene ekonomike / Planning of Economics in Civil Engineering | ECTS 4
- Osnove gradbene ekonomike / Fundamentals of Economics in Civil Engineering | ECTS 4

Promet / Traffic

- Promet / Traffic | ECTS 4
- Geotehnika prometnic / Geotechnics of Roads | ECTS 4
- Inteligentni transportni sistemi / Intelligent Transport Systems | ECTS 4
- Projektiranje in gradnja železnic / Design and Construction of Railways | ECTS 4

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE GRADBENIŠTVO - SMER GRADBENE KONSTRUKCIJE

Magistrski študijski program Gradbeništva druge stopnje, smer Gradbene konstrukcije, traja dve leti (štiri semestre) in obsega 120 kreditnih točk. V četrtem semestru so predvideni trije izbirni moduli: Interdisciplinarni projektni študij računalniško podprtega projektiranja konstrukcij, Masivne konstrukcije in Jeklene konstrukcije. V obsegu enega semestra je predviden tudi mednarodni magistrski modul Inženirsko modeliranje, ki v celoti poteka v tujem jeziku in ga neposredno vpišejo tuji študenti.

Cilj študija je usposobiti strokovnjaka s poglobljenim temeljnim znanjem na širšem področju gradbeništva, predvsem z usmerjenim znanjem na področju analize in projektiranja zahtevnejših stavb in inženirskih objektov. Študij ponuja tudi širok nabor izbirnih predmetov, tako študent poleg predmetov izbrane smeri posluša tudi predmete drugih smeri po lastni izbiri, kar mu omogoča specializacijo in pripravo za nadaljevanje študija po programih na tretji stopnji. Študijski program zajema tudi praktično usposabljanje, ki je namenjeno seznanitvi z dejanskim delom v projektivnih birojih, izvajalskih podjetjih, inštitutih, zavodih in upravnih organih.

Med študijem se bo študent z delom v skupinah, projektnim delom in reševanjem problemskih nalog privajal javnemu nastopanju in poslovanju s strankami ter se dejavno vključeval v raziskave. Pridobljeno teoretično znanje bo preskusil na primerih vaj ter pri reševanju zahtevnih teoretičnih ali strokovno usmerjenih problemov in projektov. Vse to mu bo omogočalo lažjo vključitev v prakso po končanem študiju ter razumevanje izzivov na različnih področjih gradbeništva. Z diplomo se bo študentu odprla tudi pot do pridobitve licence za projektiranje in gradnjo najzahtevnejših stavb ter inženirskih objektov.

MASTER STUDY PROGRAM CIVIL ENGINEERING - ORIENTATION STRUCTURAL ENGINEERING

The 2nd cycle master study program Civil Engineering, orientation Structural Engineering, consists of two years (four semesters) and amounts to 120 credit points. In the fourth semester, three elective modules are foreseen: Interdisciplinary Project Study of Computer-Aided Design of Structures, Concrete and Masonry Structures, Steel Structures. Additionally, International Master Module of Engineering Modelling is foreseen to be carried out within one semester only in foreign language and intended for foreign students.

The goal of the study is to train experts with in-depth basic knowledge at the wider area of civil engineering, mainly with guided knowledge for the area of analysis and design of demanding buildings and engineering structures. The study also offers a wide selection of electives. In this way, students attend not only courses from the selected orientation, but also courses from other orientations, which allows them to specialise and prepare for further studies in the third-cycle programs. The study program also includes practical training that provides students knowledge and skills required at actual work for design offices, construction companies, institutes, institutions and administrative bodies.

During the studies students work in groups, on projects, and solve specific tasks, which helps them get accustomed to public appearance and communication with customers, as well as work on real research. All the acquired theoretic knowledge can be tested during tutorials, dealing with demanding theoretical or professional problems and projects. This helps graduates in easier transition to the working life after the studies, and to understand the challenges in different areas of civil engineering. With the finished studies, graduates can also acquire the licence for the design and construction of the most demanding buildings and engineering structures.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika III / Mathematics III | ECTS 5
- 1. izbirni predmet FGG ali zunanji / 1st Elective Course (FGG or External) | ECTS 4
- Numerične metode / Numerical Methods | ECTS 4
- Gradbena fizika / Building Physics | ECTS 3
- Nelinearna mehanika / Non-linear Mechanics | ECTS 6
- Statika gradbenih konstrukcij / Stability of Building Structures | ECTS 5
- Zasnova gradbenih konstrukcij / Conception of Building Structures | ECTS 3
- Prenova in preizkušanje konstrukcij / Repair and Testing of Structures | ECTS 5
- Nelinearna analiza konstrukcij / Non-linear Analysis of Structures | ECTS 5
- Računalniško integrirana graditev / Computer-Integrated Construction | ECTS 5
- Verjetnostni račun in statistika / Theory of Probability and Statistics | ECTS 4
- Geotehnika visokih gradenj / Geotechnics of Buildings | ECTS 7
- Praktično usposabljanje / Practical Training | ECTS 4

2. letnik / 2nd year

- Vodenje projektov / Project Management | ECTS 4
- Dinamika gradbenih konstrukcij in potresno inženirstvo / Structural Dynamics and Earthquake Engineering | ECTS 7
- Izbrana poglavja iz masivnih konstrukcij / Selected Chapters from Concrete and Masonry Structures | ECTS 6
- Jeklene konstrukcije / Steel Structures | ECTS 5
- Verjetnostne metode in zanesljivost konstrukcij / Probability Methods and Reliability of Structures | ECTS 4
- 2. izbirni predmet FGG ali zunanji / 2nd Elective Course (FGG or External) | ECTS 4
- Predmeti izbranega modula / Module Elective Courses | ECTS 20
- Magistrsko delo / MSc Thesis | ECTS 10

Izbirni predmeti smeri Gradbene Konstrukcije / Elective Courses

s področja Numeričnega modeliranja / Numerical Modeling

- Numerično modeliranje trdnin / Numerical Modelling of Solids | ECTS 6
- Povezani problemi / Coupled Problems | ECTS 4

s področja Gradbeni materiali / Building Materials

- Tehnologija materialov na osnovi mineralnih veziv / Technology of Materials with Mineral Binders | ECTS 6
- Napredna gradiva / Advanced Construction and Building Materials | ECTS 4

s področja Stavbarstva / Buildings

- Napredni materiali / Advanced Materials | ECTS 4
- Pametna hiša / Smart House | ECTS 6

s področja Geotehnike / Geotehnical Engineering

- Mehanika kamnin in podzemni objekti / Rock Mechanics and Underground Structures | ECTS 6
- Modeliranje geotehničnih konstrukcij / Modelling of Geotechnical Structures | ECTS 6

ostali izbirni strokovni predmeti smeri Gradbene konstrukcije / Structural Engineering

- Požarna varnost / Fire Safety | ECTS 6
- Prednapeti beton / Prestressed Concrete | ECTS 4
- Sovprežne konstrukcije / Composite Structures | ECTS 4
- Inženirske lesene konstrukcije / Engineering Timber Structures | ECTS 4
- Lupinaste konstrukcije / Shell Structures | ECTS 4

Moduli / Modules

Interdisciplinarni projektni študij računalniško podprtega projektiranja konstrukcij / Interdisciplinary project study of Computer-aided Design of Structures

- Interdisciplinarni seminar računalniško podprtega projektiranja konstrukcij / Interdisciplinary seminar on Computer Aided Design of Structures | ECTS 10
- Informacijska in komunikacijska tehnologija za projektno delo / Information and Communication Technology for Project Work | ECTS 4
- Izbirni predmet s področja GK / Elective Course | ECTS 6

Masivne konstrukcije / Concrete Constructions

- Seminar iz projektiranja masivnih konstrukcij / The Design of Concrete and Masonry Structures Seminar | ECTS 10
- 1. Izbirni predmet s področja GK / 1st Elective Course | ECTS 6
- 2. Izbirni predmet s področja GK / 2nd Elective Course | ECTS 4

Jeklene konstrukcije / Steel Constructions

- Seminar iz projektiranja jeklenih konstrukcij / The Design of Steel Structures - seminar | ECTS 10
- 1. Izbirni predmet s področja GK / 1st Elective Course | ECTS 6
- 2. Izbirni predmet s področja GK / 2nd Elective Course | ECTS 4

Mednarodni magistrski modul - Inženirsko modeliranje / International master modul - Computational Engineering

- Numerično modeliranje trdnin / Numerical Modelling of Solids | ECTS 6
- Povezani problemi / Coupled Problems | ECTS 4
- Modeliranje geotehničnih konstrukcij / Modelling of Geotechnical Structures | ECTS 5
- Numerične metode v dinamiki tekočin / Numerical Modeling in Fluid Dynamics | ECTS 5

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE GRADBENIŠTVO - SMER NIZKE GRADNJE

Magistrski študijski program Gradbeništva druge stopnje, smer Nizke gradnje, traja dve leti (štiri semestre) in obsega 120 kreditnih točk. V četrtem semestru so predvideni štirje izbirni moduli: Komunalno inženirstvo, Organizacija – informatika, Prometno inženirstvo ter Projekt. Cilj študija je usposobiti strokovnjaka s poglobljenim temeljnim znanjem na širšem področju gradbeništva, predvsem z usmerjenim znanjem na področju gospodarske javne infrastrukture, procesa graditve, informacijske tehnologije oziroma prometnega inženirstva. Študij ponuja tudi širok nabor izbirnih predmetov, tako študent poleg predmetov izbrane smeri posluša tudi predmete drugih smeri po lastni izbiri, kar mu omogoča specializacijo in pripravo za nadaljevanje študija po programih na tretji stopnji. Študijski program obsega tudi praktično usposabljanje, ki je namenjeno seznanitvi z dejanskim delom v projektivnih birojih, izvajalskih podjetjih, inštitutih, zavodih in upravnih organih.

Med študijem se bo študent z delom v skupinah, projektnim delom in reševanjem problemskih nalog privajal javnemu nastopanju, poslovanju s strankami in dejavno sodeloval v raziskavah. Pridobljeno teoretično znanje bo preskusil na primerih vaj ter pri reševanju zahtevnih teoretičnih ali strokovno usmerjenih problemov in projektov. Vse to mu bo omogočalo lažjo vključitev v prakso po končanem študiju ter razumevanje izzivov na različnih področjih gradbeništva. Z diplomo se bo študentu odprla tudi pot do pridobitve licence za projektiranje in gradnjo najzahtevnejših stavb ter inženirskih objektov.

MASTER STUDY PROGRAM CIVIL ENGINEERING - ORIENTATION INFRASTRUCTURAL ENGINEERING

The 2nd cycle master study program Civil Engineering, orientation Infrastructural Engineering, consists of two years (four semesters) and amounts to 120 credit points. In the fourth semester, four elective modules are foreseen: Municipal Engineering, Construction and IT Management, Transportation Engineering and Project module. The goal of the study is to qualify experts with in-depth basic knowledge from the wider area of civil engineering, mainly with guided teaching from the areas of public infrastructure, construction process, information technology and transportation engineering. The study also offers a wide selection of elective courses. Thus, apart from the courses from the selected orientation, students may also choose courses from other orientations, which allows them greater specialisation and preparation for further study at the third-cycle studies. The study program includes practical training, which is intended for getting to know the real work in design offices, contracting companies, institutes and administrative bodies.

During the studies students work in groups, on projects, and solve specific tasks, which helps them get accustomed to public appearance and communication with customers, as well as work on real research. All the acquired theoretic knowledge can be tested during tutorials, dealing with demanding theoretical or professional problems and projects. This helps graduates in easier transition to the working life after the studies, and to understand the challenges in different areas of civil engineering. With the finished studies, graduates can also acquire the licence for the design and construction of the most demanding buildings and engineering structures.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika III / Mathematics III | ECTS 5
- 1. izbirni predmet / 1st Elective Course | ECTS 4
- Numerične metode / Numerical Methods | ECTS 4
- Geotehnika nizkih gradenj / Geotechnics of Infrastructural Facilities | ECTS 8
- Zagotavljanje in kontrola kakovosti / Quality Control and Quality Assurance | ECTS 4
- Operativno planiranje in spremljanje projektov / Operative Planning and Monitoring of Projects | ECTS 5
- Gospodarjenje z nepremičninami / Real Estate Management | ECTS 5
- Projektiranje gradbenih konstrukcij / Design of Building Structures | ECTS 4
- Inteligentni transportni sistemi / Intelligent Transport Systems | ECTS 4
- Optimizacijske metode v gradbeništvu / Optimisation Methods in Civil Engineering | ECTS 4
- Računalniško integrirana graditev / Computer-Integrated Construction | ECTS 5
- Verjetnostni račun in statistika / Theory of Probability and Statistics | ECTS 4
- Praktično usposabljanje / Practical Training | ECTS 4

2. letnik / 2nd year

- Vodenje projektov / Project Management | ECTS 4
- Mehanizacija in tehnologija gradnje cest / Road Construction Machinery and Technology | ECTS 7
- Mestne prometne površine / Urban Roads | ECTS 5
- Informacijsko modeliranje zgradb / Information Modelling of Buildings | ECTS 6
- 2. izbirni predmet / 2nd Elective Course | ECTS 4
- 3. izbirni predmet / 3rd Elective Course | ECTS 4
- Predmeti izbranega modula / Module Elective Courses | ECTS 20
- Magistrsko delo / MSc Thesis | ECTS 10

Izbirni predmeti / Elective Courses

- Teorija prometnega toka in analiza kapacitivnosti / Traffic Flow Theory and Capacity Analysis | ECTS 4
- Prometna ekologija / Traffic Ecology | ECTS 4
- Planiranje gradnje in vzdrževanje prometnic / Planning of Construction and Maintenance of Transport Infrastructure | ECTS 4
- Stvarno pravo / Property Law | ECTS 4
- Vrednotenje nepremičnin / Real Estate Valuation | ECTS 4
- Urbanistično načrtovanje / Urban Planning | ECTS 4
- Projektiranje in gradnja jeklenih stavb / Design and Construction of Steel Buildings | ECTS 4

Magistrski moduli / Master modules

Komunalno inženirstvo / Municipal Engineering

- Komunalno in stanovanjsko gospodarstvo / Housing and Municipal Economics | ECTS 6
- Vodovod in kanalizacija / Water Supply and Sewage Systems | ECTS 10
- Projekt iz komunalne infrastrukture / Project from Municipal Infrastructure | ECTS 4

Organizacija - informatika / Organisation – Buildings Informatics

- Procesno modeliranje in informacijski sistem / Process Modelling and Information Systems | ECTS 4
- Izbrana poglavja iz gradbene informatike / Selected Chapters of Building Informatics | ECTS 6
- Management v gradbeništvu / Management in Civil Engineering | ECTS 4
- Organizacijska priprava gradnje / Organisational Planning of Construction | ECTS 6

Prometno inženirstvo / Traffic Engineering

- Projektiranje cest / Road Design | ECTS 3
- Seminar iz cest / Road seminar | ECTS 7
- Projektiranje železnic / Railway Design | ECTS 3
- Seminar iz železnic / Railway seminar | ECTS 7

Projekt / International master modul - Computational Engineering

- Projekt iz gradbene informatike / Construction Informatics project | ECTS 4
- Projekt iz prometne infrastrukture / Project from Traffic Infrastructure | ECTS 8
- Projekt iz komunalnega gospodarstva / Project from Municipal Economics | ECTS 4
- Projekt iz organizacijske priprave gradnje / Project from Organizational Preparation of Construction | ECTS 4

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE GRADBENIŠTVO - SMER GEOTEHNIKA - HIDROTEHNIKA

Magistrski študijski program Gradbeništva druge stopnje, smer Geotehnika – hidrotehnika, traja dve leti (štiri semestre) in obsega 120 kreditnih točk. Cilj študija je usposobiti strokovnjaka s poglobljenim temeljnim znanjem na širšem področju gradbeništva, predvsem z usmerjenim znanjem na področju hidravlike in urejanja vodotokov ter analize in projektiranja zahtevnejših geotehničnih oziroma pregradnih in hidrotehničnih objektov. Študijski program obsega tudi praktično usposabljanje, ki je namenjeno seznanitvi z dejanskim delom v projektivnih birojih, izvajalskih podjetjih, inštitutih, zavodih in upravnih organih.

Med študijem se bo študent z delom v skupinah, projektnim delom in reševanjem problemskih nalog privajal javnemu nastopanju, poslovanju s strankami in se aktivno vključeval v raziskave. Pridobljeno teoretično znanje bo preskusil na primerih vaj ter pri reševanju zahtevnih teoretičnih ali strokovno usmerjenih problemov in projektov. Vse to mu bo omogočalo lažjo vključitev v prakso po končanem študiju ter razumevanje izzivov na različnih področjih gradbeništva. Z diplomo se bo študentu odprla tudi pot do pridobitve licence za projektiranje in gradnjo najzahtevnejših stavb ter inženirskih objektov.

MASTER STUDY PROGRAM CIVIL ENGINEERING - ORIENTATION GEO- & HYDROTECHNICS

The 2nd cycle master study program Civil Engineering, orientation Infrastructural Engineering, consists of two years (four semesters) and amounts to 120 credit points. The goal of the study is to qualify experts with in-depth basic knowledge from the wider area of civil engineering, mainly with guided teaching from the areas of hydraulics and river regulation as well as analysis and design of demanding geotechnical or dam and hydrotechnical structures. The study program includes practical training, which is intended for getting to know the real work in design offices, contracting companies, institutes and administrative bodies.

During the studies students work in groups, on projects, and solve specific tasks, which helps them get accustomed to public appearance and communication with customers, as well as work on real research. All the acquired theoretic knowledge can be tested during tutorials, dealing with demanding theoretical or professional problems and projects. This helps graduates in easier transition to the working life after the studies, and to understand the challenges in different areas of civil engineering. With the finished studies, graduates can also acquire the licence for the design and construction of the most demanding buildings and engineering structures.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika III / Mathematics III | ECTS 5
- 1. izbirni predmet / 1st Elective Course | ECTS 4
- Numerične metode / Numerical Methods | ECTS 4
- Geotehnika nizkih gradenj / Geotechnics of Infrastructural Facilities | ECTS 4
- Hidravlično modeliranje / Hydraulic Modelling | ECTS 7
- Hidrološko modeliranje / Hydrological Modelling | ECTS 6
- Potresno inženirstvo / Seismic Engineering | ECTS 5
- Modeliranje geotehničnih konstrukcij / Modelling of Geotechnical Structures | ECTS 6
- Numerično modeliranje trdnin / Numerical Modelling of Solids | ECTS 6
- Projektiranje gradbenih konstrukcij / Design of Building Structures | ECTS 4
- Verjetnostni račun in statistika / Theory of Probability and Statistics | ECTS 4
- 2. izbirni predmet / 2nd Elective Course | ECTS 5

2. letnik / 2nd year

- Vodenje projektov / Project Management | ECTS 4
- Urejanje vodotokov / River Engineering | ECTS 8
- Hidrotehnični objekti / Hydraulic Structures | ECTS 8
- Eksperimentalne metode v geotehniki / Experimental Methods of Geotechnical Engineering | ECTS 6
- 3. izbirni predmet / 3rd Elective Course | ECTS 4
- Praktično usposabljanje / Practical Training | ECTS 4
- Hudourništvo / Torrent, Erosion, Rockfall and Avalande Control | ECTS 6
- Stabilnost pobočij / Slope Processes | ECTS 4
- Mehanika kamnin in podzemni objekti / Rock Mechanics and Underground Structures | ECTS 6
- Magistrsko delo / MSc Thesis | ECTS 10

Izbirni predmeti / Elective Courses

- Hidravlični stroji in naprave / Hydravlic Machines and Devices | ECTS 4
- Vodne moči / Hydroelectric Power | ECTS 4
- Numerične metode v dinamiki tekočin / Numerical Methods in Fluid Dynamics | ECTS 4
- Geotehnika okolja / Environmental Geotechnics | ECTS 5

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE STAVBARSTVO

Vsebina magistrskega študijskega programa Stavbarstvo so stavbe, njihovo notranje okolje ter njihov vpliv na ekološke sisteme, torej načrtovanje, gradnja, uporaba in odstranitev stavb. V izobraževalnem sistemu Univerze v Ljubljani je načrtovanje prostora in oblikovanje stavb del študijskih programov na Fakulteti za arhitekturo, medtem ko načrtovanje nosilne konstrukcije stavb sodi v študijski program Gradbeništvo na Fakulteti za gradbeništvo in geodezijo. V obeh uveljavljenih, tradicionalnih programih je nezadostno zastopano izobraževanje o načrtovanju stavbnega ovoja, ki obsega predvsem konstrukcijsko gradbeno fiziko in načrtovanje notranjega okolja v stavbah. Študijski program Stavbarstvo je usmerjen prav v to vmesno področje. Naravna povezanost teh treh področij se je v začetku 20. stoletja začela rahljati, po energetski krizi v sedemdesetih letih prejšnjega stoletja pa se je praktično pretrgala. Povezavo med njimi je znova vzpostavil študijski program Stavbarstvo, saj organsko povezuje načrtovanje gradbenih konstrukcij in oblikovanje prostora s sistematično obravnavo odziva in delovanja stavb.

Študijski program Stavbarstvo izhaja iz zahtev Uredbe EU 305/2011, ki opredeljuje sedem osnovnih zahtev, ki morajo biti enakovredno obravnavane v celotnem življenjskem ciklu stavbe. Tako ta program študente usposobi za načrtovanje stavb v smislu energetske učinkovitosti, zaščite pred hrupom, oblikovanja notranjega toplotnega in svetlobnega okolja, ocene okoljskega (trajnostnega) vpliva stavbe, požarne varnosti, gradbene informatike ter tudi zasnove in izračuna nosilnih konstrukcij stavbe.

ACADEMIC MASTER DEGREE PROGRAM BUILDINGS

The main focus of the study programme Buildings is buildings, their interior environment and their influence upon ecological systems; i.e. design, construction, use and demolition of buildings. The educational system within the University of Ljubljana places the fields of spatial planning and building design within the context of study programmes at the Faculty of Architecture, whereas the design of load-bearing structures belongs to the study program Civil Engineering at the Faculty of Civil and Geodetic Engineering. In both of the two well established, traditional programs, education about building envelope design is underrepresented. This field encompasses structural building physics and design of the interior environment in buildings. The study program Buildings re-established the connection between these two fields, as it binds in organic fashion the structural and spatial design by systematic consideration of buildings' response and operation.

The study program Buildings stems from the requirements of the EU Regulation No. 305/2011, where seven essential requirements are defined. These requirements need to be considered equally throughout the building's life cycle. Within the study program, students gain competences for designing buildings from the viewpoint of energy efficiency, noise protection, interior energy and ambient lighting, as well as environmental impact assessment of the building, fire safety, construction informatics, the conceptual design and the load-bearing structure design of buildings.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Uporabna geometrija / Applicable Geometry | ECTS 6
- Konstrukcijska gradbena fizika * / Constructional Building Physics | ECTS 12
- Dnevna svetloba / Daylight | ECTS 6
- 1. izbirni predmet * / 1st Elective Course | ECTS 6
- Informacijsko modeliranje stavb / Information Modelling of Buildings | ECTS 4
- Projektiranje nosilnih konstrukcij stavb ** / Design of Load-Bearing Structures of Buildings | ECTS 16
  - Zasnova konstrukcij in potresno inženirstvo / Conceptual Desig and Seismic Engineering
  - Inženirstvo / Engineering
  - Projektiranje betonskih stavb / Design of Concrete Buildings
  - Projektiranje jeklenih stavb / Design of Steel Buildings
  - Projektiranje lesenih stavb / Design of Timber Buildings
  - Geotehnično projektiranje / Geotehnical Design
- Požar / Fire | ECTS 6
- Praktično usposabljanje / Practical Training | ECTS 4

2. letnik / 2nd year

- Napredni materiali / Advanced materials | ECTS 6
- Učinkovita raba energije / Efficient Energy Use | ECTS 9
- Bivalno okolje / Living Environment | ECTS 9
- 2. izbirni predmet / 2nd Elective Course | ECTS 6
- Avtomatsko vodenje sistemov / Automatic Management of Systems | ECTS 6
- Pametna hiša / Smart House | ECTS 6
- Magistrsko delo / MSc Thesis | ECTS 18

Izbirni predmeti / Elective Courses

- Tehnologija instalacij / Technology of Installations | ECTS 6
- Izbrana poglavja gradbene informatike / Selected Chapters of Building Informatics | ECTS 6
- Športna vzgoja / Sports Education | ECTS 3

* Od šolskega leta 2016/2017 naprej izvedba v 2. semestru.
** Od šolskega leta 2016/2017 naprej izvedba v 1. semestru.
* From 2016/2017 onwards taught during 2nd semester.
** From 2016/2017 onwards taught during 1st semester.

KADER / PERSONNEL

- Predstojnik
  Head
  izr. prof. dr. Maruška Šubic Kovač
- Pedagogi
  Educators
  izr. prof. dr. Albin Rakar
  (do 30. 9. 2016)
  asist. mag. Matija Polajnar
  (do 21. 1. 2017)
  asist. dr. Peter Lamovec
  (od 1. 3. 2017)
- Sodelavca
  Associates
  asist. Marko Fatur
  asist. Špela Petelin

INŠTITUT ZA KOMUNALNO GOSPODARSTVO

V začetku obdobja 2015–2017 so se že kazali prvi znaki, da slovensko gospodarstvo prehaja iz obdobja depresije. Statistična analiza dodane vrednosti na zaposlenega po dejavnostih v obdobju 2003–2013 v Sloveniji, ki smo jo izvedli na institutu, je pokazala, da je imela finančna in gospodarska kriza večji vpliv na gradbeništvo kot na poslovanje z nepremičninami. Tudi dejavnost poslovanja z nepremičninami je izšla iz krize prej kot dejavnost gradbeništva, trg nepremičnin je relativno hitro oživel, potrebe po strokovnjakih s področja poslovanja z nepremičninami, še posebej s področja vrednotenja nepremičnin, so se pričele povečevati. Na to kažejo tudi številni klici kolegov iz prakse na fakulteto po magistrantih z znanji s tega področja.

Raziskovalna in strokovna dejavnost

Obdobje svetovne finančne in gospodarske krize je skupini znanstvenikov v svetu predstavljalo izziv za analizo razmerij med gospodarstvom, gradbeništvom in poslovanjem z nepremičninami – ta v svetovnem merilu predstavlja prvo tovrstno raziskavo. Povabljeni smo bili k sodelovanju v raziskavi, ki je trajala tri leta. Izdelan je bil model vzročne analize, ki sloni na Grangerjevem testu vzročnosti in analizira vzročnost med gospodarstvom, gradbeništvom in poslovanjem z nepremičninami v Sloveniji. Ugotovljeni so bili medsebojni vplivi med temi tremi dejavnostmi. V kritični analizi dobljenih rezultatov pa je bilo poudarjeno, da je rast bruto domačega proizvoda, ki je bil vključen v analizo, le eden izmed pokazateljev blaginje državljanov. Na blaginjo državljanov vplivajo namreč tudi številni drugi dejavniki, ki v to analizo niso bili vključeni. Poleg tega Thomas Piketty (2014), najbolj bran, citiran in kritiziran avtor leta 2015, v znani knjigi z naslovom »Kapital v 21. stoletju« ugotavlja, da je osrednja težava kapitalizma njegova težnja k vedno večji premoženjski in dohodkovni neenakosti. In prav visoka rast bruto domačega proizvoda po njegovem mnenju ustvarja nove oblike neenakosti in zato ne sme predstavljati želenega cilja gospodarstva. Toliko v razmislek.

Področje nepremičnin se v bivših socialističnih državah razvija različno. Zato smo v sodelovanju z znanstveniki iz Madžarske, Poljske in Litve opravili obširno primerjalno analizo trga nepremičnin in praks vrednotenja nepremičnin v teh državah. Ugotovili smo, da je bilo z vstopom v EU področje vrednotenja nepremičnin sicer podvrženo hitrejšemu razvoju in globalizaciji, vendar pa na tem tako dinamičnem področju še vedno ostaja veliko odprtih vprašanj.

Cenitvena poročila v Sloveniji še vedno slonijo na relativno velikem deležu subjektivne presoje cenilca. Zato smo skušali to subjektivnost zmanjšati z raziskavo vpliva stvarne služnosti na zemljišču na njegovo tržno vrednost. Simulirali smo delovanje trga nepremičnin in s pomočjo vprašalnika analizirali omenjeni vpliv v Sloveniji. Rezultati so pokazali precej manjši vpliv, kot smo ga do takrat zasledili v nekaterih cenitvenih poročilih.

MUNICIPAL ECONOMICS INSTITUTE

In the beginning of the period 2015–2017, the first signs of recovery of the Slovenian economy started to appear. Statistical analysis of added value per capita by sectors for Slovenia in the period of 2003–2013, made by the Institute, showed that financial and economic crisis had a larger impact on civil engineering than on real estate transactions. In addition, the real property sector came out of crisis sooner than the construction sector, and the real property market revived relatively quickly. The demand for experts from the area of real estate transactions increased, especially for the area of real estate valuation. This was evident also from numerous calls by partners from practice asking for MSc graduates with knowledge from this area.

Research and professional activity

The period of global financial and economic crisis was a challenge, shared by scientists around the world, to analyse the relations among the economy, the construction sector and real property transactions, which was the first such research on the global scale. We were invited to cooperate in a research that lasted for three years. A model of sample analysis was made, based on the Granger causality test. It analyses the causality between the economy, the construction sector and real estate transactions in Slovenia. Findings showed mutual influences among the three sectors. A critical analysis of the obtained results emphasised that the growth of gross national product, which was included in the analysis, is just one indicator of social welfare. There are numerous other factors that affect social welfare, which were not included in this analysis. Further on, Thomas Piketty (2014), one of the most referenced, cited and criticised authors of 2015, states in his famous book titled Capital in the Twenty-First Century that the central problem of capitalism is its aspiration towards increasing property and income inequality. In his opinion, high growth of gross national product is the main reason behind new forms of inequalities, which is why it should not represent the goal of economy. Just for a reflection!

Today the real estate sector develops differently in different former socialist countries. This was the reason for a vast comparative analysis of real estate market and real estate valuation practices in these countries, performed in cooperation with scientists from Hungary, Poland and Lithuania. It was established that with the entry of these countries into the EU zone, the real estate valuation has been subjected to faster development and globalisation, but there are still numerous open questions in this dynamic territory.

In Slovenia, valuation reports are in a relatively large share still subjective estimations of the valuer. With a research investigating the influence of material easement of a property on its market value, we aimed at reducing this subjectivity. With the help of a questionnaire, we simulated the real estate market operations and analysed the above-mentioned influence in Slovenia. Results showed much smaller influence than previously reported in several valuation reports.

In 2016 we joined COST Action 15221, dealing with the analysis of effective institutional models of cohesive teaching, learning, research and writing development in higher education.

In the professional area, we cooperated in the development of the profession in the Society of Court Experts and Valuers for the Construction Sector (SICGRAS), by preparing legal regulations and recommendations and by organising educational events.

Educational activity

The Municipal Economics Institute is involved in teaching activities at almost all study orientations.

Within the first-cycle study programs, we provide students with basic knowledge from the areas related to our work, by teaching mandatory courses: Spatial Development, Municipal Economics and Construction Legislation, Communal Technical Infrastructure, as well as with several mandatory courses on building land management and real estate valuation.

Within the second-cycle study programs, we offer students contents from municipal and building economics. In cooperation with teachers from other units, we provide students knowledge on infrastructural systems and real estate management. With the development of the real estate market in Slovenia, students showed a lot of interest in the course Real Estate Valuation, within which they prepare a valuation report for a selected real estate. The Institute's members put a lot of effort into lectures and tutorials, as well as supervision or co-supervision for diploma or master theses.

Exceptional achievement

Key findings of part of the monograph titled A Causal Analysis between Construction, Real Estate, and Economic Growth: A Case Study of Slovenia. In: ABDULAI, Raymond Talinbe (ed.). Real estate, construction and economic development in emerging market economies (Routledge studies in international real estate). 1st ed. London; New York: Routledge. 2016, 64–87, represent results of the first such analysis in Slovenia, and the monograph is the first in the world dealing with the three sectors.

V letu 2016 smo se vključili v »COST Action 15221«, ki se ukvarja z analizo učinkovitih institucionalnih modelov za povezovanje poučevanja, učenja, raziskovanja in pisanja v visokošolskem izobraževanju.

Na strokovnem področju smo sodelovali pri razvoju stroke v Združenju sodnih izvedencev in cenilcev gradbene stroke (SICGRAS), in sicer pri pripravi pravnih predpisov in priporočil ter pri organizaciji izobraževanja.

Pedagoška dejavnost

Inštitut za komunalno gospodarstvo je vključen v pedagoško delo na skoraj vseh študijskih smereh.

V okviru prvostopenjskih študijskih programov na študente prenašamo temeljno znanje področij, povezanih z našim delom, in sicer v okviru obveznih predmetov – Urejanje prostora, Komunalno gospodarstvo in gradbena zakonodaja, Komunalne naprave – ter pri več različnih obveznih predmetih o urejanju stavbnih zemljišč in vrednotenju nepremičnin.

Na drugostopenjskih študijskih programih študentom predstavljamo komunalno in stanovanjsko gospodarstvo, študente v sodelovanju s pedagogi drugih kateder seznanimo z infrastrukturnimi sistemi ter gospodarjenjem z nepremičninami. Z razvojem trga nepremičnin v Sloveniji je posebno zanimanje študentov vzbudil predmet Vrednotenje nepremičnin, pri katerem študentje za izbrano nepremičnino izdelajo tudi cenitveno poročilo. Člani inštituta veliko truda usmerjamo tako v predavanja in vaje kot tudi v mentorsko oziroma somentorsko delo pri zaključnih diplomskih oziroma magistrskih nalogah.

Izjemni dosežek

Ključne ugotovitve dela monografije z naslovom A causal analysis between construction, real estate, and economic growth: a case study of Slovenia. V: ABDULAI, Raymond Talinbe (ur.). Real estate, construction and economic development in emerging market economies (Routledge studies in international real estate). 1st ed. London; New York: Routledge. 2016, str. 64–87, predstavljajo rezultate prve tovrstne analize v Sloveniji, sama monografija pa prvič v svetu obravnava vsa tri obravnavana področja.

Ogled regijskega center za ravnanje z odpadki – RCERO Ljubljana v okviru predmeta Urejanje stavbnih zemljišč in cenilstvo
Visit to the regional waste management centre – RCERO Ljubljana within the course Building Land Development and Valuation

»Gasilsko« fotografiranje s študenti med ogledom regijskega centra za ravnanje z odpadki – RCERO Ljubljana
Group photo with students during the visit to the regional waste management centre – RCERO Ljubljana

Ogled Komunale Novo mesto v okviru predmeta Komunalno in stanovanjsko gospodarstvo
Visit to the municipal utilities company Novo mesto within the course Municipal and Housing Economics

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Tomo Cerovšek
- Pedagogi
  Educators
  prof. dr. Žiga Turk
  doc. dr. Matevž Dolenc
  doc. dr. Andreja Istenič Starčič
- Asistenta
  Assistants
  asist. dr. Robert Klinc
  izr. prof. dr. Vlado Stankovski

KATEDRA ZA GRADBENO INFORMATIKO

Katedra za gradbeno informatiko (KGI) se osredotoča na razvoj, posredovanje in uporabo naprednih informacijskih rešitev za izboljšanje informacijskih in materialnih procesov v gradbeništvu. Usmerjamo se na tista področja rabe informacijske in komunikacijske tehnologije (IKT) v gradbeništvu, ki odločilno prispevajo k digitalni transformaciji gradbene industrije.

V letih 2016 in 2017 smo se usmeril na IKT za: boljše upravljanje projektnih informacij; informacijsko modeliranje stavb (angl. BIM); visokoprepustna računska okolja; storitve v oblaku; napredne metode interoperabilnosti, procesno modeliranje ter nove tehnološke, sodelovalne in organizacijske vidike. Za uspešno delo na tako širokem področju so ključni ljudje, zato smo k sodelovanju pritegnili tudi raziskovalce iz tujine, ki so obogatili prenos znanja in načine dela ter bili vključeni v različne raziskovalne projekte.

Obdobje so zaznamovali: preverjena uspešnost preteklega raziskovalnega dela, mednarodna prepoznavnost in odmevnost pri objavah v vodilnih revijah gradbene informatike ter uspešnost pri prijavah na evropskem programu H2020. Osnovno poslanstvo katedre smo udejanjali s pedagoškim, raziskovalnim in strokovnim delom.

Pedagoško delo

Skrbeli smo za prenos različnih vrst znanj, ki jih ustvarimo v okviru raziskovalnega, aplikativnega in strokovnega dela ter za prenos dobrih praks iz tujine. Predavamo vsebine, ki so povezane s projektno komunikacijo, produktnim in procesnim modeliranjem ter računalniško podprtim načrtovanjem ter rabo IKT v celotnem življenjskem ciklu objektov. Tehnične vsebine dopolnjujemo z organizacijskimi, ekonomskimi, trajnostnimi, družbenimi in sodobnimi pedagoškimi vidiki. Vsebine učnih načrtov smo nadgrajevali z večjim poudarkom na BIM, sočasnem inženirstvu, avtomatski obdelavi podatkov, programiranju, procesnem modeliranju, na znanju podprtem inženirstvu, parametrizaciji in trajnostni gradnji. Razvoj smo usmerili tudi v študijske vsebine v povezavi s praktičnim usposabljanjem in razvojem kompetenc študentov v realnih delovnih okoljih. V okviru diplomskih del smo bili mentorji pri temah s področij aplikacij BIM, programiranja inženirskih aplikacij za mobilne naprave, vizualizacij, navidezne resničnosti, večmaterialnega trajnostnega projektiranja, modelnih tehnik upravljanja projektov (5D), razvoja modelov za proizvodnjo v merilu (3D tisk) ali dejanski velikosti (CNC) do parametričnih analiz za numerično zahtevne operacije.

Kot predavatelji in mentorji smo sodelovali tudi na tujih univerzah, kot je Dublin Institute of Technology, National Cheng Kung University, National Kaohsiung Normal University, Tajvan, University College Cork in Stanford University, kjer že več let uspešno sodelujemo v okviru projektno zasnovanega učenja.

CHAIR OF CONSTRUCTION INFORMATICS

Chair of Construction Informatics focuses on the development, exchange and use of advanced information and communication technologies (ICT) and material processes in construction. We direct our endeavours to the applications of ICT in civil engineering, which significantly contributes to the digital transformation of construction industry.

In 2016 and 2017, we focused on ICT for better project information management, building information modelling (BIM), high-performance computer environments, cloud services, interoperability process modelling and new technological, cooperative and organisational aspects. Successful work within this broad field is based on people. Thus, we invited also foreign researchers to join us in projects, and they enriched the knowledge transfer and the principles of work within the research projects they were involved in.

The period was marked by confirmed success of previous research work, international recognition and visibility in terms of publications in leading journals in the field of construction informatics, as well as success of our applications within the H2020 programme. Our fundamental mission was realised through educational, research and professional work.

Educational activity

We took care of the transfer of knowledge that was created in the framework of research, applied and professional work, as well as transfer of internationally important knowledge and best practices. Our lectures convey content related to project communication, product and process modelling, computer-supported design and use of ICT throughout the life cycle of structures. Technical content is supplemented with organizational, economic, sustainable, social and contemporary pedagogical aspects. The course contents are upgraded by emphasizing BIM, programming of engineering applications for mobile devices, visualisation, virtual reality, multi-material sustainable design, project management model techniques (5D), scale production model development (3D print) or actual size (CNC), as well as parametric analyses for numerically demanding operations.

As lecturers and supervisors, we also cooperated at foreign universities, such as Dublin Institute of Technology, National Cheng Kung University, National Kaohsiung Normal University, Taiwan, University College Cork and Stanford University, where we successfully cooperated within project-based learning.

Research activity

Our research and development activities contribute to the development of construction informatics as an interdisciplinary scientific discipline in the international environment. We continued with research in the field of information modelling, model communication, possibilities for actualisation of models with sensors, parametric studies of

high-performance computing networks, cloud services and internet of things, etc. We identified the opportunity in the field of ICT, IoT (Internet of Things) and digital models integration, because we believe that the number of the embedded IoT systems will increase significantly within the next years (e.g. smart houses or cities), as well as in cloud computing. We actively participated in the preparation of the concept "smart specialization". Appropriateness of our orientation is reflected in successfully acquired financial funds for research activities within the EU programme H2020: we successfully continued or finished the work at various projects (SWITCH, ENTICE, EINS, RR-ICT).

The Chair is the core of the research group e-Construction: the final report of the group's past financing period and consequent successful evaluation ensured prolongation of the financing for the next period.

Professional work

We took part in the development of a research competence centre, in applied projects and in other types of collaboration with the industry. These activities ensure that we directly contribute to the technological advances. Special emphasis is placed on the open BIM and the use of neutral external schemes, classifications, process standardisation and step-by-step implementation in the Slovenian industry. In the framework of knowledge transfer and publishing, we are active as reviewers for leading scientific journals, and we promote open access to knowledge. In 2016, two members of our Chair started recording podcasts BIMtalks, discussing the BIM and ICT technology in construction with guests.

Exceptional achievement

The Chair successfully finished several prominent research projects (SWITCH, ENTICE, EINS, RR-ICT) amounting to more than 0.6 million EUR for UL FGG.

Raziskovalno delo

Z raziskovalnim in razvojnim delom prispevamo k razvoju gradbene informatike kot interdisciplinarne znanstvene vede v mednarodnem okolju. Nadaljevali smo z raziskavami informacijskega modeliranja, modelne komunikacije, možnosti za aktualizacijo modelov s senzorji, parametričnih študij visokoprepustnih računskih omrežij, storitev v oblaku ter interneta stvari. Posebno priložnost smo zaznali pri integraciji IKT, predmetov in digitalnih modelov (npr. pametne hiše ali mesta) te računalništvu v oblaku. Pravilnost naše usmeritve se odraža tudi v uspešno pridobljenih sredstvih za raziskave v okviru programa EU H2020: uspešno se je nadaljevalo oziroma zaključilo delo na različnih projektih (SWITCH, ENTICE, EINS, RR-ICT).

Člani KGI predstavljajo jedro raziskovalne skupine e-Gradbeništvo, kjer smo si z zaključnim poročilom preteklega obdobja financiranja in uspešno evalvacijo zagotovili nadaljevanje financiranja za naslednje obdobje.

Strokovno delo

Sodelovali smo v kompetenčnem centru, pri aplikativnih projektih in drugih oblikah sodelovanja z industrijo tako, da neposredno v prispevamo k dvigu tehnološke ravni. Poseben poudarek namenjamo odprtemu pristopu BIM in uporabi nevtralnih eksternih shem, klasifikacijam, standardizaciji procesov in postopnemu uvajanju v slovensko industrijo. Pri širjenju znanja in publicističnega dela sodelujemo kot recenzenti pri vodilnih revijah, promoviramo odprt dostop do znanja. Člana KGI sta v letu 2016 začela s snemanjem oddaj podkasta BIMpogovori, v katerih se z gosti pogovarjata o tehnologiji BIM in IKT v gradbeništvu.

Izjemni dosežek

Katedra je uspešno zaključila več odmevnih raziskovalnih projektov (SWITCH, ENTICE, EINS, RR-ICT) v vrednosti več kot 0,6 milijona EUR za UL FGG.

Model BIM UL FGG
Model BIM UL FGG

KADER / PERSONNEL

- Predstojnica
  Head
  prof. dr. Tatjana Isaković
- Namestnik predstojnice
  Deputy head
  prof. dr. Matej Fischinger
- Pedagogi
  Educators
  akad. prof. dr. Peter Fajfar
  prof. dr. Matjaž Dolšek
  prof. dr. Boštjan Brank
  asist. dr. Jure Snoj
  asist. dr. Peter Kante
  asist. Aleš Jamšek
- Sodelavci
  Associates
  doc. dr. Iztok Peruš
  asist. dr. Mirko Kosič
  asist. dr. Blaž Zoubek
  asist. dr. Jure Žižmond
  dr. Marko Brozovič
  dr. Nuša Lazar Sinkovič
  dr. Meta Kržan
  dr. Andrej Anžlin
  Žiga Šebenik
  Gabrijela Jankovič
  Francesca Celano
  Stefano Caprinozzi

KATEDRA ZA KONSTRUKCIJE IN POTRESNO INŽENIRSTVO

Na KKPI se ukvarjamo z različnimi vidiki projektiranja gradbenih konstrukcij, predvsem s poglavitno funkcijo, ki jo ta postopek mora zagotoviti, to je zagotavljanje stabilnosti in varnosti gradbenih konstrukcij pri različnih vplivih s posebnim poudarkom na potresni obtežbi.

Raziskovalna in strokovna dejavnost

Na KKPI se ukvarjamo z raziskavami in razvojem naprednih metodologij in orodij za analizo in projektiranje konstrukcij, še posebej smo aktivni na področju potresnega inženirstva. Ponašamo se z dolgoletnim uspešnim sodelovanjem z najbolj uglednimi institucijami na svetu, kot so npr. ENS Cachan, Univerza v Tokiu, Univerza v Stanfordu, UC Berkeley in laboratorij ELSA v Ispri.

Glavna področja našega raziskovanja so sodobne metode za analizo in projektiranje najbolj kompleksnih vrst konstrukcij ter razvoj teoretičnih osnov in aplikativnih metod in orodij za potresno zaščito konstrukcij. Temeljne raziskave so bile vedno osnova za nadaljnje aplikativne študije, ki so botrovale številnim družbeno pomembnim dosežkom. Tako so rezultati naših dosedanjih raziskav in ekspertiz bistveno pripomogli k povečanju potresne varnosti številnih zelo pomembnih objektov, kot so npr. nuklearne elektrarne, pomembni viadukti in nakupovalna središča. Družbeno pomembne so bile tudi raziskave bolj običajnih tipov konstrukcij, ki se uporabljajo vsakodnevno, kot so npr. stanovanjske stavbe in industrijski objekti.

Zelo tesno sodelujemo z različnimi podjetji v Sloveniji in tujini. Rezultati tega sodelovanja so številni novi in izboljšani postopki projektiranja za različne tipe gradbenih konstrukcij. Veliko pozornosti namenjamo razvoju in uporabi novih tehnologij (npr. potresni izolaciji) in novih, okolju prijaznih materialov pri izboljšavah potresne varnosti različnih konstrukcij.

Dejavno sodelujemo pri razvoju in implementaciji evropskih standardov v projektantsko prakso. V letih 2016 in 2017 so bili člani naše katedre na razpisu CEN TC 250 uradno vključeni v delovne skupine za nadaljnji razvoj skupnih evropskih standardov za projektiranje na potresnih področjih Evrokod 8/1 in Evrokod 8/3. V predlog novih verzij teh standardov so vključene tudi metodologije in postopki, ki smo jih razvili na KKPI v okviru svojega raziskovalnega dela. Na ta način smo pomembno prispevali k potresni varnosti ne samo v Sloveniji, pač pa tudi širše v Evropi.

CHAIR FOR STRUCTURAL AND EARTHQUAKE ENGINEERING

Members of the Chair are dealing with various aspects of structural design, in particular with the main function this procedure has to ensure, i.e. stability and safety of structures, with special emphasis on earthquake load.

Research and professional activity

The Chair is involved in research in the field of advanced methodologies for structural analysis and design, in particular in the field of earthquake engineering. A strong collaboration network has been established with the most eminent institutions worldwide, e.g. ENS Cachan, University of Tokyo, Stanford University, UC Berkeley and ELSA Laboratory in Ispra.

The main thematic focus areas of the research are advanced analysis and design techniques for the most complex structures, as well as the development of the theoretical background, applied analysis and tools for seismic protection of structures. The fundamental research is typically conducted to provide the basis for further applied studies, the results of which are placed to the service of society. The results and expertise obtained so far have improved the seismic safety of structures of outmost importance, such as nuclear power plants, main viaducts and shopping centres. The conducted research devoted to more common and more numerous structures, such as residential and industrial building stock, is of particular social relevance as well.

Strong partnership has been established with the industry in Slovenia and abroad. The cooperation has resulted in new and improved design techniques for different types of structures. Significant attention is devoted to the development and application of the new technologies (e.g. seismic isolation) and new environment-friendly materials for the improvement of seismic safety of different types of structures.

We are actively involved in the development and implementation of the relevant European norms and their application to design practice. In 2016 and 2017, the members of our Chair were officially included at the public tender of CEN TC 250, in the work groups for further development of European norms for the design at seismic areas, Eurocode 8/1 and Eurocode 8/3. The proposal of the new versions of these norms includes also methodologies and procedures developed by the members of our Chair within their research work. In this way, we considerably contributed to the seismic safety not only in Slovenia, but also in the wider European area.

Educational activites

Members of the Chair provide courses at all levels of study at different thematic areas. The courses deal with various areas that are tightly linked to our research and professional work: dynamics of structures and earthquake engineering, design and non-linear analysis of buildings and bridges in seismic areas, reliability analysis in earthquake engineering, analysis of slab and shell structures, finite element analysis, interdisciplinary IT supported design of structures, etc.

Our study programs are clearly focused and they meet the highest standards. The courses' curricula are constantly upgraded to provide the students the information of the recent advances in the field. Innovative and up-to-date teaching methods and tools are used. We were among the pioneers who introduced the multidisciplinary project based IT supported study of design of structures. For this advanced teaching approach, we were awarded by the Faculty of Education at the University of Ljubljana.

The best students are given the opportunity to be involved into research projects as postgraduate students funded by the Ministry of Education, Science and Sport of the Republic of Slovenia. Many of them have outstanding professional careers and take high positions in the profession and society.

Exceptional achievement

Academician, Prof. Dr. Peter Fajfar, for many years Head of the Chair for Structural and Earthquake Engineering, founder and for many years leader of the research group Earthquake Engineering, received the highest national and international awards for his research work, which is, as he always says, intertwined with the activities of the whole research group. The highest possible award at the national level is the Zois award that he received in 2015. As written in the justification of the award, »Peter Fajfar founded the contemporary earthquake engineering in Slovenia and with his achievements he contributed considerably that this field of science became one of the most prominent areas in Europe and in the world«. Let us also mention that in its many years of existence only four representatives of engineering sciences have so far received this prestigious award in the field of science, which increases the importance of this achievement even further.

Pedagoška dejavnost

Na KKPI predavamo predmete na vseh stopnjah študija in različnih smereh. Predmeti se nanašajo na različna področja, tesno povezana z našim raziskovalnim in strokovnim delom: dinamika konstrukcij in potresno inženirstvo, projektiranje in nelinearna analiza stavb in mostov na potresnih področjih, zanesljivost konstrukcij v potresnem inženirstvu, analiza ploskovnih in lupinastih konstrukcij, metoda končnih elementov, interdisciplinarni projektni študij računalniško podprtega projektiranja konstrukcij itd.

Naši študijski programi so jasno opredeljeni in izpolnjujejo najvišje standarde. Učne vsebine nenehno razvijamo in izpopolnjujemo ter tako študente seznanjamo z najnovejšimi dosežki na področjih, ki jih obravnavajo naša predavanja. Pri tem uporabljamo najsodobnejše tehnike in orodja za poučevanje. Tako smo med prvimi vpeljali interdisciplinarni projektno orientirani študij, podprt z najsodobnejšimi orodji informacijske tehnologije. Za ta inovativni pristop k poučevanju smo prejeli nagrado Pedagoške fakultete Univerze v Ljubljani.

Najboljšim študentom omogočamo, da se kot mladi raziskovalci, ki jih financira Ministrstvo za izobraževanje, znanost in šport Republike Slovenije, vključijo v raziskovalno delo na različnih projektih. Mnogo med njimi jih je ustvarilo izjemne poklicne kariere in so zasedli pomembne položaje v stroki in v družbi.

Izjemni dosežek

Dolgoletni predstojnik KKPI, ustanovitelj in dolgoletni vodja raziskovalne skupine »Potresno inženirstvo«, akad. prof. dr. Peter Fajfar, je prejel najvišja nacionalna in mednarodna priznanja za raziskovalno delo, ki je, kot sam vedno poudarja, vtkano v aktivnosti cele raziskovalne skupine. Najvišje možno priznanje na nacionalni ravni je Zoisova nagrada, ki jo je prejel v letu 2015. Kot je bilo zapisano v obrazložitvi nagrade, »je Peter Fajfar utemeljil sodobno potresno inženirstvo v Sloveniji in s svojimi dosežki odločilno prispeval, da se je ta veja znanosti povzpela v najožji evropski in svetovni vrh.« Omenimo, da so to prestižno nagrado na področju znanosti v njenem dolgoletnem obstoju prejeli le štirje predstavniki inženirskih ved, kar še bolj poudarja pomen dosežka.

Akademik prof. dr. Peter Fajfar, Zoisov nagrajenec za življenjsko delo
Academian, Prof. Dr. Petrer Fajfar, Zois Prize Winner for Lifetime Achievement

KADER / PERSONNEL

- Predstojnik
  Head
  izr. prof. dr. Jože Lopatič
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Sebastjan Bratina
- Pedagog
  Educator
  doc. dr. Drago Saje
- Tehnični sodelavec
  Technical associate
  Igor Valjavec
- Sodelavca
  Associates
  asist. Žiga Krofl
  (od 10. 10. 2016)
  asist. Uroš Gantar
  (od 9. 1. 2017)

Eksperimentalne preiskave obnašanja natezno obremenjenih armiranobetonskih elementov
Experimental testing of the behaviour of stress loaded reinforced concrete elements

KATEDRA ZA MASIVNE IN LESNE KONSTRUKCIJE

Katedra za masivne in lesene konstrukcije raziskovalno, strokovno in pedagoško deluje na širšem področju gradbenih konstrukcij in pokriva armirane in prednapete betonske konstrukcije ter sovprežne, zidane in lesene konstrukcije. Konstrukcijam iz vseh teh materialov je skupno, da materialna in geometrijska nelinearnost ter reološke lastnosti pomembno vplivajo na njihovo obnašanje. Pri armiranem in prednapetem betonu imamo opravka s »kompozitnim materialom«, ki je izrazito nehomogen – sestavljajo ga med seboj zelo različni materiali, ki se že vsak posebej obnaša izrazito nelinearno.

Raziskovalno in strokovno delo

Raziskave mehanskih in reoloških lastnosti betona glede na sestavo betonske mešanice. Cilj trenutnih preiskav je razvoj primernih receptur betonov visoke trdnosti, izdelanih iz domačih materialov. Ukvarjamo pa se tudi z razvojem in raziskovanjem lastnosti mikroarmiranih betonov. Razvijamo nove vrste betonov, ki so ali trajnejši, kjer je to bistvena zahteva, in/ali trdnejši pri velikih tlačnih obremenitvah. Dobro poznavanje mehanskih in reoloških lastnosti betona je podlaga za nelinearno analizo armiranih in prednapetih betonskih konstrukcij.

Izdelava teoretičnih podlag in programske opreme za realistično nelinearno analizo obnašanja armiranih in prednapetih betonskih konstrukcij, sovprežnih in lesenih konstrukcij. Pri tem obravnavamo odziv konstrukcij na zunanje vplive pri običajnih projektnih stanjih in povišani temperaturi v razmerah požara. V analizi zajamemo materialno in geometrijsko nelinearnost, reologijo materialov, vpliv postopnosti gradnje, vpliv lokalizacije deformacij in materialno mehčanje. Razvita programska oprema omogoča reševanje najzahtevnejših konkretnih problemov iz prakse.

Laboratorijske preiskave obnašanja nosilnih elementov iz armiranega in prednapetega betona ter sestavljenih lesenih elementov z vključenimi kovinskimi ali nekovinskimi ojačitvami. Laboratorijske in terenske preiskave odziva konstrukcijskih elementov na mehanske obtežbe ali vplive okolja, vključno z rednimi obremenilnimi preizkušnjami različnih premostitvenih objektov, kot so mostovi, viadukti, nadvozi in podvozi, pred predajo objektov v uporabo.

Sodelovanje s podjetji iz gospodarstva pri razvoju inovativnih armiranih in prednapetih betonskih, sovprežnih in lesenih konstrukcijskih elementov in sistemov je stalnica našega delovanja. V zadnjem obdobju pa z gospodarstvom sodelujemo tudi preko projekta TIGR4smart, ki je sofinanciran v okviru »Strategije pametne specializacije Slovenije«.

CHAIR OF CONCRETE, MASONRY AND TIMBER STRUCTURES

The Chair of Concrete, Masonry and Timber Structures is active in research, professional and educational work covering the wider area of building structures. Our main focus is on reinforced and prestressed concrete structures, composite, masonry and timber structures. Structures made of all these materials share the same material and geometric nonlinearity as well as rheological properties that affect their behaviour considerably. Reinforced and prestressed concretes represent »composite material«, which is extremely non-homogeneous and consists of very diversified materials, each of them behaving extremely nonlinearly.

Research and professional work

Research of mechanical and rheological properties of concrete related to the concrete mix composition. The aim of the latest investigations is the development of adequate recipes for high strength concretes made of local materials. We also develop and investigate the properties of micro-reinforced concretes. We develop new types of concrete with longer life span, where durability is the essential demand, and/or concretes with higher strength in case of large compressive load. Good knowledge of mechanical and rheological concrete properties is the basis for the elaboration of nonlinear analysis of reinforced and prestressed concrete structures.

Elaboration of theoretic bases and software for realistic nonlinear analysis of the behaviour of reinforced and prestressed concrete structures, composite and timber structures. Within this area we investigate the structural response to external impacts in cases of normal design conditions and in cases of elevated temperatures during fire. The analysis includes material and geometric nonlinearity, rheology of materials, the influence of gradual construction, the influence of localized deformations and material softening. The developed software allows solving the most demanding real-life problems from practice.

Laboratory investigations into the behaviour of load-carrying elements made of reinforced and prestressed concrete as well as composite timber elements with metal or non-metal reinforcements. The laboratory and field investigations are focused on the response of structural elements on the mechanical loads or impacts from the environment, including regular load tests of various bridging structures, such as bridges, viaducts, cross-overs and underpasses, before they are handed over to public use.

We continuously cooperate with the industry in the development of innovative reinforced and prestressed concrete, composite and timber structural elements and systems. Lately, we also cooperate with the economy within the project TIGR4smart, financed within the »Strategy of Smart Specialisation of Slovenia«.

Educational activity

With the courses taught by the members of the Chair of Concrete, Masonry and Timber Structures, we transfer to our students the knowledge about the behaviour of non-reinforced, reinforced and prestressed concrete structures as well as composite, masonry and timber structures. Students learn about the procedures for their design, and once they master these bases, they also learn about proper conceptual design, modelling, analysis and design of load-carrying structural elements.

In different study programs, students are offered the following courses: Concrete Structures, Concrete and Masonry Structures, Timber Structures, Design of Building Structures, Introduction to Timber and Steel Structures, Introduction to Concrete and Masonry Structures, Concrete Buildings, Concrete Bridges, Design of Load-Bearing Structures of Buildings, Selected Chapters from Concrete and Masonry Structures, Engineering Timber Structures and Seminar from the Design of Concrete and Masonry Structures. Some courses are offered also as elective contents, some of them are available within modules, while others are obligatory for specific study programs. As a rule, the courses are provided in the form of lectures, complemented by laboratory and seminar tutorials or seminars dealing with practical cases. An exception is the course Seminar from the Design of Concrete and Masonry Structures, where students learn conceptual design and design of concrete buildings and bridges in the form of seminars and tutorials. The teaching process is complemented by expert field trips. We visit current building sites, production plants for concrete mix ingredients, production plants for prefabricated concrete and timber products and production plants for prefabricated elements used in concrete or timber structures.

Exceptional achievements

In 2015, members of the Chair were authors of two articles published in distinguished international journals: an article titled Reduction of the Early Autogenous Shrinkage of High Strength Concrete in the journal Advances in Materials Science and Engineering and an article titled Semi-Analytical Buckling Analysis of Reinforced Concrete Columns Exposed to Fire in the Fire Safety journal. We have also elaborated several expert opinions for our partners, dealing with the most demanding professional problems. Each year we are actively involved in the organisation of the Conference of Structural Engineers of Slovenia, one of the oldest and most important such events in Slovenia.

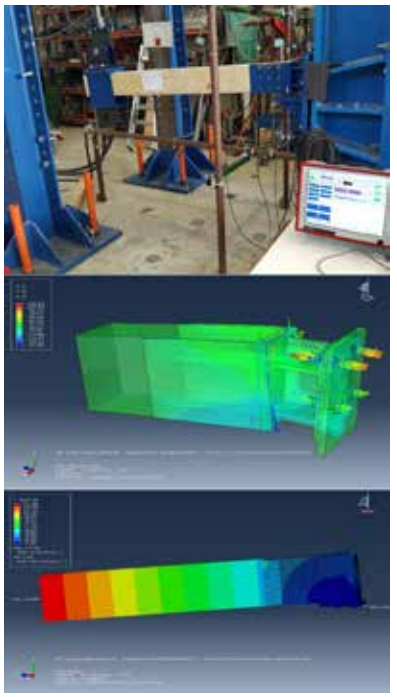
Pedagoška dejavnost

V okviru predmetov, ki jih pedagoško pokriva Katedra za masivne in lesene konstrukcije, se študentje seznanijo z obnašanjem nearmiranih, armiranih in prednapetih betonskih konstrukcij ter sovprežnih, zidanih in lesenih konstrukcij, spoznajo postopke za njihovo dimenzioniranje; ko obvladajo te osnove, se naučijo še smotrnega snovanja, modeliranja, analize ter konstruiranja elementov nosilnih sistemov konstrukcij.

Slušatelji v različnih študijskih programih lahko sodelujejo pri naslednjih predmetih: Betonske konstrukcije, Masivne konstrukcije, Lesene konstrukcije, Projektiranje gradbenih konstrukcij, Osnove lesenih in jeklenih konstrukcij, Osnove betonskih in zidanih konstrukcij, Masivne stavbe, Masivni mostovi, Projektiranje nosilnih konstrukcij stavb, Izbrana poglavja iz masivnih konstrukcij, Inženirske lesene konstrukcije in Seminar iz projektiranja masivnih konstrukcij. Del predmetov je iz nabora izbirnih posameznih predmetov, nekaj jih je možno izbrati v okviru izbire modulov, del predmetov pa je za posamezne študijske programe obvezen. Praviloma se predmeti izvajajo v obliki predavanj, ki jih dopolnjujejo laboratorijske in seminarske vaje ali seminarji z obravnavo praktičnih primerov. Izjema pri tem je predmet Seminar iz projektiranja masivnih konstrukcij, pri katerem se študentje učijo snovanja in projektiranja masivnih stavb in mostov, kjer delo poteka v obliki seminarja in vaj. Strokovne ekskurzije dopolnjujejo učni proces. V okviru pedagoškega procesa obiskujemo aktualna gradbišča, obrate za proizvodnjo surovin betonskih mešanic, obrate za izdelavo betonskih ali lesenih prefabriciranih proizvodov ter obrate za izdelavo elementov montažnih betonskih ali lesenih objektov.

Izjemni dosežki

Sodelavci katedre so v letu 2015 kot avtorji ali soavtorji objavili dva prispevka v uglednih mednarodnih revijah, in sicer članek z naslovom Reduction of the early autogenous shrinkage of high strength concrete v reviji Advances in Materials Science and Engineering ter članek z naslovom Semi-analytical buckling analysis of reinforced concrete columns exposed to fire v reviji Fire Safety Journal. Poleg tega so naši sodelavci za zunanje naročnike izdelali več ekspertiz glede najzahtevnejših strokovnih problemov. Vsako leto pa so ključno pripomogli tudi k organizaciji Zborovanj gradbenih konstruktorjev Slovenije, ki so ena najstarejših in najpomembnejših tovrstnih srečanj pri nas.



Eksperimentalne preiskave in numerična simulacija obnašanja priključka lesenega stebra
Experimental testing and numerical simulations of the behaviour of the connecting timber column

Študentje pri predmetu Inženirske lesene konstrukcije med ekskurzijo v podjetju Hoja
Students in the course Engineering Timber Structures, during a visit at the Hoja company

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Zvonko Jagličić
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Gašper Jaklič
- Pedagogi
  Educators
  doc. dr. Jure Kokalj
  izr. prof. dr. Marjeta Kramar Fijavž
  izr. prof. dr. Ganna Kudryavtseva
  izr. prof. dr. Mitja Lakner
  asist. dr. Marjeta Škapin Rugelj
- Sodelavka
  Associate
  mag. Mojca Premuš

KATEDRA ZA MATEMATIKO IN FIZIKO

Za razumevanje naravnih pojavov je nujno poznavanje matematike in fizike, zato sta ti dve področji za inženirski študij ključni. Predstavljata jezik za formulacijo inženirskih problemov ter hkrati zagotavljata osnovno orodje za njihovo reševanje. Pomembni sta tudi za raziskovalno delo na katerem koli področju tehnike.

Raziskovalna in strokovna dejavnost

Člani Katedre za matematiko in fiziko so po izobrazbi in habilitacijah učitelji, asistenti in strokovni sodelavci s področij matematike in fizike. Sodelujejo pri raziskovalnih projektih na UL FGG in drugih fakultetah ljubljanske univerze: Fakulteti za arhitekturo, Fakulteti za matematiko in fiziko, Fakulteti za kemijo in kemijsko tehnologijo, ter inštitutih: Inštitutu za matematiko, fiziko in mehaniko (IMFM), Institutu »Jožef Stefan« (IJS) in Inštitutu Andrej Marušič. Dejavni so tudi v mednarodnem okolju.

Matematiki raziskovalno delujejo na različnih področjih, kot so: numerična matematika, teorija operatorjev, teorija kaosa in dinamičnih sistemov, algebra, linearna algebra ter kompleksna analiza. V okviru numerične matematike se ukvarjajo s teorijo aproksimacije in z računalniško podprtim geometrijskim načrtovanjem (CAGD). Študirajo probleme interpolacije in aproksimacije s polinomskimi in racionalnimi krivuljami ter zlepki. Z operatorskimi polgrupami obravnavajo rešitve sistemov parcialnih diferencialnih enačb in jih uporabljajo za modeliranje različnih procesov na omrežjih ter v teoriji upravljanja. Ukvarjajo se z modeliranjem procesov v kemijskem inženirstvu, ki potekajo v mikro kanalih. To je uporabno npr. za modeliranje sušenja in sintranja perlitne plošče v mikrovalovni peči. Sodelujejo tudi z drugimi raziskovalnimi skupinami na fakulteti, predvsem pri razvoju in implementaciji različnih statističnih in numeričnih metod. Kot primer omenimo sodelovanje pri modeliranju prometnih tokov, pri upravljanju vodovodnih sistemov ali pri modeliranju funkcionalnih regij.

Fiziki so znotraj UL FGG aktivni na področju neporušnih preiskav in gradbene fizike. Vodijo projekt ARRS Senzorske tehnologije pri kontroli posegov v objekte kulturne dediščine. S sodelavci s Fakultete za elektrotehniko UL, Mednarodne podiplomske šole Jožefa Stefana, IJS in IMFM razvijajo metode in senzorje za spremljanje konstrukcijskih in nekonstrukcijskih posegov v objekte kulturne dediščine.

Raziskujejo tudi magnetne lastnosti številnih novih materialov za uporabo v medicini, zmogljivejših baterijah in v novi veji elektronike – spintroniki. Preko numeričnih simulacij večdelčnih kvantnih sistemov raziskujejo tudi elektronske lastnosti močno koreliranih sistemov. Pokazali so na primer, da je za razumevanje prevodnosti v veliki družini materialov, imenovanih slabe kovine, poleg difuzijske konstante zelo pomembna tudi nabojna susceptibilnost.

CHAIR OF MATHEMATICS AND PHYSICS

Knowledge of mathematics and physics is indispensable for understanding natural phenomena. For this reason, these two areas are of key importance for the engineering studies. They are the language for the formulation of engineering issues and at the same time provide the basic tool for their solving. They are also important for the research work in any field of engineering.

Research and professional activity

Members of the Chair of Mathematics and Physics are teachers, assistants and professional associates with habilitation from mathematics and physics. They cooperate in research projects at the Faculty of Civil and Geodetic Engineering as well as at other faculties of the University of Ljubljana: Faculty of Architecture, Faculty of Mathematics and Physics, Faculty of Chemistry and Chemical Technology, and with institutes: Institute of Mathematics, Physics and Mechanics (IMFM), Jožef Stefan Institute (IJS), Andrej Marušič Institute. They are also active in the international environment.

Mathematicians are active in research of numerical mathematics, operator theory, chaos theory and dynamical systems, algebra, linear algebra and complex analysis. Within numerical mathematics, we are engaged in the approximation theory and computer-aided geometric design (CAGD). We study interpolation and approximation problems with polynomial and rational curves and splines. Using operator semi-groups we search for solutions of systems of partial differential equations and use them for modelling various processes in networks and in control theory. Within chemical engineering we model processes appearing in micro-channels. This is useful for example for modelling drying and sintering of perlite plates in the microwave oven. We also collaborate with other research groups at our faculty, mainly in the development and implementation of various statistical and numerical methods. As an example, we cooperate in the modelling of traffic flows, in controlling water distribution networks or modelling functional regions.

Physicists are involved in the field of non-destructive testing in civil engineering and building physics. They coordinate a national research project Sensor Technologies in Diagnostics and Monitoring of Cultural Heritage Buildings. In cooperation with researchers from Faculty of Electrical Engineering, Jožef Stefan International Postgraduate School, IJS, and IMFM, they develop experimental methods and sensors for monitoring structural and non-structural injections in cultural heritage buildings.

They research magnetic properties of various new materials for use in medicine, high-capacity batteries and new kind of electronics spintronics. With the use of numerical simulations of quantum many-body systems, they research electronic properties of strongly correlated systems. They showed, for example, that for understanding the conductivity of a large class of materials called bad metals, besides diffusion constant also the charge susceptibility is very important.

Educational activity

The Chair members provide for the basic knowledge from mathematics, statistics and general physics in the study programs of civil engineering, geodesy, environmental engineering, as well as building physics at the studies of civil engineering and buildings. We are engaged in the teaching process of all three cycles of studies. The courses in the first and second cycles are taught in the classical manner by lectures and seminar tutorials in small groups. In general physics, the emphasis is on demonstration experiments. At the second cycle studies, the teaching is supplemented by project and seminar tasks by using computer tools. The third cycle study is designed with a higher level of individual work and is adapted to the students' wishes and needs. We also cooperate as supervisors or co-supervisors in final theses.

The latest higher education textbooks written by or in cooperation with the Chair members are:

Discrete Dynamic Systems (Lakner, Petek, Škapin Rugelj, 2015), Introduction to Physics: Mechanics, Thermodynamics and Molecular Physics (Peternelj, Kranjc, 2014), Introduction to Building Physics (Peternelj, Jagličić, 2014), Mathematics 1. Part 1, Mappings, Numbers and Vector Spaces (Lampret, 2013).

Exceptional achievements

An article of Jure Kokalj, *Bad-metallic Behavior of Doped Mott Insulators*, was published 2017 in the distinguished Journal Physical Review B. Ganna Kudryavtseva and Mark V. Lawson published *A Perspective on Non-commutative Frame Theory* in Advances in mathematics. In co-authorship of Zvonko Jagličić a manuscript *A High-Temperature Quantum Spin Liquid with Polaron Spins* was published in Nature Physics. Marjeta Kramar Fijavž is a co-author of textbook *Positive Operator Semigroups – From Finite to Infinite Dimensions* published by the international publishing house Birkhäuser/Springer.

Pedagoška dejavnost

Člani katedre pokrivajo potrebe strokovnih predmetov po znanju iz matematike in statistike ter splošne fizike na študiju gradbeništva, geodezije in okoljskega inženirstva ter gradbene fizike na študijih gradbeništva in stavbarstva. Sodelujejo na vseh treh stopnjah študija. Predmeti na prvi stopnji potekajo klasično s predavanji in seminarskimi vajami v manjših skupinah. Pri splošni fiziki je poudarek na demonstracijskih poskusih. Na drugi stopnji delo dopolnjujejo tudi projektne in seminarske naloge, po možnosti z uporabo računalniških orodij. Študij na tretji stopnji je bolj individualno zasnovan, prilagojen željam in potrebam študentov. Sodelujejo tudi kot mentorji oziroma somentorji pri zaključnih delih.

Najnovejši visokošolski učbeniki, katerih (so) avtorji so člani katedre, so:

Diskretni dinamični sistemi (Lakner, Petek, Škapin Rugelj, 2015),

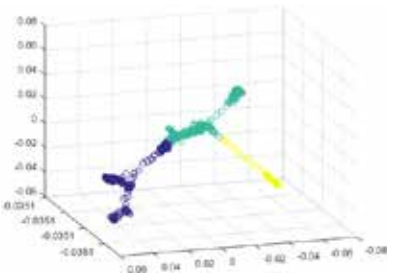
Osnove fizike: mehanika, termodinamika in molekularna fizika (Peternelj, Kranjc, 2014),

Osnove gradbene fizike (Peternelj, Jagličić, 2014),

Matematika 1. Del 1, Preslikave, števila in vektorski prostori (Lampret, 2013).

Izjemni dosežki

Članek Jureta Kokalja, *Bad-metallic behavior of doped Mott insulators*, je leta 2017 izšel v ugledni reviji Physical Review B. Ganna Kudryavtseva je s kolegom Markom V. Lawsonom objavila članek *A perspective on non-commutative frame theory* v reviji Advances in Mathematics. Zvonko Jagličić je s sodelavci z IJS objavil članek *A high-temperature quantum spin liquid with polaron spins* v reviji Nature Physics. Marjeta Kramar Fijavž je soavtorica učbenika *Positive Operator Semigroups – From Finite to Infinite Dimensions* pri mednarodni založbi Birkhäuser/Springer.



Spektralne točke in pripadajoče razbitje danega vodovodnega omrežja na tri merilna območja. Avtor slik je Jure Zevnik.
Spectral points and corresponding partition of the given water distribution network to three district metered areas. Figures by Jure Zevnik.

KADER / PERSONNEL

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  prof. dr. Goran Turk
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  doc. dr. Gregor Trtnik
  doc. dr. Eva Zupan
  asist. dr. Bojan Čas
  asist. dr. Urban Rodman
  strok. sod. Mitja Plos
  strok. sod. Tamara Šuligoj
- Mladi raziskovalci
  Young researchers
  Barbara Fortuna
  Urška Dolinar

KATEDRA ZA MEHANIKO

Katedra za mehaniko je ena najstarejših pedagoško raziskovalnih enot UL FGG, saj pod različnimi imeni deluje vse od ustanovitve Tehniške fakultete leta 1919.

Raziskovalno in strokovno delo

Člani KM se ukvarjamo s preučevanjem zahtevnih problemov s področja konstrukcij. Razvijamo sodobne računske metode za analizo napetostnega in deformacijskega stanja vseh vrst inženirskih konstrukcij. Pri našem delu se tesno prepletata in dopolnjujeta teoretično in eksperimentalno delo. Področja dela naše katedre so široka, vendar medsebojno tesno povezana. Detajlno nas zanimajo problemi, povezani z gibanjem in deformiranjem sistema teles, nelinearne analize prostorskih linijskih konstrukcij, stabilnostni problemi vseh vrst kompozitnih konstrukcij, ki so sestavljene z delno povezanimi sloji, problemi, povezani z zahtevnimi kemijskimi, hidrološkimi, toplotnimi in mehanskimi procesi v poroznih materialih v normalnih pogojih in pri povišanih temperaturah med požarom, modeliranje nelinearnega obnašanja vseh vrst materialov, s poudarkom na mehčanju in eksplozijskem luščenju betona, ter aplikacije statističnih metod v teoriji konstrukcij. Za analizo obnašanja konstrukcij razvijamo verificirane in validirane računske metode in pripadajoče računalniške programe. Ti so namenjeni načrtovanju najzahtevnejših inženirskih konstrukcij, na primer načrtovanju nosilne konstrukcije predora med najintenzivnejšim požarom. Velik del naših raziskav predstavlja eksperimentalno delo. Veliko pozornosti posvečamo implementaciji sodobnih neporušnih metod za določanje materialnih lastnosti armiranobetonskih konstrukcij med požarom in po požaru. Z ultrazvočnimi metodami raziskujemo lastnosti svežih in strjenih betonov, s porušnimi in neporušnimi eksperimentalnimi metodami pa razvijamo avtomatiziran postopek za razvrščanje iglavcev in listavcev.

CHAIR OF MECHANICS

Chair of Mechanics is one of the Faculty's oldest educational and research units; with changing names, it has been active from the very foundation of the Technical Faculty in 1919.

Research and professional activity

Members of the Chair of Mechanics follow modern trends in the development of structural mechanics, engineering problems in modern structures and other research fields, such as numerical mechanics, applied mathematics and reliability of structures. Our main interests are dynamic behaviour of the systems of rigid or deformable bodies, numerical models for the analysis of spatial frame and shell structures, challenging stability problems of composite structural elements, coupled problems of heat and mass transfer in porous material, non-destructive experiments of structures and material with the emphasis on concrete, asphalt materials and timber, and non-linear modelling of structural material, specifically the influences of softening. The evaluation of numerical models of the group is based on both verification and validation. Validation of the models employed is mostly based on experimental work and the data obtained from this work, which is an important advantage. The final result of programme will be specialized advanced computer programs for the analysis and design of demanding engineering products.

Educational activity

Members of the Chair of Mechanics have wide experiences in teaching various courses in the field of structural mechanics, numerical methods in mechanics, fire safety, statistics and reliability of structures for undergraduate and postgraduate students. In academic years 2015-2016 and 2016-2017 they organized two National Competitions in Structural Mechanics with the main purpose to spread the knowledge and experiences of research work among secondary school pupils. In this members of the chair supervised six master theses and eight PhD theses. The head of the chair Igor Planinc has also been invited on national radio to present his work to wider audience as a well-recognized expert in the fields of mechanics and civil engineering.

Exceptional achievement

In the period 2015-2017 we published several original scientific papers, including nine articles in indexed journals of the upper half of SCI database. Among them the paper by J. Pirc, G. Turk, and M. Žura: Using the robust statistics for travel time estimation on highways, published in IET intelligent transport systems, is the most highly rated.

Pedagoško delo

Katedra skrbi za pouk temeljnih predmetov s področja mehanike konstrukcij, numeričnih metod v mehaniki, statističnih metod in zanesljivosti konstrukcij na vseh dodiplomskih in podiplomskih študijskih programih FGG ter predmete s področja požarne varnosti konstrukcij. V študijskih letih 2015-2016 in 2016-2017 smo organizirali tekmovanji iz znanja za srednješolce in objavili poročili z rešitvami tekmovalnih nalog. V tem obdobju so bili člani skupine mentorji ali somentorji pri šestih magistrskih delih in osmih doktorskih disertacijah. Vodja skupine Igor Planinc je bil povabljen tudi k sodelovanju v radijski oddaji Podobe znanja kot prepoznaven strokovnjak na področju gradbeništva in mehanike.

Izjemni dosežek

V obdobju 2015-2017 so člani katedre objavili številne izvirne znanstvene članke, med njimi kar devet člankov v revijah, ki po kakovosti spadajo v zgornjo polovico baze SCI. Izpostavimo članek avtorjev J. Pirc, G. Turk, and M. Žura: Using the robust statistics for travel time estimation on highways, ki je bil objavljen v IET intelligent transport systems in spada v kategorijo A'.

Meritve vibracij
Measurements of vibrations

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  asist. dr. Matej Maček
  asist. Katarina Sirk
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  Associates
  prof. dr. Bojan Majes
  asist. dr. Jasna Smolar
  mag. Sebastjan Kuder
  Aleš Oblak
  Miran Merc
  izr. prof. dr. Vojkan Jovičić

Reometer, s katerim smo na Katedri za mehaniko tal vpeljali meritve reoloških lastnosti sedimentov iz vodnih okolij, zalivnih mas in drugih sorodnih materialov
Rheometer introduced at the Chair of Soil Mechanics for the investigations of rheological properties of sediments from water environments, injection masses and other similar materials

KATEDRA ZA MEHANIKO TAL Z LABORATORIJEM

Geotehnika povezuje grajeno in naravno okolje. Tla s svojo nehomogenostjo in nepredvidljivostjo ter naravno pogojeni dejavniki tveganja, kot so potresi in ekstremni vremenski pojavi, na katere se tla odzivajo s podori, plazovi in drugimi oblikami porušitev, postavljajo geotehniko na posebno mesto znotraj gradbeniških znanosti. Naloga geotehnika je preučiti sestavo in lastnosti tal, zagotoviti ustrezno temeljenje gradbenih objektov, varnost pobočij, izbrati ustrezne materiale za gradnjo nasipov in predpisati primerno tehnologijo gradnje. Skrb za racionalno rabo prostora upravičeno potiska gradbene posege v tehnično manj primerna tla, zato predstavljajo pomembno področje geotehnike tudi tehnologije izboljšanja mehanskih in fizikalnih lastnosti tal. Poseben izziv so gradnje na degradiranih tleh s preseženimi koncentracijami težkih kovin, soli in drugih onesnaževal v tleh in podzemni vodi.

Raziskovalna in strokovna dejavnost

V letu 2016 smo pridobili tri-in-pol-letni evropski projekt programa Obzorje 2020 Liquefact v konzorciju 11 mednarodnih partnerjev, ki se ukvarja s preučevanjem, kartiranjem, metodami napovedovanja pojava utekočinjenja tal, posledicami za stavbe in infrastrukturo ter analizo možnih ukrepov za preprečevanje pojava. Razvija metode za učinkovito odpravljanje posledic in zmanjševanje vplivov likvifakcije na družbene sisteme. Leta 2016 se je začel projekt CRP »In situ imobilizacija onesnaženih zemljin z uporabo naprednih nanotehnologij in njihova predelava v urbana tla« ter nadaljeval projekt »In-situ remediacija onesnažene zemljine na področju stare Cinkarne« v partnerstvu z Institutom Jožef Stefan in Zavodom za gradbeništvo Slovenije. Sodelovali smo pri bilateralnem projektu s Hrvaško »Laboratorijske preiskave in numerično modeliranje zemeljskih plazov v flišu na Hrvaškem in v Sloveniji«.

V recenziranih revijah smo objavili sedem člankov, imeli sedem vabljenih predavanj, od tega pet na uglednih mednarodnih dogodkih ali univerzah. Na mednarodnih znanstvenih srečanjih smo objavili 12 in na domačih šest prispevkov. Področja objav so raznolika: izboljšanje tal, zemeljski plazovi, laboratorijske in terenske preiskave obnašanja tal, metode izboljšanja zahtevnih materialov, kot so žlindre, naravni ali umetni sedimenti v vodnih okoljih. Mednarodne pozornosti so deležni dosežki katedre na področju laboratorijskih meritev zemljinske sukcije in monitoringa plazov ter nasipov, grajenih z materiali mejne kakovosti. Pri nas se na področju nezasičenih tal redno izpopolnjujejo člani univerz iz sosednjih držav.

Inovativne geotehnične rešitve na področju sanacij velikih plazov Slano Blato in Macesnik so postavile Slovenijo na svetovni zemljevid. Poleg sodelovanja v mednarodnem konzorciju za plazove in Centru odličnosti je katedra aktivno sodelovala pri organizaciji Svetovnega foruma o plazovih (2017) v Ljubljani in pri pripravi strokovnega vodiča po plazovih treh dežel.

CHAIR OF SOIL MECHANICS WITH LABORATORY

Geotechnics is a link between built and natural environments. The ground with its non-homogeneous structure and unpredictability, with naturally conditioned risk factors, such as earthquakes and extreme weather phenomena causing rockfalls, landslides and other forms of failures, places geotechnics to a special place within civil engineering sciences. The task of a geotechnical expert is to study the composition and properties of the ground and to provide adequate foundations for building structures, safety of slopes, select adequate materials for the construction of dams as well as prescribe adequate technology for their construction. The care for rational use of space is a legitimate reason for directing construction interventions to technically less appropriate ground. For this reason, one of the important areas of geotechnics is also technology for improving mechanical and physical ground properties. A special challenge is construction on brownfields with exceeded concentrations of heavy metals, salts and other pollutants in the ground and in groundwater.

Research and professional activity

In 2016 we won a three-and-a-half year European Horizon 2020 project Liquefact, implemented in a consortium of 11 international partners. The aim of the project is to study, map and develop prediction methods for the phenomenon of soil liquefaction on social systems. It develops methods for efficient repair of consequences and reduction of liquefaction impacts on social systems. In 2016 we started with a new national Targeted Research Project »In-situ immobilisation of polluted soils by using advanced nanotechnologies and their remodelling to urban ground« and continued the project »In-situ remediation of polluted soil in the area of old Cinkarna« in partnership with the Jožef Stefan Institute and the Slovenian National Building and Civil Engineering Institute. We cooperated in a bilateral research project with Croatia »Laboratory tests and numerical modelling of landslides in flysh in Croatia and Slovenia«.

In peer-reviewed journals we published seven articles, we had seven invited lectures, of that five at esteemed international events and universities. We published 12 articles at international scientific conferences and six at national. The areas of publications are varied: soil improvement, landslides, laboratory and field tests of soil behaviour, methods of improving demanding materials, such as slags, natural or artificial sediments in water environments. The achievements of the Chair of Soil Mechanics dealing with measurements of soil suction and monitoring of landslides and dams built from marginal materials received international attention. Members of universities from our neighbouring countries frequently come to study unsaturated soil behaviour at our Chair.

Innovative geotechnical solutions in the field of mitigation of large landslides Slano Blato and Macesnik placed Slovenia on the world map. Beside cooperation in international consortium for landslides and Centre of Excellence, the Chair actively participated also in the World Landslide

Forum (2017) in Ljubljana by preparing expert guidelines to landslides of three countries.

Members of the Chair of Soil Mechanics are convinced that professional and research work are closely linked. Only in this way, demanding professional problems can be transferred to the research environment, and the resulting solutions back into practice. We cooperate closely with investors, national agencies, designers and contractors of geotechnical constructions. Our professional and consulting activities are divided into several areas, such as design, elaboration of geotechnical opinions and studies, expert consulting, reviews and auditing of project documents, elaboration of laboratory and field tests and advanced approaches to research for the remediation of polluted soils, as well as improvement of the use of marginal materials. The Chair's mission is basic laboratory or field tests of soils, rocks, byproducts and wastes, and professional support, based on knowledge, experiences and equipment, to all who need it. Regular annual educational seminars for the representatives of investors into municipal and national infrastructure and cooperation with schools are an always welcome form of transfer of new knowledge to engineering practice.

In the beginning of 2017, Boštjan Pulko and Janko Logar passed the responsible reviewer exam at the Slovenian Chamber of Engineers.

Educational activity

We teach courses from the area of geotechnics at all three cycles of studies within UL FGG. In the academic years 2015/16 and 2016/17, 23 graduates of the first cycle studies and seven graduates of the second cycle finished their studies. Two candidates finished their studies with PhD titles and four finished the pre-Bologna master's study programs. In spring 2016, Janko Logar worked for one semester as visiting professor at the Technical University in Vienna.

Achievement

The Chair is proud of the PhD thesis by Jasna Smolar »Recognition of Properties and Sustainable Management of Sediments From Water Environments« (supervisor Assist. Prof. Dr. Ana Petkovšek), where the author checks the applicability and reliability of field and laboratory tests of soils and existing material models in the study and description of muds that can be placed in a transition zone between solids and liquids. She extended the list of standard tests by using rheometer, she also studied the possibilities of improving muds by binders. Persistent research work by Assist. Prof. Dr. Boštjan Pulko in the area of behaviour of soils improved by gravel piles led to a completely new theoretically rigorous semi-analytical method that allows insight into transfer of stresses throughout the consolidation and influence on time distribution of ground settlements. Construction of industrial lysimeters brings important improvement to the existing laboratory and field testing methods, especially in the light of studies of long-term impacts of using alternative materials on the environment, within the new paradigm of circular economy.

Na Katedri za mehaniko tal z laboratorijem smo prepričani, da sta strokovno in raziskovalno delo tesno povezana. Le tako lahko zahtevne strokovne probleme prenesemo v raziskovalno okolje in rešitve, izhajajoče iz rezultatov raziskav, nazaj v prakso. Tesno sodelujemo z investitorji, državnimi organi, projektanti in izvajalci geotehničnih gradenj. Strokovno svetovalno delo lahko razdelimo na nekaj zaokroženih področij, kot so projektiranje, izdelava geotehničnih mnenj in študij, strokovno svetovanje, recenziranje in revidiranje projektne dokumentacije, izvedba laboratorijskih in terenskih preiskav ter napredni pristopi pri izvajanju raziskav za remediacijo onesnaženih zemljin in izboljšanje rabe materialov mejne kakovosti. Poslanstvo Katedre za mehaniko tal je izvajanje temeljnih laboratorijskih ali terenskih raziskav zemljin, kamnin, sekundarnih surovin in odpadkov in strokovna podpora z znanjem, izkušnjami in opremo vsem, ki takšno podporo potrebujejo. Vselej dobrodošla oblika prenosa novih znanj v operativno prakso so redni letni izobraževalni seminarji za predstavnike investitorjev v občinsko in državno infrastrukturo in sodelovanje s šolami.

V začetku leta 2017 sta Boštjan Pulko in Janko Logar opravila izpit za odgovornega revidenta pri IZS.

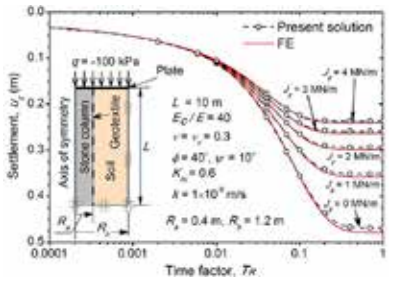
Pedagoška dejavnost

Poučujemo predmete s področja geotehnike na vseh treh stopnjah študijev v okviru UL FGG. V letih 2015/16 in 2016/17 je na Katedri za mehaniko tal z laboratorijem zaključilo študij 23 diplomantov prve in sedem druge stopnje, dva sta doktorirala, štirje so dokončali še »stari« magistrski študij. Janko Logar je spomladi leta 2016 en semester deloval kot gostujoči profesor na Tehniški univerzi na Dunaju.

Dosežek

Katedra se lahko pohvali z doktoratom Jasne Smolar »Prepoznavanje lastnosti in trajnostno upravljanje s sedimenti iz vodnih okolij« (mentorica doc. dr. Ana Petkovšek), v katerem avtorica preverja uporabnost in zanesljivost terenskih in laboratorijskih preiskav zemljin ter obstoječih materialnih modelov pri preučevanju in opisovanju muljev, ki jih lahko uvrstimo v območje med trdne snovi in tekočine. Nabor standardnih preiskav je razširila z uporabo rheometra, preučevala je tudi možnosti izboljšanja muljev z vezivi. Vztrajno raziskovalno delo doc. dr. Boštjana Pulka na področju obnašanja tal, izboljšanih z gruščnatimi koli, je privedlo do povsem nove teoretično rigorozne semianalitične metode, ki omogoča vpogled v prenos napetosti ves čas trajanja konsolidacije in vpliv na časovni potek posedkov tal. Izgradnja industrijskih lizimetrov pomeni pomembno nadgradnjo obstoječih laboratorijskih in terenskih raziskovalnih metod, zlasti v luči študij dolgoročnih vplivov rabe alternativnih materialov na okolje v okviru nove paradigme krožnega gospodarstva.

Poskusni nasip, zgrajen iz žlindre, in industrijski lizimeter za dolgoročno spremljanje vplivov vgrajene žlindre na okolje in preverjanje primerljivosti rezultatov laboratorijskih izluževalnih in perkolacijskih testov.
Test embankment made of boiler slag and an industrial lysimeter for long-term monitoring of quality and quantity of percolated water as well as for the comparison with the results of laboratory leaching and percolation tests.



Vpliv togosti (Jg) geotekstilnega ovoja gruščnatega kola na posedke temeljnih tal pod brezkrajno gibko obtežbo (Pulko, Logar, 2017)
Influence of stiffness (Jg) of geotextile wrap on stone column on the settlements of foundation ground under infinite flexible load (Pulko, Logar, 2017)

Terenske vaje pri predmetu Mehanizacija in tehnologija gradnje cest: kontrolne meritve izvedenih zemeljskih del
Field work with students within the course Road Construction Machinery and Technology: quality control of earthworks

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Jože Korelc
- Namestnik predstojnika
  Deputy head
  doc. dr. Primož Može
- Raziskovalci
  Researchers
  asist. dr. Teja Melink
  Nina Zupan
  Sara Piculin
- Sodelavci
  Associates
  viš. pred. Leon Hladnik
  doc. dr. Franc Sinur

KATEDRA ZA METALNE KONSTRUKCIJE

Katedra za metalne konstrukcije je vodilna slovenska pedagoška in raziskovalna enota s področja jeklenih in sovprežnih konstrukcij ter metod nelinearne analize konstrukcij. Predstojnik katedre, prof. dr. Jože Korelc, je nosilec pedagoškega in raziskovalnega dela na področju metod nelinearnega modeliranja konstrukcij. Nosilec pedagoškega in raziskovalnega dela na področju metalnih konstrukcij je doc. dr. Primož Može. Katedra aktivno v svoje delo vključuje zunanja sodelavca, viš. pred. Leona Hladnika in doc. dr. Franca Sinurja, in s tem zagotavlja povezanost teorije s prakso. Pedagoško in raziskovalno delo katedre podpirajo raziskovalci asist. dr. Teja Melink, mlada raziskovalka Nina Zupan in Sara Piculin.

Področje jeklenih in sovprežnih konstrukcij

Katedra za metalne konstrukcije je vodilna slovenska pedagoška in raziskovalna enota s področja jeklenih in sovprežnih konstrukcij. S svojim raziskovalnim delom je po eni strani močno vpeta v evropski raziskovalni prostor, po drugi strani pa s svojim pedagoškim, razvojnim in strokovnim delom pomembno vpliva na razvoj področja jeklenih in sovprežnih konstrukcij v Sloveniji. Raziskovalno delo na področju jeklenih konstrukcij je močno povezano s sodelovanjem v delovanju tehničnih odborov Evropske konvencije za jeklene konstrukcije (ECCS) in delovnih skupinah evropske organizacije za standardizacijo (CEN/TC 250/SC3). Z industrijo KMK sodeluje pri razvoju novih izdelkov in nudi strokovno izobraževanje. KMK kot partner sodeluje tudi na evropskih projektih, ki so financirani pod okriljem Raziskovalne fundacije za premog in jeklo. Na strokovnem področju je KMK kot revident ali svetovalec prisotna pri projektiranju jeklenih objektov v Sloveniji (stavbe, mostovi, rezervoarji, stolpi ...) in tudi v mednarodnem prostoru, kjer je pomembno omeniti projektiranje norveškega mostu čez jezero Farris in oceno preostale življenjske dobe jeklenih rezervoarjev za naročnike, kot na primer Phillips 66 Humber Refinery, Vopak.

Področje znanstvenega računstva

K povečani splošnosti in zanesljivosti novo razvitih numeričnih postopkov in računalniških programov je v zadnjem desetletju bistveno prispeval interdisciplinarni pristop, kjer se akumulirana znanja s področja računalništva, matematike in mehanike učinkovito združijo s poznavanjem tehnologije. Sodelavci katedre so ena od na svetovnem nivoju vodilnih raziskovalnih skupin na področju razvoja bazičnih orodij in metod konvergentnega inženirstva, temelječega na splošnih simbolno-numeričnih okoljih za tehnično računanje. Prof. dr.-ing. Jože Korelc je s sodelavci v dveh desetletjih razvil inovativni pristop k avtomatizaciji numeričnega modeliranja. Razviti programi (AceGen in AceFEM) pa so podprti s strani vodilnega svetovnega proizvajalca splošnih simbolno-numeričnih okolij za tehnično računanje Wolfram Research. Te pri raziskovalnem delu uporabljajo med drugimi na univerzah v Hannovru, Swanseaju, Trentu, Pavii in Cape Townu, v mednarodnih korporacijah Boeing and Osram in tudi v

CHAIR FOR METAL STRUCTURES

Chair for Metal Structures is the leading Slovenian educational and research unit engaged in steel and composite structures and non-linear analysis of structures. The Chair is managed by Prof. Dr. Jože Korelc, in charge of education and research in the area of nonlinear modelling of structures. In the area of metal structures, Assist. Prof. Dr. Primož Može is responsible for the Chair's educational and research work. Actively involved in the Chair's research and education are external partners, Sen. Lect. Leon Hladnik and Assist. Prof. Dr. Franc Sinur, who make sure the Chair connects theory to practice. As support to education and research, there are three more members of the Chair: Assist. Teja Melink, PhD, young researcher Nina Zupan and Sara Piculin.

The area of steel and composite structures

Chair for Metal Structures is the leading Slovenian educational and research unit engaged in steel and composite structures. With our research work we are on the one hand strongly connected to the European research area, while on the other we importantly affect with our educational, research and professional activity the development of steel and composite structures in Slovenia. The research activity in the area of steel structures is closely linked to the participation of the Chair members in technical committees of the European Convention for Constructional Steelwork (ECCS) and in workgroups of the European Standardisation Organisation (CEN/TC 250/SC3). The Chair cooperates with the industry in the development of new products and offers professional education. As partner the Chair cooperates also in European projects financed by the Research Foundation for Coal and Steel. In the professional area, the Chair members work as reviewers and consultants for the design of steel structures in Slovenia (buildings, bridges, reservoirs, towers, etc.) as well as internationally. Especially worth mentioning are the design of the Norwegian bridge across Farris lake and the estimation of residual life span of steel reservoirs for customers such as Phillips 66 Humber Refinery, Vopak.

The area of scientific computing

Owing to the interdisciplinary approach in scientific computing, with the accumulated knowledge from computer science, mathematics and mechanics effectively combined with the knowledge of technology, the newly developed numerical procedures and the resulting software programs have gained on generality, reliability and interdisciplinarity. In the last two decades Prof. Dr.-Ing. Jože Korelc and his co-workers have developed an innovative approach to automatic generation of numerical models. The developed software programs (AceGen and AceFEM) are supported by the world's leading manufacturer of symbolic-numeric environments for technical computation, Wolfram Research, and are used in research work by numerous universities, such as Hannover, Swansea, Trento, Pavia and Cape Town, in international

corporations, such as Boeing and Osram, and in numerous research institutions in Slovenia. The main areas of work are: development of finite elements for the simulation of solids, contact problems and sensitivity analysis; analysis and optimisation of steel structures; simulations of coupled thermal-hydro-mechanical problems; analysis of stochastic problems and development of algorithms for multi-scale analysis.

Educational activity

The Chair is in charge of all the courses dealing with steel and composite structures in the higher education professional as well as academic studies at UL FGG. As teachers, we meet students in higher years of their studies, where the teaching material is presented through project work, with the exception of basic courses. In this way, we offer a personal, relaxed relationship between the student and the teacher, which proves to be the appropriate approach, because a growing number of our students find jobs in renowned international design companies specialised in the design of steel structures. The Chair is also responsible for the courses from the area of nonlinear numerical analysis of structures and solids at the master and doctoral study of Civil Engineering. In the last few years, we have also been engaged in the field of international technical education in the form of international workshops and seminars, because the approach for the development of numerical methods that we developed enables students to learn also about complex nonlinear models.

Exceptional achievements

In 2016 a monograph by Jože Korelc, Peter Wriggers, Automation of Finite Element Methods was published. The monograph, published by Springer Verlang, summarizes 20 years of work of Prof. Jože Korelc in the area of automation of numerical modelling of problems in the mechanics of solids. The development of new finite elements is a demanding and time consuming work, especially for simulation of nonlinear problems. The automation of this process may reduce the required time by several size classes.

Assist. Prof. Dr. Primož Može was selected at an international call for a member of the project group for the development of the second generation of Eurocodes for the design of joints in steel structures (EN 1993-1-8).

številnih raziskovalnih institucijah v Sloveniji. Glavna področja dela so: razvoj končnih elementov za simulacije trdnin, kontaktnih problemov ter občutljivostne analize; analiza in optimizacija jeklenih konstrukcij; simulacije povezanih termo-hidro-mehanskih problemov; analiza stohastičnih problemov ter razvoj algoritmov za analizo na več skalah.

Pedagoška dejavnost

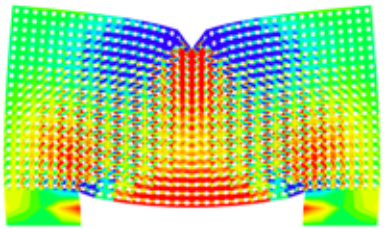
Katedra je nosilec vseh predmetov s področja jeklenih in sovprežnih konstrukcij na visokošolskih in univerzitetnih študijih UL FGG. Pedagogi s KMK se s študenti srečamo v višjih letnikih študija, kjer je snov, z izjemo osnovnih predmetov, podana preko projektnega dela. S tem ustvarimo individualen, sproščen odnos študent–pedagog, kar se izkaže za primeren pristop, saj je več naših študentov dobilo zaposlitev v priznanih mednarodnih projektantskih podjetjih, ki so specializirana za projektiranje jeklenih konstrukcij. Katedra je tudi nosilec predmetov s področja nelinearne numerične analize konstrukcij in trdnin na magistrskem in doktorskem študiju Gradbeništva. V zadnjih letih se preko mednarodnih delavnic in seminarjev pedagoško vse bolj uveljavlja tudi na področju mednarodnega tehničnega izobraževanja, saj na katedri razviti pristop k razvoju numeričnih metod študentom omogoča, da se neposredno seznanijo tudi s kompleksnimi nelinearnimi modeli.

Izjemni dosežki

V letu 2016 je bila objavljena monografija Jože Korelc, Peter Wriggers, Automation of finite element methods. Monografija, objavljena pri založbi Springer, povzema 20-letno delo prof. Jožeta Korelca na področju avtomatizacije numeričnega modeliranja problemov v mehaniki trdnin. Razvoj novih končnih elementov je zahtevno in časovno potratno delo, še posebej za simulacije nelinearnih problemov. Avtomatizacija tega procesa lahko skrajša potrebni čas za več velikostnih redov.

Doc. dr. Primož Može je bil na mednarodnem razpisu izbran za člana projektne skupine za razvoj druge generacije standarda Evrokod za projektiranje spojev v jeklenih konstrukcijah (EN 1993-1-8).

Test polno nosilnega spoja med stebrom in prečko
Test of a full strength beam-to-column joint



Večnivojske simulacije obnašanja heterogenih materialov z AceGen/AceFEM
Multi-level simulations of behaviour of heterogeneous materials with AceGen/AceFEM

KADER / PERSONNEL

- Predstojnica
  Head
  izr. prof. dr. Jana Šelih
- Pedagog
  Educator
  doc. dr. Aleksander Srdić
- Sodelavci
  Associates
  doc. dr. Primož Banovec
  doc. dr. Andrej Kryžanovski
  asist. dr. Matej Kušar
  prof. dr. Roko Žarnić

Prof. dr. Jana Šelih in doc. dr. Aleksander Srdić s Katedre za operativno gradbeništvo
Prof. Dr. Jana Šelih and Asist. Prof. Dr. Aleksander Srdić from the Chair of Construction Management

KATEDRA ZA OPERATIVNO GRADBENIŠTVO

Gradbeni objekt, most, stanovanjsko stavbo ali industrijski objekt je treba zgraditi skladno z načrti. Izvedba del mora biti kar se da racionalna, kar lahko dosežemo z načrtovanjem in racionalizacijo izvedbenih dejavnosti. Med uporabo objekta je treba spremljati njegovo stanje ter na tej osnovi načrtovati vrsto in obseg vzdrževanja in sanacije, nato pa ta dela tudi izvesti. Navsezadnje je treba ovrednotiti objekt tudi ob izteku življenjske dobe ter se odločiti, ali ga je smiselno porušiti ali prenoviti.

Sodelavci Katedre se ukvarjamo s temi področji, saj se zavedamo, da lahko napredek pri novih konstrukcijskih in tehnoloških rešitvah uspešno uvedemo le ob podpori izboljšanih ali novih metod za planiranje del ter metod za odločanje v različnih razmerah ter njihovi implementaciji v prakso.

Katedra ima pet sodelavcev. Vodja katedre, prof. dr. Jana Šelih, se s sodelavci doc. dr. Aleksandrom Srdićem, doc. dr. Andrejem Kryžanovskim, doc. dr. Primožem Banovcem, as. dr. Matejem Kušarjem in prof. dr. Rokom Žarnićem, raziskovalno in strokovno ukvarja z aktualnimi problemi v gradbeništvu, ki se pojavljajo v izvedbeni fazi ter fazi vzdrževanja. Kot izjemno pomembno strokovno področje se v zadnjem času izkazuje tudi vsebinska in informacijska podpora izvedbenim procesom v gradbenih podjetjih, s čimer lahko gradbena izvajalska podjetja obvladujejo in racionalizirajo svoje delovanje.

Raziskovalna in strokovna dejavnost

Raziskovalno in strokovno delo Katedre za operativno gradbeništvo je prvenstveno usmerjeno v študij, načrtovanje in racionalizacijo procesov znotraj gradbenega projekta. Ta je sestavljen iz več faz, ki jih moramo učinkovito obvladovati. Pozornost namenjamo študiju vseh faz gradnje, od identifikacije investitorjevih potreb, zasnove in projektiranja objekta, do predaje objekta v uporabo. Tako zagotavljamo celovito obvladovanje procesov, s čimer omogočamo racionalno porabo virov v projektu. Da bi delo v operativi potekalo brez nepotrebnih zastojev, razvijamo sodobne metode ter tehnike planiranja in spremljanja projektov.

Pri informacijski podpori vodenja gradbenih projektov se uspešno povezujemo z industrijo, ki razvija za to ustrezne programske rešitve. Kot strokovnjaki sodelujemo pri reševanju nesoglasij med deležniki gradbenih projektov, ugotavljamo, zakaj je prišlo do odstopanj od prvotnih načrtov, kako velika so ter zlasti, s kakšnimi ukrepi lahko nastale zamude zmanjšamo. Raziskujemo tudi uporabo različnih metod naročanja v gradbeništvu.

Pri obravnavanju grajenega okolja poudarjamo celovit pristop, posebno pozornost namenjamo tudi obdobju uporabe gradbenih objektov. Pomemben del našega raziskovalnega dela je usmerjen v vzdrževanje in prenovo cestne infrastrukture, pri čemer zaradi

CHAIR OF CONSTRUCTION MANAGEMENT

Building structures, bridges, residential buildings or industrial structures, they must all be built according to a design provided by a designer. To achieve this goal, numerous activities have to be carried out, and they must be interconnected and adjusted in a coherent manner. These activities should be carried out as deliberately and rationally as possible, which can be achieved by planning and rational implementation of activities. During the time that a structure is in use, it is important to monitor its condition and accordingly plan the type and scope of maintenance or repair, including the performance of such works. Last but not least, at the end of the service life, structures should be assessed, and a decision must me made whether to demolish or to renovate them.

Members of the Chair of Construction Management focus on all these areas, as we are aware that new structural and technological solutions can be only realised with support of improved or new methods for the design of works, and methods for taking decisions under different conditions, including their implementation in practice.

The Chair has five members. Headed by Assoc. Prof. Dr. Jana Šelih, the co-workers Assist. Prof. dr. Aleksander Srdić, Assist. Prof. Dr. Andrej Kryžanowski, Assist. Prof. Dr. Primož Banovec, Assist. Dr. Matej Kušar and Prof. Dr. Roko Žarnić focus their research and professional work on current challenges in civil engineering, appearing in the implementation and maintenance phases. An area that has lately been gaining importance is information support to processes used by construction companies for the management and rationalization of their activities.

Research and professional activity

Research and professional activity of the Chair of Construction Management is first and furthermost focused on the study, design and rationalization of processes within the construction area. These processes consist of several phases that need to be managed. Therefore, we study all construction phases: from identification of the investor's needs, through conceptual design and structural design, up to the point of making structures available for use. In this way, we provide a holistic process management, thus enabling rational use of project resources. To help the work in construction practice to run as smoothly as possible, we develop modern methods and strategies for the design and monitoring of projects.

As regards the IT support to construction projects, we have established successful cooperation with the industry developing appropriate software solutions. In our professional activity we cooperate in solving disagreements among stakeholders of various construction projects, where our job is to find out the reasons for discrepancies from original designs, their magnitude and especially the measures to reduce delays. We also research the use of different consignment methods in civil engineering.

When dealing with the built environment, we support a holistic approach and pay special attention to the service life and maintenance of building structures. An important part of our research work is focused on the maintenance and repair of road infrastructure, where we use multi-criteria methods for decision-making processes, with the purpose to provide as efficient use of available financial means as possible.

Educational activity

The Chair members teach several courses. At the first cycle studies of Civil Engineering and Environmental Civil Engineering the course Organisation and Management of Construction Works equips the students with the basic concepts how a construction company operates and about the work at a construction site, whereas for the students of the study program Construction Management the emphasis of the course Organisation and Management of Construction Works is more on practical knowledge and skills required from an engineer in a construction company. The course Quality Assurance and Quality Control raises the students' awareness about the importance of quality in the whole construction process and emphasises the role of compliance certifications for construction process, as required by the European legislation. Within the course Project Planning and Management students gain basic knowledge on the technologies and methods for the project design, and the course Operative Planning and Monitoring of Projects provides in-depth knowledge on the methods and use of various technologies and modern IT solutions in the project design as well as its monitoring and implementation analysis. Within the courses, Technology and Technological Processes students learn some basic principles for the implementation of all kinds of works at the construction site.

At the second cycle master study program of civil engineering the courses Management in Civil Engineering and Organization Planning of Construction provide upgraded theoretical and practical knowledge on organisation management and activities during the construction that may essentially affect the project success. The course Project Management, also at the second cycle studies, gives students the basic skills for project management and the application of this knowledge in civil engineering.

Exceptional achievement

As lead partner we cooperated in an expert study, where we elaborated a methodology for the definition of toll for road classes, which is of exceptional importance for efficient road network management in Slovenia.

zagotavljanja učinkovitejše porabe razpoložljivih finančnih sredstev uporabljamo večkriterijske metode odločanja, ter določanje višine cestnine za tovorna vozila.

Pedagoška dejavnost

Sodelavci katedre poučujejo več predmetov. Na I. stopnji študentje v okviru predmetov Organizacija gradbenih del in poslovanje (program Gradbeništvo in Okoljsko gradbeništvo) osvojijo osnove poslovanja gradbenega podjetja in dela na gradbišču, študentje študijskega programa Operativno gradbeništvo pa predmet Organizacija in vodenje gradbenih del, pri katerem je bolj poudarjeno praktično znanje, ki ga potrebuje inženir v gradbenem podjetju. Predmet Zagotavljanje in kontrola kakovosti študente ozavesti o pomembnosti kakovosti v celotnem procesu graditve ter poudari vlogo potrjevanja skladnosti gradbenih proizvodov, kot to zahteva evropska zakonodaja. Pri predmetu Planiranje in vodenje projektov študentje pridobijo osnovno znanje o tehnikah in metodah za planiranje projektov, pri predmetu Operativno planiranje in spremljanje projektov pa poglobljeno znanje o metodah ter uporabi različnih tehnik in sodobnih programskih rešitev glede planiranja projektov in tudi spremljanja in analize izvajanja projekta. V okviru predmetov Tehnologija in Tehnološki procesi študentje osvojijo temeljno znanja o načinih izvajanja gradbenih vrst del.

Med študijem predmetov Management v gradbeništvu in Organizacijska priprava del na II. stopnji študent nadgradi teoretično in praktično znanje o managementu organizacij ter o dejavnostih, ki se izvajajo pred gradnjo in ki lahko bistveno vplivajo na uspešnost projekta. Predmet Vodenje projektov, ki se izvaja na II. stopnji, ponuja študentu osnove o vodenju projekta ter aplikacijo tega znanja na področju gradbeništva.

Izjemni dosežek

Kot vodilni partner smo sodelovali v strokovni študiji, v kateri smo izdelali metodologijo za določanje višine cestnine za cestninske razrede, kar je izjemnega pomena za učinkovito gospodarjenje s cestnim omrežjem v Sloveniji.

Montaža
Assembly

KADER / PERSONNEL

- Predstojnik
  Head
  izr. prof. dr. Vlatko Bosiljkov
- Namestnica predstojnika
  Deputy head
  prof. dr. Violeta Bokan-Bosiljkov
- Asistenta
  Assistants
  asist. dr. David Antolinc
  asist. dr. Petra Štukovnik
- Strokovna sodelavka
  Professional associate
  asist. dr. Andreja Padovnik
- Laboranta
  Laboratory operators
  Franci Čepon
  Boštjan Jursinovič

KATEDRA ZA PRESKUŠANJE MATERIALOV IN KONSTRUKCIJ

Sodelavci katedre se intenzivno ukvarjamo z razvojem preskusnih metod in preizkušanjem materialov ter konstrukcijskih elementov in sklopov v laboratoriju in na terenu. Posebno pozornost namenjamo zgodovinskim objektom in stavbam kulturne dediščine.

V letih 2015–2017 smo zaposleni na KPMK velik poudarek namenili sodelovanju z gospodarstvom in prenašanju raziskovalnih dosežkov v prakso, predvsem pri pripravi in uveljavljanju standardov (Evrokod) za masivne objekte in projektiranje potresno odpornih objektov. V praktično uporabo so bili preneseni inovativni materiali in sklopi. Sodelovali smo tudi pri obnovi in utrditvi vrste pomembnih objektov v Sloveniji.

Na raziskovalnem področju smo v tem obdobju začeli intenzivno graditi time raziskovalcev z različnih tehniških, naravoslovnih in umetniških področjih, kar nam omogoča celovito reševanje problemov s področja grajenega okolja, objektov kulturne dediščine ter odpiranje novih raziskovalnih področij. Po uspešno zaključenem podiplomskem študiju štirih članov katedre ter eni upokojitvi smo sestavo raziskovalne skupine KPMK obogatili z restavratorko konservatorko. Trenutno deluje v okviru KPMK sedem strokovnjakov različnih strok (od tega pet doktorjev znanosti).

Pedagoško delo

Člani KPMK predavamo in vodimo vaje pri šestih predmetih na dodiplomskih študijskih programih. Smo nosilci predmetov: Gradiva, Stavbarstvo I, Gospodarjenje s sekundarnimi in odpadnimi surovinami, Prenova in preskušanje konstrukcij in Napredna gradiva. Predavamo tudi na tujih univerzah (štiri vabljena predavanja).

Bili smo mentorji pri treh doktoratih, enem znanstvenem magisteriju, 13 strokovnih magisterijih in 12 diplomah starih univerzitetnih programov ter pri 16 diplomah prvostopenjskih bolonjskih študijev.

Raziskovalno delo

Raziskovalno delo članov KPMK poteka v okviru raziskovalnega programa P2-0185 Potresno inženirstvo ter številnih evropskih in drugih mednarodnih projektov. Eksperimentalno podprte analize stavb so po eni strani usmerjene v varovanje grajene dediščine ter po drugi strani v inovativne rešitve za moderne stavbe; kar skupaj zagotavlja trajnostni razvoj naših mest in podeželja.

V luči prenove standarda Evrokod 8 smo v letu 2016 na izbranih pomembnih objektih stavbne dediščine v Sloveniji (UL ALUO, Palača Kazina) uporabili razvite napredne metode, pristope in znanja ter izdelali projektne variante ojačitve objektov ob upoštevanju sedanjih predpisov.

Nadaljujemo z raziskavami na področju diagnostike v gradbeništvu. Z infrardečo termografijo smo pokazali, da lahko odkrijemo defekt

CHAIR FOR TESTING IN MATERIALS AND STRUCTURES

Members of the Chair are intensively engaged in the development of testing methods and testing of materials, structural elements and constructional complexes in our laboratory and in the field. Special attention is paid to historic structures and cultural heritage buildings.

In the period 2015–2017 we focused especially on the cooperation with building sector and transfer of research achievements into practice, mainly in the preparation and introduction of standards (Eurocodes) for concrete and masonry structures as well as design of eartthquake resistant structures. Innovative materials and complexes were transferred into practice. We also cooperated in the renovation and strengthening of several important structures in Slovenia.

In the research area, we intensively started building teams of experts from different research fields e.g. technology, natural sciences and art. This allows us to solve many problems in the built environment, structures of cultural heritage and in new research areas in a holistic way. After successfully finishing postgraduate studies by four members of the Chair and after one retirement, the research group of our Chair was enriched by an expert in restauration and conservation. For the moment, the Chair has seven experts from different professions and degrees (five of them are doctors of science).

Educational work

As members of the Chair for Testing in Materials and Structures, we hold lectures and provide tutorials for six courses at the undergraduate study programs. We are coordinators of the courses: Building Materials, Buildings I, Secondary and Waste Materials Management, Repair and Testing of Structures and Advanced Building Materials. We also hold lectures at international universities (four invited lectures).

We were supervisors of three PhD theses, one MSc thesis, 13 professional master degrees and 12 diploma theses of the former academic study programs, as well as 16 diploma theses of the first cycle Bologna studies.

Research work

The Chair members implement their research work within the research program P2-0185 Earthquake Engineering, as well as in numerous European and other international projects. Experimentally supported analyses of buildings are on the one hand oriented towards the protection of built heritage and on the other into innovative solutions for modern buildings, with the final aim to provide sustainable development of our urban and rural areas.

Within the framework of renewal of Eurocodes 8, in the year 2016 new advanced methods, approaches and on knowledge based methodologies were applied at selected structures of building heritage in Slovenia (UL ALUO, Palace Kazina) and prepared project variants for strengthening of structures considering present regulations.

We continue with research in the area of diagnostics in civil engineering. Using infrared thermography, we showed that defect in concrete may be detected at a depth equal to or smaller than the defect dimension D, when the thermal contrast method is used. By using pulse-phasal method, we increased the largest possible depth of detecting the depth of defect with dimension D by 50%. We continue work within national research project J2-8194 – Sensor Technologies in Diagnostics and Monitoring of Cultural Heritage Buildings (leader Z. Jagličić).

We are actively involved in the COST TU1404 action »Towards the next generation of standards for service life of cement-based materials and structures«. Member of our Chair is active in the Core group and works as coordinator of STSM research visits. We are also active in the international expert organisation RILEM. Member of our Chair is its local commissioner for Europe. We also actively cooperate in technical committees of RILEM: TC SGM, TC AAA, TC MRP and TC 277–LHS.

Professional work

Professional work of our Chair focuses on experimentally supported development of new construction products or technologies for the economy and on the elaboration of expert opinions for different clients. We are also in charge of activities for the preparation of national and European legislation from the area of civil engineering. To name a few, we cooperate in CEN/TC250/SC6/WG1, we are national coordinator for EC6 and participate in CEN/TC250/SC8/WG1 – part for masonry structures, as well as in SIST (TC BBB, TC AGR and TC CAA). We are active in the Slovenian Association for Concrete, where our member is the chairperson of the Council of experts and member of the Governing Board.

We cooperate with the company Schiedel GmbH in the optimisation of their chimney systems for the construction in earthquake-prone areas.

In cooperation with the company VARIS, we developed light-aggregate self-compacting concrete with declared compressive strength and own weight. VARIS started to immediately use it in practice.

Research of isolation plates made of polymer, composite and textile wastes was the focus of the project »Development and analysis of innovative products from waste«. It was co-financed by the European Regional Development Fund. With a combination of selected fraction of polymer waste materials and with different settings of influential parameters, we can make construction slabs with adequate physical, chemical and mechanical properties for different applications in construction.

Exceptional achievements

14 publications of research results in SCI indexed journals.

Coordination of work in the national committee and preparation of National Annex to Eurocode 6.

Award for best teacher in 2015.

v betonu na globini, ki je enaka ali manjša dimenziji defekta D, če uporabimo metodo toplotnega kontrasta. Z uporabo pulzno-fazne metode smo za 50 % povečali največjo možno globino detektiranja defekta dimenzije D. Delo nadaljujemo v okviru nacionalnega ARRS projekta J2-8194 Senzorske tehnologije pri kontroli posegov v objekte kulturne dediščine (nosilec Z. Jagličić).

Aktivno sodelujemo v akciji COST TU1404 »Towards the next generation of standards for service life of cement-based materials and structures«. Članica KPMK je članica »core group« in koordinatorica raziskovalnih obiskov STSM. Aktivni smo tudi v mednarodni strokovni organizaciji RILEM. Članica KPMK je področna komisarka za Evropo, poleg tega pa aktivno sodelujemo tudi v tehničnih odborih RILEM: TC SGM, TC AAA, TC MRP in TC 277–LHS.

Strokovno delo

Strokovno delo katedre je usmerjeno v eksperimentalno podprt razvoj novih gradbenih proizvodov ali tehnologij za naročnike iz gospodarstva in v izdelavo ekspertnih mnenj za različne naročnike. Vodimo tudi aktivnosti pri oblikovanju domače in evropske zakonodaje s področja gradbeništva. Med drugim sodelujemo v CEN/TC250/SC6/WG1, smo nacionalni koordinator za EC6 ter sodelujemo v CEN/TC250/SC8/WG1 – del za zidane konstrukcije ter pri SIST (TC BBB, TC AGR in TC CAA). Aktivni smo tudi v Združenju za beton Slovenije, kjer je članica KPMK predsednica Sveta strokovnjakov in članica UO.

Sodelujemo s podjetjem Schiedel GmbH pri optimizaciji njihovih dimniških sistemov za gradnjo na potresno nevarnih področjih.

V sodelovanju s podjetjem VARIS smo razvili lahkoagregatni samozgoščevalni beton z deklarirano tlačno trdnostjo in lastno težo. Podjetje VARIS ga je začelo uporabljati v praksi takoj.

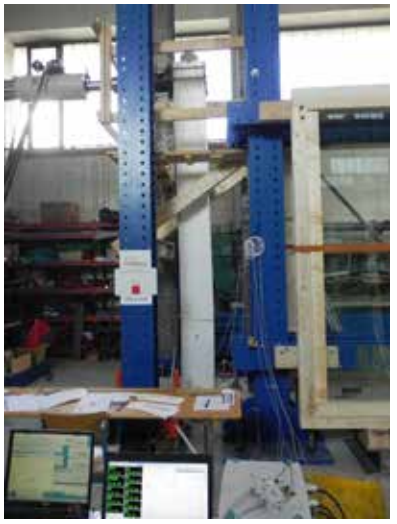
Raziskave izolacijskih plošč iz polimernih, kompozitnih in tekstilnih odpadkov so potekale v okviru projekta »Razvoj in analize inovativnega izdelka iz odpadkov« in so bile sofinancirane s strani Evropskega sklada za regionalni razvoj. S kombinacijo izbranih frakcij polimernih odpadnih surovin in z različnimi nastavitvami vplivnih parametrov lahko izdelamo gradbene plošče, ki imajo ustrezne fizikalne, kemijske in mehanske lastnosti za različne namene uporabe v gradbeništvu.

Izjemni dosežek

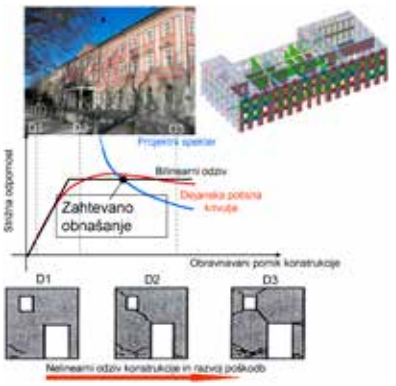
14 objav rezultatov raziskav na KPMK v revijah z indeksom SCI.

Koordinacija dela nacionalnega komiteja in priprava Nacionalnega dodatka za Evrokod 6.

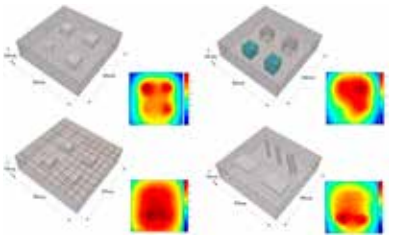
Priznanje za najboljšega učitelja leta 2015.



Ciklične preiskave sodobnih dimniških sistemov
Cyclic investigations of modern chimney systems



Palača Kazina: princip potresne analize
Palace Kazina: principle of seismic analysis



Termografija
Thermography

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Roman Kunič
- Namestnik predstojnika
  Deputy head
  doc. dr. Mitja Košir
- Asistenta
  Assistants
  doc. dr. Mateja Dovjak
  Luka Pajek
- Tehnični sodelavci
  Technical associates
  David Božiček
  Nika Šubic
  Nataša Iglič
  Rudi Perdan

KATEDRA ZA STAVBE IN KONSTRUKCIJSKE ELEMENTE

Zametki KSKE segajo v leto 1921, ko je Inštitutu za gradbeno inženirstvo Oddelka za gradbeništvo pripadal predmet Visoke gradnje. Katedra za stavbe in konstrukcijske elemente je bila ustanovljena leta 1980 na Konstrukcijski smeri Oddelka za gradbeništvo Fakultete za arhitekturo, gradbeništvo in geodezijo. Ustanovitev nove Katedre je omogočila prestrukturiranje učnih vsebin, ki so bile odgovor na probleme energetske krize v sedemdesetih letih, ki so ustvarjali nove zahteve pri oblikovanju konstrukcijskih sklopov ovoja stavbe kot pomembnega dela bivalnega in delovnega okolja. V tem obdobju je prišlo do preloma s klasičnim stavbarstvom, saj so se v gradbeništvu začeli pojavljati novi materiali in nove zasnove konstrukcijskih sklopov.

KSKE sestavlja osem članov, ki skrbimo za pedagoško dejavnost na magistrskem programu Stavbarstvo in Gradbeništvo kot tudi za dva predmeta na Zdravstveni fakulteti Univerze v Ljubljani. Pomembna dejavnost na katedri je strokovna in raziskovalna dejavnost, povezana z varčevanjem z energijo, varovanjem okolja, dinamično analizo toplotnih odzivov konstrukcijskih sklopov in celotnih stavb, izzivi s področja dnevne osvetlitve in osončenja objektov, s skrbjo za zdravo bivalno in delovno okolje.

Raziskovalna in strokovna dejavnost

Raziskovalna dejavnost na KSKE je primarno usmerjena v naslednja področja: razvoj in aplikacije načrtovalskih metodologij oblikovanja stavb, njihovih elementov in konstrukcijskih sklopov glede na bioklimatske danosti, stacionarne in dinamične analize toplotnih tokov v stavbah, analize osončenosti in osvetljenosti, oblikovanje in aplikacija kontrolnih sistemov za regulacijo in optimizacijo delovanja notranjega okolja v stavbah, eksergijske analize toplotnega udobja uporabnikov stavb, razvoj simulacijskih računalniških programov za analizo toplotnih in svetlobnih lastnosti stavb ter preučevanje medsebojnih interakcij med uporabniki in stavbo s poudarkom na zdravem in spodbudnem okolju. Katedra je s svojo raziskovalno dejavnostjo usmerjena tudi v izvajanje eksperimentov v realnem okolju. Namen je preverjanje simulacijskih predpostavk ter prikaz aplikacij naprednih sistemov za regulacijo notranjega okolja.

Pedagoška dejavnost

Pouk izvajamo na UL FGG ter na Zdravstveni fakulteti UL:

- **I. stopnja Gradbeništvo** (Stavbarstvo I in II, Uvod v načrtovanje stavb, Bioklimatsko načrtovanje, Prenova stavb),
- **I. stopnja Operativno gradbeništvo** (Stavbarstvo),
- **I. stopnja Sanitarno inženirstvo** (Konstrukcijski sklopi stavb, Bioklimatsko načrtovanje),
- **II. stopnja Stavbarstvo** (Dnevna svetloba, Bivalno okolje, Napredni materiali, Učinkovita raba energije, Pametna hiša),
- **III. stopnja Grajeno okolje** (Dnevna svetloba, Bioklimatsko načrtovanje, Načrtovanje zdravih stavb in Napredni konstrukcijski sklopi).

CHAIR OF BUILDINGS AND CONSTRUCTIONAL COMPLEXES

The beginnings of the Chair of Buildings and Constructional Complexes go back to 1921, when the then Institute for Construction Engineering at the Department of Civil Engineering was in charge of the course Buildings. The present name Chair of Buildings and Constructional Elements was given to this unit in 1980; it was part of the Structural Division at the Department of Civil Engineering within the then Faculty of Architecture, Civil and Geodetic Engineering. With the establishment of the new Chair, the teaching contents were updated to respond to the issues of energy crisis in the 1970s. The crisis generated new demands for the design of building envelope constructional complexes as an important part of the living and working environment. This period is characterised by a turn in the classical architecture, resulting from new construction materials and new designs of constructional complexes.

The Chair has eight members: Assist. Prof. Dr. Roman Kunič as Head, Assist. Prof. Dr. Mitja Košir as Deputy Head, Assist. Prof. Dr. Mateja Dovjak and Luka Pajek as assistants and David Božiček, Nika Šubic, Nataša Iglič and Rudi Perdan as technical support. Our teaching activity is focused on the new master study program Buildings, updated courses at the study programs of Civil Engineering, as well as two courses at the Faculty of Health Sciences, University of Ljubljana. Important for our Chair are also professional and research activities, with the main focus on energy savings, environmental protection, dynamic analysis of thermal responses in constructional complexes and buildings as a whole, challenges from the areas of daylighting and solar radiation of buildings, care for healthy living and working environment.

Research and professional activity

The Chair's research activity is primarily oriented towards the development and application of building design methodologies, their elements and constructional complexes considering bioclimatic conditions, stationary and dynamic analysis of thermal flows in buildings, analysis of solar radiation and illumination, design and application of control systems for the regulation and optimisation of the internal environment in buildings, exergy analyses of thermal comfort for building users, development of simulation software for the analysis of thermal and lighting properties in buildings as well as study of interactions among users and the building with the emphasis on a healthy and stimulating environment. With our research activity, we deal with real environment experiments, with the purpose to check the simulation assumptions and develop applications of advanced systems for the regulation of interiors.

Educational activity

We teach at the Faculty of Civil and Geodetic Engineering as well as the Faculty of Health Sciences. Due to the nature of the scientific area covered by

the Chair members, our teaching is mainly focused on building envelopes, internal environment, use of materials and interaction between users and the building. In the past in the traditional studies of civil engineering and architecture these areas were neglected. For this reason, the Bologna reform of higher education studies was an opportunity to accredit a second cycle study program Buildings, with the aim to qualify experts with balanced knowledge about the main pillars that allow the design and implementation of the bioclimatic concept: conceptual design of space, conceptual design of loadcarrying structures, design of protective structures (thermal and sound insulation, protection against water and humidity, psychophysical protection, etc.), energy efficiency, independent design, cooperation in the design and implementation of demanding buildings. Graduates of this study are equipped with in-depth theoretical and expert knowledge. They are able to find jobs and work independently at demanding expert and development tasks from the areas of constructional building physics and bioclimatic design.

Exceptional achievements

Among the exceptional achievements of our Chair during this period, we can count as many as 11 important works (10 articles and one chapter in a book) published in English, with one publication in SICRIS as A'' and 9 works as A'. These works have already reached 14 and 10 citations, three works 6 citations, and two works 5 citations.

An exceptional achievement of our Chair is the article titled Fuzzy Control System for Thermal and Visual Comfort in Building, published in the journal Renewable Energy. The article has 31 citations. Another article, Indoor Environment Simulator for Control Design Purposes from the journal Building and Environment, is published in SICRUS as A', whereas the article Life Expectancy Prediction and Application Properties of Novel Polyurethane Based Thickness Sensitive and Thickness Insensitive Spectrally Selective Paintcoatings for Solar Absorbers was published in the journal Solar Energy Materials and Solar Cells and has recorded 14 citations.

An exceptional achievement is also our six published patents.

Zaradi narave znanstvenega področja, ki ga pokrivajo člani KSKE, se njihovo poučevanje osredotoča predvsem na področje delovanja stavbnih ovojev, notranjega okolja, uporabe materialov ter interakcije uporabnikov s stavbo. Ta področja so bila v preteklosti na tradicionalnem študiju gradbeništva in arhitekture zastopana nezadostno. Zato je bil ob bolonjski reformi visokošolskega študija akreditiran drugostopenjski študijski program Stavbarstvo, s ciljem oblikovati strokovnjaka, ki bo uravnoteženo obvladal glavne podporne stebre, na katerih je možno načrtovati in izvajati bioklimatski koncept: zasnovo prostora, zasnovo nosilne konstrukcije, načrtovanje zaščitnih konstrukcij (toplotna in zvočna izolacija, zaščita pred vodo in vlago, psihofizična zaščita ...), energetsko učinkovitost, samostojno načrtovanje, sodelovanje pri načrtovanju in izvedbi zahtevnih stavb. Diplomant te smeri ima poglobljeno teoretično in strokovno znanje, je zaposljiv ter lahko samostojno opravlja tudi najzahtevnejše strokovne in razvojne naloge s področja konstrukcijske gradbene fizike in bioklimatskega načrtovanja.

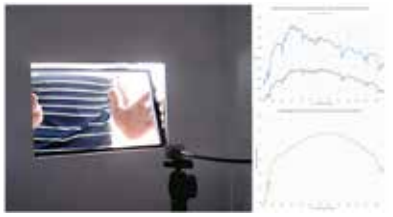
Izjemni dosežki

Med izjemne dosežke naše katedre v tem obdobju lahko štejemo kar 11 pomembnih del (10 člankov in eno poglavje v knjigi), objavljenih v tujini, z eno objavo v SICRIS-u kot A'' in kar devet objav kot A'. Omenjena dela so v tem času dosegla že 14 in 10 citiranj, tri dela po šest citiranj in dve deli po pet citiranj.

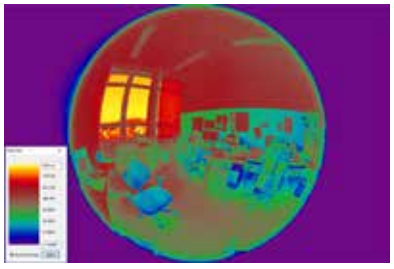
Izjemen dosežek katedre je članek z naslovom Fuzzy Control System za toplotno in vizualno udobje v stavbi, objavljen v reviji Renewable Energy. Članek ima 31 citatov. Članek Simulator notranjega okolja za namene načrtovanja nadzora iz revije Building and Environment je v SICRISu okategorizian kot A, medtem ko je bil članek Napovedovanje življenjske dobe in uporabne lastnosti občutljive in debeloslojne spektralno selektivne barvne prevleke za absorberje, ki temeljijo na poliuretanu, za absorberje solarne snovi, objavljen v reviji Solar Energy Materials in Solar Cells in je zabeležil 14 citatov.

Izjemen dosežek so tudi naših šest objavljenih patentov.

Analiza osončenosti in senc s heliodonom
Insolation and shadow analysis using heliodon



Merjenje propustnosti stekel
Measuring transmisivity of glazing



Ocena bleščanja v prostoru z uporabo 180-stopinjskega pogleda
Daylight glare assessment in 180 degree view

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Peter Lipar
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Marijan Žura
- Pedagogi
  Educators
  doc. dr. Tomaž Maher
  asist. dr. Rok Marsetič
  asist. dr. Darja Šemrov
  asist. dr. Irena Strnad
  viš. pred. mag. Robert Rijavec
- Tehnični sodelavci
  Technical associates
  mag. Simon Detellbach
  Jure Velkavrh
  Barbara Sterle

PROMETNOTEHNIŠKI INŠTITUT

Gospodarski razvoj in vse večja želja ljudi po mobilnosti vplivata na rast motornega cestnega prometa in s tem povezane probleme, ki jih poznamo pod pojmi »zastoji–stroški–varnost–ogljični odtis«. Sodelavci Prometnotehniškega inštituta se zavedamo pomembnosti mobilnosti ter vplivov prometa na okolje, zato želimo s prometnim planiranjem, ustreznim načrtovanjem izgradnje in vzdrževanja infrastrukture ter implementacijo inteligentnih transportnih sistemov izboljšati prometni nivo uslug in tako prispevati k večji prometni varnosti. Prizadevamo si za udejanjanje trajnostne mobilnosti, kjer je to le mogoče.

Vsi sodelavci inštituta se poleg pedagoškega dela, katerega primarna naloga je izobrazba kakovostnih, kompetentnih in zanesljivih kadrov, ukvarjamo tudi s strokovnim in raziskovalnim delom na vseh področjih prometnega inženirstva.

Raziskovalno in strokovno delo

Na Prometnotehniškem inštitutu se ukvarjamo s strokovnim in raziskovalnim delom na vseh področjih prometnega inženirstva. S svojimi raziskavami želimo prispevati k dvigu kakovosti v vseh fazah življenjskega cikla prometnic: od planiranja in projektiranja do gradnje, obratovanja in vzdrževanja. S temeljnimi raziskavami na področju makroskopskih in mikroskopskih transportnih modelov poskušamo izboljšati napovedi rasti prometa, ki so osnova za načrtovanje prometnic. S proučevanjem zaznav voznikov na potek ceste v okolju poskušamo prispevati k projektiranju predvidljivih, varnejših cest in cest, ki odpuščajo napake voznikov. Z razvojem inteligentnih transportnih sistemov želimo povečati varnost in prepustnost infrastrukture. Z zunanjimi partnerji smo razvili številne informacijske rešitve, namenjene učinkovitemu vodenju projektov, ki jih redno posodabljamo in razvijamo, ter ponujamo celovito podporo končnim uporabnikom. Pomembno področje dela so tudi priprave strokovnih podlag za zakone, pravilnike in predpise.

Pedagoška dejavnost

Cilj predmetov prometnega inženirstva je razumevanje značilnosti cestnega in železniškega prometa, pridobiti znanja o postopkih projektiranja, gradnje in vzdrževanja prometnih infrastruktur ter znanja o napovedovanju in modeliranju prometa. Študentje se spoznajo s sodobnimi informacijskimi in telekomunikacijskimi tehnologijami na področju cestnih in železniških sistemov. Pri vajah se znanje, pridobljeno na predavanjih, povezuje z reševanjem praktičnih primerov in problemov iz vsakodnevne prakse in z ogledom praktičnih primerov na terenu. Študentje skupaj z mentorji kritično vrednotijo in presojajo obstoječe stanje in prakse na področju prometa. Tako se ustvarja prostor, v katerem se študent nauči prepoznati delovanje sistema v vsakodnevni praksi in ga ovrednoti skozi lastne izkušnje.

TRAFFIC TECHNICAL INSTITUTE

Economic development and increasing demand for mobility affect the growth of motorized road traffic and the related problems known as »congestion-costs-safety-carbon footprint«. Members of the Traffic Technical Institute are aware of the importance of mobility and traffic impacts on the environment. For this reason, we wish to improve the level of traffic surfaces with adequate traffic planning, design for the construction and maintenance of traffic infrastructure and implementation of intelligent transport systems, with the main aim to contribute to better traffic safety. We aspire towards the realisation of sustainable mobility, wherever feasible.

In addition to educational work, which is mainly focused on the education of capable, competent and reliable graduates, all Institute members are also engaged in professional work in all areas of traffic engineering.

Research and professional activity

Members of the Traffic Technical Institute are engaged in professional and research work in all areas of traffic engineering. With our research work we aim at raising quality in all phases of the traffic infrastructure life cycle: from the planning and design, to construction, operation and maintenance. Our basic research dealing with macroscopic and microscopic transport models aims at improving predictions of traffic growth, which is the foundation for planning traffic infrastructure. By studying drivers' perceptions of road alignment in the environment we try to contribute to the design of predictable, safer and »forgiving« roads. With the development of intelligent transport systems we wish to improve safety and capacity of road infrastructure. In cooperation with our external partners we have developed numerous IT solutions intended to efficient project management. They are regularly updated, constantly developed and offered as holistic support to final users. Important area of our work is also preparation of professional bases for various acts, rules and regulations.

Educational activity

The aim of the courses from traffic engineering is to make students understand the characteristics of road and railway traffic, to provide knowledge on the procedures of design, construction and maintenance of traffic infrastructure and knowledge on the prediction and modelling of traffic. Students learn about modern IT technologies in road and railway systems. Within tutorials the knowledge, provided in lectures, is linked to practical cases and problems from daily practice, and visits to practical cases in the field are organised. Assisted by mentors, students critically assess and evaluate existing situations and practical cases in traffic. This creates a space where students learn to detect how the system operates in daily practice and are able to evaluate it through own experiences.

With the acquired knowledge students are qualified to perform direct tasks in institutions active in road and railway traffic research, at the ministry for traffic, in road and railway engineering companies, design organisations, construction companies for highway and railway engineering, as well as in road and railway infrastructure administration. When they finish their studies, they are qualified to perform and solve current technical, technological, organizational and other issues in processes related to traffic services and traffic infrastructure.

Exceptional achievements

In the recent period, our experts successfully implemented two European projects: SEE-ITS (Intelligent Transport Systems in SE Europe) and ROSEE (Traffic Safety in SE Europe). We successfully finished a targeted research project Model of the Integration of Slovenian Bicycle Network.

In the professional area, our Institute has been for some time advisor of the Slovenian Motorway Company in the elaboration of project documents and other expert materials required for managing traffic on Slovenian motorways. We also consult the Municipality of Ljubljana for the area of traffic infrastructure. We cooperated with several municipalities in the elaboration of integral traffic strategy and we prepared a substantial number of traffic studies and studies on traffic safety.

Scientific articles by our members titled Reinforcement Learning Approach for Train Rescheduling on a Single-Track Railway and Numerical Optimal Control Method for Shockwaves Reduction at Stationary Bottlenecks were published in renowned international journals.

S pridobljenimi znanji so študentje usposobljeni za opravljanje neposrednih delovnih nalog v institucijah, ki se ukvarjajo z raziskavami cestnega in železniškega prometa, na ministrstvu, pristojnem za promet, družbah cestne in železniške dejavnosti, projektantskih organizacijah, gradbenih podjetjih na področju nizkih zgradb ter pri upravljavcih cestne in železniške infrastrukture. Po končanem študiju so študentje usposobljeni za izvajanje in reševanje aktualnih tehničnih, tehnoloških, organizacijskih in drugih problemov v procesih, povezanih s prometnimi storitvami in prometno infrastrukturo.

Izjemni dosežki

V zadnjem obdobju so naši strokovnjaki uspešno izvedli dva evropska projekta, in sicer SEE-ITS (Inteligentni transportni sistemi v JV Evropi) in ROSEE (Prometna varnost v JV Evropi). Uspešno smo izvedli CRP Izdelava modela povezanosti celotne Slovenije s kolesarskimi potmi.

Na strokovnem področju je bil in je še inštitut svetovalec DARSA pri izdelavi projektne dokumentacije in drugih strokovnih gradiv v okviru upravljanja prometa na avtocestah, prav tako izvajamo svetovalne storitve na področju prometne infrastrukture za Mestno občino Ljubljana. V več občinah smo sodelovali pri izdelavi celostne prometne strategije in tudi večjega števila prometnih študij in študij o varnosti prometa.

Znanstvena članka sodelavcev inštituta Reinforcement learning approach for train rescheduling on a single-track railway in Numerical optimal control method for shockwaves reduction at stationary bottlenecks sta bila objavljena v uglednih mednarodnih revijah.

Mikroskopska simulacija z vgrajenimi optimalnimi spremenljivimi omejitvami hitrosti – razcep Koseze
Microscopic simulation with built-in optimal changeable speed limitations – junction Koseze

Makroskopski model novega polnega priključka na Leskoškovo cesto – BTC
Macroscopic model of the new full connection to Leskoškova street – BTC

Prometna mreža mikroskopskega modela območja Malence
Traffic network of microscopic model of Malence area

Mikroskopska simulacija prometne zapore predora Golovec
Microscopic simulation of traffic jam in the Golovec tunnel

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Franc Sinur
  (do 2016)
  prof. dr. Vlatko Bosiljkov
  (od 2017)

- Pedagogi
  Educators
  prof. dr. Vlatko Bosiljkov
  prof. dr. Tatjana Isaković
  doc. dr. Jože Lopatič
  doc. dr. Primož Može
  prof. dr. Goran Turk

- Tehnični sodelavec
  Technical associate
  Boštjan Jursinovič

KONSTRUKCIJSKO-PROMETNI LABORATORIJ

Konstrukcijsko prometni laboratorij (KPL) na Oddelku za gradbeništvo predstavlja skupno infrastrukturo za zadovoljevanje potreb naslednjih pedagoško-raziskovalnih enot (PRE): KMLK, KMK, KPMK, KKPI, KM, KSKE, KMTal, PTI, KGI in KMF. Organa vodenja in upravljanja KPL sta Kolegij KPL in Predstojnik KPL.

KPL je prvenstveno namenjen praktičnemu izvajanju pedagoškega, znanstvenega, raziskovalnega in strokovnega dela PRE. Pri tem imajo prednost zlasti tiste raziskave temeljnega in aplikativnega značaja, ki podpirajo dodiplomski in podiplomski študij, še posebej magistrske in doktorske naloge. V KPL se odvijajo tudi razvojne in strokovne naloge z namenom po izpopolnjevanju kadrov, vzdrževanju stika z gradbeno prakso in krepitvi materialne podlage, zlasti v pogledu nabave in modernizacije laboratorijske opreme. Po možnosti naj bi zaradi vzgoje kadrov tudi pri takšnih nalogah sodelovali študenti oziroma diplomanti na različnih ravneh izobraževanja.

Stavba KPL je bil zgrajena leta 1984 in financirana v okviru posebne izobraževalne skupnosti za gradbeništvo Slovenije. Z zgraditvijo laboratorija so se bistveno izboljšali pogoji za eksperimentalno delo na fakulteti. Večji del stavbe KPL zavzema univerzalni preizkusni prostor, namenjen materialnim in mehanskim preiskavam konstrukcijskih elementov ter eksperimentalni podpori predavanj in vaj. Sodobna merilna in preskusna oprema omogoča postavitev zahtevnejših preskuševališč s statično in kvazidinamično obremenitvijo. Hala je opremljena z mostnim dvigalom, ki omogoča manipulacijo večjih vzorcev.

Preizkusna in merilna oprema

Opremljanje laboratorija poteka postopoma in tako se je v več kot 30 letih njegovega obstoja laboratorij opremilo z opremo, ki omogoča izvedbo najrazličnejših vrst sodobnih eksperimentalnih preiskav. Pomembnejša preizkusna oprema je tako:

- preizkuševalna ploščad z modularnim vpenjalnim,
- univerzalna statična preizkusna stroja kapacitete 5000 kN in 50 kN,
- dinamični preizkusni stroj Instron s kapaciteto 1000 kN,
- dinamični preizkusni stroj Roell/Amsler kapacitete 100 kN,
- servohidravlični preizkusni sistem z dvema dvosmernima batoma kapacitete 250 kN,
- ločeni hidravlični črpalki s pretokoma 76 in 18 l/min,
- reometer ConTec,
- protitočni mešalec,
- standardiziran mešalec za malte in paste,
- reakcijska stena za vnos horizontalne obtežbe do 1000 kN,
- dva vpenjalna okvirja z nosilnostjo 3000 kN.

STRUCTURAL AND TRAFFIC INSTITUTE

Structural and Traffic Laboratory at the Department of Civil Engineering represents the common infrastructure intended to serve the needs of the following educational and research units: Chair of Concrete, Masonry and Timber Structures, Chair for Metal Structures, Chair of Testing in Materials and Structures, Chair of Structural and Earthquake Engineering, Chair of Mechanics, Chair of Buildings and Constructional Complexes, Chair of Soil Mechanics with Laboratory, Traffic Technical Institute, Chair of Construction IT and Chair of Mathematics and Physics. The laboratory is managed by the Laboratory Board and Head of Laboratory.

The laboratory is intended first and furthermost for practical implementation of the educational, scientific, research and professional activities of the educational and research units. Advantage is given especially to basic and applied research supporting undergraduate and graduate studies, especially master and doctoral theses. The laboratory is also used for development and professional tasks with the purpose to provide personal qualification, maintain contacts with the construction industry and to strengthen our material assets, especially regarding the acquisition and modernisation of laboratory equipment. In order to provide qualification to our students and graduates at different levels of education, we encourage their cooperation in such tasks.

The laboratory building was finished in 1984 and was financed within the educational community for civil engineering in Slovenia. With this laboratory the conditions for experimental work at the faculty improved considerably. The largest part of the laboratory consists of a universal testing area intended for material and mechanical tests of structural elements and experimental support for lectures and tutorials. Modern measuring and testing equipment allows us to prepare demanding test set ups with static and quasi dynamic loading. The hall is equipped with a crane that allows manipulation of larger specimens.

Testing and measuring equipment

The laboratory has been equipped in stages. Thus, in more than 30 years of its existence, equipment has been acquired that allows the implementation of various types of modern experimental investigations. Some important pieces of equipment are as follows:

- strong floor with a modular system for positioning of steel structural elements,
- universal static testing systems with capacities of 5000 kN and 50 kN,
- Instron dynamic testing system with a capacity of 1000 kN,
- Roell/Amsler dynamic testing system with a capacity of 100 kN,
- two servo hydraulic actuators, each with a capacity of 250 kN,
- separate hydraulic pumps with the rate of flow of 76 and 18 l/min,
- rheometer ConTec Viscometer 5,

- concrete pan mixer,
- Hobart mixer for mortars and pastes,
- reaction wall with up to 1000 kN of bearing capacity in horizontal direction,
- two vertical frames with 3000 kN of bearing capacity.
- Important calibrated measuring equipment includes:
- displacement, acceleration, force and deformation meters,
- multichannel systems for data acquisition (HBM, Dewetron and Dewesoft),
- optical system for measuring of displacement field (software for digital processing of images was developed at UL FGG).

Educational, research and professional activity

The laboratory provides for the experimental part of tutorials for several courses. At the first cycle studies students are introduced to laboratory work within the courses Materials, Buildings I, Building Physics. At the second cycle, they learn about demanding experimental work within the course Renovation and Testing of Structures, where they perform and numerically analyse demanding tests. An increasing number of students also use the laboratory for their experimental work within diploma and master theses.

Research activity is represented in the laboratory within investigations for numerous national and European projects (e. g. RFCS OUTBURST, Tigr4Smart) and doctoral theses.

With the aim to provide the best possible service to economy, the laboratory is actively involved in experimental tests for the needs of the construction industry. In this way we make sure to stay in touch with the economic development guidelines and use our expert knowledge in solving current development issues of the industry.

Exceptional achievements

On the basis of research work in the laboratory, several scientific contributions were published, some of the latest ones are listed below:

- FORTUNA, Barbara, PLOS, Mitja, ŠULIGOJ, Tamara, TURK, Goran. Mechanical properties of Slovenian structural beech timber. V: WCTE 2018 : Proceedings, World conference on timber engineering, Seoul, Republic of Korea, August 20-23, 2018. Seoul: Republic of Korea. 2018, str. 1–7, ilustr.
- B. Šubic, G. Fajdiga, J. Lopatič, Bending of wooden based hybrid beams: experimental analysis. V: WCTE 2016 : Proceedings, World conference on timber engineering, Vienna, Austria, 22-25 August 2016, str. 1-8.
- MOŽE, Primož. Bearing strength at bolt holes in connections with large end distance and bolt pitch. Journal of constructional steel research, ISSN 0143-974X. [Print ed.], 2018, letn. 147, str. 132–144, ilustr., doi: 10.1016/j.jcsr.2018.04.006

Od pomembnejše kalibrirane merilne opreme pa se uporabljajo:

- merilniki po m za zajem polja pomikov pri statičnih testih (programska oprema za obdelavo slik je razvita na UL FGG).

Pedagoško, raziskovalno in strokovno delo

V KPL se izvaja eksperimentalni del vaj pri več predmetih. Na I. stopnji se z delom v laboratoriju študenti srečajo pri predmetih Gradiva, Stavbarstvo I, Gradbena fizika. Na II. stopnji pa se študenti srečajo z zahtevnejšim eksperimentalnim delom pri predmetu Prenova in preskušanje konstrukcij, kjer izvajajo in numerično analizirajo bolj zahtevne preiskave. Poleg tega vedno več študentov v KPL opravi tudi eksperimentalni del diplomskih in magistrskih del.

Raziskovalna dejavnost v KPL poteka v sklopu preiskav za številne nacionalne in evropske projekte (npr. RFCS OUTBURST, Tigr4Smart) ter v doktorskih disertacijah.

Poleg pedagoške in raziskovalne dejavnosti si KPL v želji po čim večjem sodelovanju z gospodarstvom prizadeva za izvedbo eksperimentalnih preiskav, pridobljenih iz gospodarstva. To omogoča za laboratorij neprekinjen stik s smernicami razvoja v gospodarstvu in uporabo strokovnega znanja pri reševanju razvojnih problemov, s katerimi se to sooča.

Pomembnejše objave raziskav v laboratoriju

Na podlagi raziskovalnega dela v laboratoriju je bilo v objavljenih več znanstvenih prispevkov, nekateri izmed najnovejših so našteti spodaj:

- FORTUNA, Barbara, PLOS, Mitja, ŠULIGOJ, Tamara, TURK, Goran. Mechanical properties of Slovenian structural beech timber. V: WCTE 2018 : Proceedings, World conference on timber engineering, Seoul, Republic of Korea, August 20-23, 2018. Seoul: Republic of Korea. 2018, str. 1–7, ilustr.
- B. Šubic, G. Fajdiga, J. Lopatič, Bending of wooden based hybrid beams: experimental analysis. V: WCTE 2016 : Proceedings, World conference on timber engineering, Vienna, Austria, 22-25 August 2016, str. 1-8.
- MOŽE, Primož. Bearing strength at bolt holes in connections with large end distance and bolt pitch. Journal of constructional steel research, ISSN 0143-974X. [Print ed.], 2018, letn. 147, str. 132–144, ilustr., doi: 10.1016/j.jcsr.2018.04.006

Test ojačene ukrivljene jeklene pločevine v tlaku – projekt RFCS OUTBURST
Test of curved stiffened steel panel – project RFCS OUTBURST

Test spoja les–jeklo – projekt Tigr4Smart
Test of timber-to-steel joint – project Tigr4Smart

VSEBINA / CONTENT

ODDELEK ZA GEODEZIJO

Oddelek za geodezijo UL FGG sestavlja 6 kateder. To so Katedra za geodezijo, Katedra za geoinformatiko in katastre nepremičnin, Katedra za kartografijo, fotogrametrijo in daljinsko zaznavanje, Katedra za inženirsko geodezijo, Katedra za matematično in fizikalno geodezijo ter navigacijo in Katedra za prostorsko planiranje, v okviru katerih je zaposlenih 30 sodelavcev, od tega 14 učiteljev, 10 asistentov, en strokovni sodelavec, štirje tehniški sodelavci in en mladi raziskovalec.

DEPARTMENT OF GEODETIC ENGINEERING

The Faculty's Department of Geodetic Engineering consists of 6 chairs: Chair of Geodesy, Chair of Geoinformation and Real Estate Cadastres, Chair of Cartography, Photogrammetry and Remote Sensing, Chair of Engineering Geodesy, Chair of Mathematical and Physical Geodesy and Navigation, and Chair of Spatial Planning. The Department of Geodetic Engineering has 30 members, of those 14 teachers, 10 assistants, 1 professional associate, 4 technical associates and 1 young researcher.

Na Oddelku za geodezijo izvajamo dva študijska programa prve stopnje:

- univerzitetni študijski program prve stopnje Geodezija in geoinformatika
- visokošolski strokovni študijski program prve stopnje Tehnično upravljanje nepremičnin

in dva študijska programa druge stopnje:

- magistrski študijski program druge stopnje Geodezija in geoinformatika
- magistrski študijski program druge stopnje Prostorsko načrtovanje

V digitalni dobi sta geodezija in geoinformatika nepogrešljivi vedi pri zagotavljanju prostorske podatkovne infrastrukture, ki je temelj za upravljanje prostora in nepremičnin ter za oblikovanje strateških in političnih odločitev, vezanih na prostor in družbo v celoti. Diplomanti naših študijskih programov tekom študija pridobijo bogata znanja s področja geodezije, geoinformatike, nepremičnin, prostorskega načrtovanja, ekonomike in prava. V prostoru delujejo številne stroke zato je pomembno njihovo interdisciplinarno povezovanje, v katerem so lahko uspešni le široko izobraženi in razgledani strokovnjaki.

The Department of Geodetic Engineering offers four study programs, two from the first cycle:

- first cycle academic study program Geodesy and Geoinformatics
- first cycle higher education professional program Technical Real Estate Management

and two from the second cycle:

- second cycle master study program Geodesy and Geoinformatics
- second cycle master study program Spatial Planning.

In this digital age, geodesy and geoinformatics are indispensable sciences for providing spatial data infrastructure, which is the foundation for space and real estate management as well as for preparing strategic and political decisions related to space and society as a whole. During the studies, graduates of our study programs acquire rich knowledge from the areas of geodesy, geoinformatics, real estate, spatial planning, economics and law. There are numerous fields of expertise active in space, which requires their interdisciplinary cooperation. Such cooperation can only be successful if it is driven by educated and well informed experts.

PEDAGOŠKO DELO

Pedagoško delo je usmerjeno v podajanje znanja, ki je usklajeno z razvojem znanosti in stroke v svetu ter s potrebami v Sloveniji. V preteklosti je bila geodezija ena maloštevilnih strok, ki se je ukvarjala s pridobivanjem prostorskih podatkov, danes geodezija zagotavlja referenčne prostorske podatke. Vedno nove tehnologije za pridobivanje prostorskih podatkov in nova področja uporabe prostorskih podatkov ter tudi vedno večje zahteve glede kakovosti prostorskih podatkov zahtevajo pridobivanje prostorskih podatkov izključno po geodetskih načelih.

Geodezija pridobiva, analizira, vzpostavlja in vzdržuje zbirke prostorskih in nepremičninskih podatkov ter skrbi za njihovo organiziranje, povezovanje, prikazovanje in distribucijo. Pri tem je, poleg znanj s področja geodezije, geoinformatike, fotogrametrije in kartografije, pomembno tudi poznavanje prava v povezavi z zemljiško administracijo (katastri nepremičnin, nepremičninske evidence) in zagotavljanjem pravne varnosti lastništva nepremičnin ter ekonomije v povezavi z upravljanjem zemljišč oziroma nepremičnin in njihovega vrednotenja. Zaradi vloge geodezije v prostoru je pomembno njeno sodelovanje pri načrtovanju in izvajanju posegov v prostor, zato je potrebno poznavanje procesov prostorskega planiranja in osnov gradbeništva.

Cilj vseh študijskih programov na Oddelku za geodezijo je vzgoja strokovnjakov na področjih geodezije, geoinformatike, upravljanja nepremičnin, prostorskega in urbanističnega planiranja ter okoljskih, ekonomskih, pravnih in organizacijskih ved. Znanja z naštetih področij so ključna pri izvedbi vseh vrst projektov v prostoru, evidentiranju in obdavčenju nepremičnin, upravljanju in gospodarjenju z zemljišči, nepremičninami in prostorom, prostorskem načrtovanju in vodenju prostorskih politik.

V izvedbo pedagoškega procesa vključujemo predavatelje iz podjetij in javne uprave ter organiziramo obiske ustanov in strokovne ekskurzije v Sloveniji in tujini. Študentom omogočamo sodelovanje pri raziskovalnem in strokovnem delu v okviru različnih projektov in spodbujamo njihovo sodelovanje z inštitucijami doma in v tujini. UL FGG je vključena v mrežo mednarodne študijske izmenjave študentov in praktičnega usposabljanja, predvsem preko programov ERASMUS+. Študente spodbujamo k prijavljanju na različne razpise ter jim pomagamo, da lastne ideje razvijejo in pripeljejo do končnih rezultatov. Najboljša diplomska in magistrska dela predlagamo v izbor za različne nagrade, kot so na primer univerzitetna in fakultetna Prešernova nagrada ter nagrada ESRI.

Skupaj imamo na Oddelku za geodezijo na študijskih programih prve stopnje vpisanih okrog 140 študentov in na študijskih programih druge stopnje okrog 90 študentov. Študentom je na razpolago sodobna geodetska merska in programska oprema za pridobivanje, obdelavo, analizo, vizualizacijo, shranjevanje in upravljanje vseh vrst prostorskih podatkov.

Sodelavci Oddelka za geodezijo pripravljamo tematska predavanja s področij geodezije in sorodnih strok za srednje šole ter sodelujemo pri organizaciji tehničnih dni in poletnih šol UL FGG za dijake in učence.

EDUCATIONAL WORK

Educational work is oriented into transfer of knowledge adjusted to the development of science and profession in the world and to the needs in Slovenia. In the past, geodesy was one of few fields of science that focused on the acquisition of spatial data. Today, geodesy provides reference spatial data. Continuously new technologies for the acquisition of spatial data and new areas their use, as well as the increasing demands regarding the quality of spatial data require their acquisition exclusively according to geodetic principles.

Geodesy collects, analyses, establishes and maintains databases of spatial and real estate data and assists in their organisation, interconnection, presentation and distribution. Apart from knowledge of geodesy, geoinformation, photogrammetry and cartography, it is also important for students to have knowledge about law related to land administration (cadastres, real estate records) and providing legal security for the real estate ownership and economy related to land or real estate management and valuation. Due to its role in spatial planning, geodesy must be involved in the planning and implementation of developments in space. For this reason, we provide our students with knowledge about the processes of spatial planning as well as the basics of civil engineering.

The goal of all study programs at the Department of Geodetic Engineering is education of experts in the areas of geodesy, geoinformatics, real estate management, spatial and urban planning as well as environmental, economic, legal and organisational sciences. Knowledge from these areas is critical for the implementation of all types of projects in space, real estate registration and taxation, land management, real estate and spatial planning and management of spatial policies.

We invite lecturers from business companies and public administration to participate in our education process and organise visits to institutions and field trips in Slovenia and abroad. We offer our students the possibility to participate in research and professional work within various projects and encourage cooperation with various institutions in Slovenia and abroad. The Faculty enables international student exchange for studies and internship, mainly within the ERASMUS+ program. We encourage our students to apply to various calls and assist them in realising their own ideas up to the final result. The best diploma and master theses are recommended for various awards, such as Faculty's or University's Prešeren Award, the ESRI award, etc.

The number of students enrolled to the first cycle study programs at the Department of Geodetic Engineering is around 140, and to the second cycle study programs around 90. Students can benefit from top measuring equipment and contemporary geodetic measuring and software tools for the collection, processing, analysis, visualisation, recording and management of all types of spatial data.

Members of the Department of Geodetic Engineering prepare thematic lectures from the area of geodesy and the related areas for secondary schools and cooperate in the organisation of technical days and summer schools organised by UL FGG for primary and secondary school population.

SCIENTIFIC AND RESEARCH WORK

Scientific and research work is carried out under the umbrella of the research program financed by the Slovenian Research Agency: Geoinformation Infrastructure and Sustainable Spatial Development of Slovenia, which includes researchers from all the Department's chairs, as well as the Municipal Economics Institute from the Department of Civil Engineering. Research work within the research program is focused on practically all areas of modern geodesy, geoinformation, cartography, photogrammetry, remote sensing, real estate cadastres, real estate valuation, municipal engineering and spatial planning. Our work includes in particular the establishment and maintenance of the national coordinate system, development of methods and software for position definition in global navigation satellite systems, definition of the Earth's gravity field, monitoring and modelling of geokinematic activities, development of high precision surveying methods for the needs of monitoring stability of the natural and built environment, development of software for the processing of laser scanning data, development of photogrammetric and processing methods of remote sensing data of the Earth from the air and the universe, with the development of standards of spatial data, visualisation of space, development of spatial analysis, with the collection and application of real estate data, land development as well as spatial planning and development.

Within the above mentioned research program, our department is engaged in national and international research and development projects. We cooperate with researchers from other faculties and universities as well as with experts and research institutions and companies in Slovenia and outside its borders.

The findings of our research are regularly presented at various national and international scientific and expert conferences, in internationally established journals, where we also cooperate as reviewers and members of editorial boards. We publish and review articles in the journal Geodetski vestnik, published by the Slovenian Association of Surveyors.

PROFESSIONAL WORK

We cooperate with the Surveying and Mapping Authority of the Republic of Slovenia and the Geodetic Institute of Slovenia, as well as with ministries, municipalities and institutions that develop solutions in the areas of geodesy, geodetic and spatial data infrastructure, land administration and spatial management, solutions of the decision-making process in case of natural and other disasters, solutions of the legal bases for spatial development documents, and with institutions dealing with issues of the development of urban and rural area, regional development, resistance of urban areas to challenges of climate changes, as well as inclusion of the public into the processes of spatial planning.

We pay a lot of attention to cooperation with business companies. We cooperate with them on all areas of geodesy, geoinformatics and spatial planning.

ZNANSTVENO IN RAZISKOVALNO DELO

Znanstvenoraziskovalno delo poteka v okviru raziskovalnega programa ARRS »Geoinformacijska infrastruktura in trajnostni prostorski razvoj Slovenije«, v katerega so vključeni raziskovalci vseh kateder z Oddelka za geodezijo ter Inštituta za komunalno gospodarstvo z Oddelka za gradbeništvo. Raziskovalno delo v okviru raziskovalnega programa je usmerjeno v praktično vsa področja sodobne geodezije, geoinformatike, kartografije, fotogrametrije, daljinskega zaznavanja, katastrov nepremičnin, vrednotenja nepremičnin, komunalnega inženirstva in prostorskega načrtovanja. Podrobneje pa se ukvarjamo z vzpostavitvijo in vzdrževanjem državnega koordinatnega sistema, razvojem metod in programske opreme za določanje položaja v globalnih navigacijskih satelitskih sistemih, določitvijo težnostnega polja Zemlje, spremljanjem in modeliranjem geokinematičnega dogajanja, razvojem visoko natančne geodetske izmere za spremljanje stabilnosti naravnega in grajenega okolja, razvojem programske opreme za obdelavo podatkov laserskega skeniranja, razvojem fotogrametričnih in metod daljinskega zaznavanja Zemlje iz zraka in vesolja, razvojem standardov za prostorske podatke, vizualizacijo prostora, razvojem prostorskih analiz, s pridobivanjem in upravljanjem podatkov o nepremičninah, razvojem zemljišč ter načrtovanjem in razvojem prostora.

Poleg dela v okviru omenjenega raziskovalnega programa smo vključeni v domače in mednarodne raziskovalne in razvojne projekte. Sodelujemo z raziskovalci drugih fakultet in univerz ter s strokovnjaki z raziskovalnih inštitucij in podjetij doma in v tujini.

Izsledke svojega dela predstavljamo na domačih in tujih znanstvenih in strokovnih konferencah, v mednarodno uveljavljenih revijah, kjer delujemo tudi kot recenzenti in člani uredniških odborov. Pri glasilu Zveze geodetov Slovenije, Geodetskem vestniku, objavljamo in delujemo kot recenzenti ter sodelujemo pri delu uredniškega odbora.

STROKOVNO DELO

Sodelujemo z Geodetsko upravo Republike Slovenije in Geodetskim inštitutom Slovenije ter ministrstvi, občinami in institucijami, ki razvijajo rešitve na področjih geodezije, geodetske in prostorske podatkovne infrastrukture, zemljiške administracije ter upravljanja prostora, rešitve za odločanje v primerih naravnih in drugih nesreč, rešitve pri pripravi strokovnih podlag za prostorske razvojne dokumente ter inštitucije, ki se ukvarjajo z vprašanji urejanja naselij in podeželskega prostora, regionalnega razvoja, odpornosti mest na izzive podnebnih sprememb ter vključevanja javnosti v procese prostorskega načrtovanja.

Veliko pozornost namenjamo sodelovanju z gospodarskimi družbami, s katerimi sodelujemo na vseh področjih geodezije, geoinformatike in prostorskega načrtovanja.

UNIVERZITETNI ŠTUDIJSKI PROGRAM PRVE STOPNJE GEODEZIJA IN GEOINFORMATIKA

Univerzitetni študijski program prve stopnje Geodezija in geoinformatika traja tri leta (šest semestrov) in obsega skupaj 180 kreditnih točk. Študijski program ne vključuje smeri in se izvaja kot redni in izredni študij.

Cilj prvostopenjskega študija Geodezije in geoinformatike je usposobiti strokovnjaka s kakovostnim znanjem in temeljno teoretično ter praktično podlago znanj s področij geodezije in geoinformatike. Diplomant ob zaključku študija pridobi primerno osnovo za učinkovito vključitev v poklic oziroma za nadaljnji raziskovalni študij na istem oziroma sorodnem študijskem programu. Pridobljena znanja diplomantu podajajo širok vpogled v zgodovinski razvoj in trenutno stanje stroke v Sloveniji, Evropi in širše; omogočajo izvedbo in kritično presojo postopkov, vezanih na geodezijo in geoinformatiko; zagotavljajo razvijati in poglabljati profesionalno inženirsko odgovornost in zagotavljajo primerljivost pridobljenih znanj na sorodnih študijskih programih v širši regiji.

Splošne kompetence so: sposobnost samostojnega študija novih tehnologij in metodologij; poklicna strokovna odgovornost; sposobnost razumevanja temeljnih tujih pojmov s posameznih področij ob uporabi tuje učne literature in zmožnost smiselne uporabe tujih pojmov pri sporazumevanju v slovenskem jeziku; sposobnost uporabe informacijsko-komunikacijske tehnologije s področij geodezije in geoinformatike; sposobnost povezovanja z drugimi strokami in dela v skupinah s strokovnjaki z različnih področij ter sposobnost vodenja manjših geodetskih podjetij.

Diplomant pridobi predmetno-specifične kompetence:

- pozna vlogo in pomen geodezije in geoinformatike v sodobni družbi,
- samostojno rešuje vse vrste tipičnih geodetskih nalog s področij zajemanja, ocenjevanja kakovosti in uporabnosti geodetskih podatkov,
- razume in strokovno uporablja sodobne geodetske tehnologije in metodologije za pridobivanje prostorskih podatkov z ustrezno natančnostjo,
- pozna in pravilno uporablja prostorske podatke glede na njihov pomen, obliko zapisov, kakovost, vire, pridobivanje in zajem prostorskih podatkov;
- izvaja geodetska dela pri vzdrževanju osnovnega geodetskega sistema in izmeri; graditvi manj zahtevnih objektov; upravnih postopkih za potrebe evidentiranja nepremičnin; sodeluje pri načrtovanju, zasnovi in izvedbi posegov v prostor; vzdržuje geografske in kartografske sisteme ter pripravlja kartografske prikaze prostorskih podatkov; aktivno sodeluje z investitorji, projektanti in izvajalci posegov v prostor.

FIRST CYCLE ACADEMIC STUDY PROGRAM GEODESY AND GEOINFORMATION (BA)

University Bachelor Degree Program Geodesy and Geoinformation consists of 3 years (6 semesters) and amount to 180 credit points. The study program does not include individual study orientations.

General competences acquired by the graduates of the bachelor study programme of Geodesy and Geoinformation include the ability to: -study new technologies and methodologies independently by acquiring the bases of professional responsibility; -communicate in oral and written form in the native and in foreign languages with special emphasis on the knowledge of foreign language terminology; -use information and communication technologies in the fields of geodesy and geoinformation; -connect with other professionals in working teams of different experts from various professional fields; -manage a small surveying firm engaged in solving professional problems.

Subject-specific competencies

With the first cycle bachelor study programme Geodesy and Geoinformation the graduate acquires the following course-specific competences:

- knowledge of the role and importance of geodesy and geoinformation in modern society,
- ability to independently solve all kinds of typical surveying tasks in the areas of data capture and quality assessment as well as to make decisions related to the use of spatial information,
- ability to use modern surveying technologies and methodologies to acquire spatial data with appropriate precision or accuracy,
- knowledge of spatial data usage according to their importance, form of records, quality, resources, production and recovery,
- ability to use the measurement results and professional knowledge in: - maintenance of basic geodetic systems; - less complex building construction; - administrative procedures to meet the needs of real estate registration; - participation in planning, design and implementation of interventions in space; - maintenance of geographic and cartographic systems and preparation of cartographic spatial data; - cooperation with investors, designers and contractors.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika I / Mathematics I | ECTS 10
- Fizika / Physics | ECTS 9
- Programska orodja v geodeziji / Software Tools in Geodesy | ECTS 5
- Uvod v geodezijo / Introduction to Geodetic Engineering | ECTS 6
- Matematika II / Mathematics II | ECTS 8
- Gradbeništvo in infrastruktura / Civil Engineering and Infrastructure | ECTS 4
- Detajlna izmera / Topografic Surveying and Mapping | ECTS 10
- Statične metode v geodeziji / Statistical Methods in Geodesy | ECTS 4
- Izravnalni račun I / Adjustment Computation I | ECTS 4

2. letnik / 2nd year

- Izravnalni račun II / Adjustment Computations II | ECTS 4
- Prostorsko načrtovanje / Spatial Planning | ECTS 4
- Višja geodezija / Geodesy | ECTS 4
- Kartografija / Cartography | ECTS 8
- Geoinformatika I / Geoinformatics I | ECTS 6
- Avtomatska obdelava podatkov / Introduction to Data Processing | ECTS 4
- 1. izbirni predmet FGG ali zunanji / 1st Elective Course (FGG or External) | ECTS 9
- Fotogrametrija I / Photogrammetry I | ECTS 5
- Precizna klasična geodetska izmera / Precise Terrestrial Surveying | ECTS 9
- GNSS v geodeziji / GNSS in Geodesy | ECTS 8
- Uvod v pravo / Introduction to Law | ECTS 4

3. letnik / 3rd year

- Urejanje podeželskega prostora / Rural Planning | ECTS 4
- Ekonomika in management v geodeziji / Economics and Management in Geodesy | ECTS 5
- 2. izbirni predmet FGG ali zunanji / 2nd Elective Course (FGG or External) | ECTS 9
- Geodezija v inženirstvu I / Engineering Surveying I | ECTS 6
- Daljinsko zaznavanje I / Remote Sensing I | ECTS 4
- Stvarno pravo / Property Law | ECTS 4
- Evidence in katastri nepremičnin / Real Estate Records and Cadastres | ECTS 8
- Upravljanje in vrednotenje nepremičnin / Real Estate Management and Valuation | ECTS 6
- 3. izbirni predmet FGG ali zunanji / 3rd Elective Course (FGG or External) | ECTS 9
- Praktično usposabljanje / Practical Training | ECTS 4
- Diplomsko delo / Diploma Work | ECTS 8

Izbirni predmeti / Elective Courses

- Programiranje / Programming | ECTS 4
- Terensko delo / Field Work | ECTS 6
- Standardi v geodeziji in inženirstvu / Standards in Surveying and Engineering | ECTS 4
- Hidrografija in toponomija / Hidroraphy and Toponomy | ECTS 9
- * Merjenje in opisovanje prostora / Measuring and Description of Space | ECTS 4

* Predmet namenjen kot izbirni študentom drugih članic (predvsem družboslovnim)
/ The course intened as an optional subject for students from other (social sciences) faculties

VISOKOŠOLSKI STROKOVNI ŠTUDIJSKI PROGRAM PRVE STOPNJE TEHNIČNO UPRAVLJANJE NEPREMIČNIN

Visokošolski strokovni študijski program prve stopnje Tehnično upravljanje nepremičnin traja tri leta (šest semestrov) in obsega skupaj 180 kreditnih točk. Študijski program ne vključuje smeri.

Temeljni cilj prvostopenjskega študijskega programa Tehnično upravljanje nepremičnin je usposobiti strokovnjaka s kakovostnim znanjem in temeljno podlago predvsem uporabniških znanj s področij geodezije in upravljanja nepremičnin. Pridobljeno znanje omogoča diplomantu hitro in učinkovito vključitev v delo ob zaposlitvi, predstavlja podlago za samostojno sledenje razvoja stroke v sklopu vseživljenjskega učenja, predstavlja ustrezno izhodišče za študij geodezije in geoinformatike na drugi stopnji, omogoča prehajanje med sorodnimi študijskimi programi ter zagotavlja vseevropsko primerljivost dosežene izobrazbe.

Splošne kompetence diplomanta so: poklicna strokovna, okoljska in družbena odgovornost; zmožnost opredeljevanja, razumevanja in reševanja aplikativnih problemov na področju geodezije in upravljanja nepremičnin; sposobnost strokovnega sporazumevanja v pisni in ustni obliki; sposobnost povezovanja z drugimi strokami in dela v skupini s strokovnjaki z različnih področij; sposobnost kritičnega vrednotenja konkretnih rešitev; sposobnost uporabe izbrane informacijske tehnologije s področij geodezije in upravljanja nepremičnin; ter sposobnost vodenja manjšega geodetskega podjetja.

Predmetno-specifične kompetence diplomanta so, da pozna vlogo in pomen upravljanja nepremičnin v trajnostno naravnani družbi ob podpori geodezije in geoinformatike, samostojno rešuje vse vrste tipičnih praktičnih nalog s področja urejanja podatkov in manj zahtevnih preureditev nepremičnin, razume in strokovno uporablja sodobne geodetske merske postopke v prid nastajanju in vzdrževanju zbirk podatkov, evidentira meje lastništva in meje drugih pravic na nepremičninah, vrednoti tržne vrednosti nepremičnin, evidentira ter vzdržuje zbirke katastrskih podatkov za potrebe obdavčitve nepremičnin, pozna in tolmači pomen, obliko, kakovost, vire, pridobivanje in zajem prostorskih podatkov za potrebe urbanega in ruralnega prostorskega načrtovanja in določitve rabe zemljišč, sodeluje pri pripravi prostorskih aktov, sodeluje pri načrtovanju, zasnovi in izvedbi nepremičninskih posegov v prostor, izvaja geodetska dela pri detajlni geodetski izmeri, pri graditvi manj zahtevnih objektov in v okviru upravnih postopkov za potrebe evidentiranja nepremičnin, vzdržuje zemljiške informacijske sisteme, razume kartografske prikaze prostorskih podatkov, sodeluje z investitorji, projektanti in izvajalci pri nepremičninskih posegih v prostor, pozna osnove pravnega in upravnega sistema, pomembne za geodeta in za upravljanje ter evidentiranje prostora.

HIGHER EDUCATION PROFESSIONAL FIRST CYCLE STUDY PROGRAM REAL ESTATE VALUATION

Professional first cycle bachelor degree programme 1 Technical Real Estate Management consists of 3 years (6 semesters) and amounts to 180 ECTS points. The study programme does not include any orientations.

The basic goal of the Professional Bachelor Degree Programme Technical Real Estate Management is to train expert with professional quality skills and fundamental theoretical and mostly practical knowledge in the fields of geodesy and real estate management. Acquired knowledge enables graduates quick and effective involvement in work at the time of first employment, is a basis for independent follow-up of the profession in the context of lifelong learning, is an appropriate basis for the study of geodesy and geoinformation at the second cycle, enables transition between related study programs and ensures European comparability of achieved education.

General competences are: professional technical, environmental and social responsibility; the ability of defining, understanding in solving applied problems in the fields of geodesy and real estate management; the ability of professional written and oral communication; the ability to connect with other professionals and work in a team with experts from various fields; the ability to critically assess concrete solutions; the ability to use selected information technologies in the fields of geodesy and real estate management; and the ability to manage a small geodetic company.

Subject-specific competences of the graduate student are, that he knows the role and importance of real estate management in sustainability-oriented society with support of geodesy and geoinformation, independently solves all types of typical practical tasks in the field of data recording and less complex real estate rearrangements, understands and makes professional use of contemporary geodetic technologies and methodologies to the benefit of creating and maintaining data bases, records boundaries of private properties and boundaries of other rights on real estate, evaluates real estate market values, records and maintains data bases for the needs of real estate taxation, knows and interprets the meaning, form, quality, sources, acquisition and maintenance of spatial data for the needs of urban and rural spatial planning and definition of land use, takes part in the preparations of spatial acts, takes part in planning, design and implementation of interventions into space, develops geodetic works in detailed surveying, in the construction of less complex structures and within legal procedures for the needs of real estate recording, maintains land information systems, understands cartographic presentations of spatial data, cooperates with investors, designers and contractors in interventions into space, knows the bases of legal and administrative systems important for the surveyor as well as for managing and recording space.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Geodezija / Geodetic Engineering | ECTS 4
- Infrastrukturni objekti / Infrastructural Objects | ECTS 4
- Inženirska matematika I / Engineering Mathematics I | ECTS 6
- Programska orodja v upravljanju nepremičnin / Software in Real Estate Management | ECTS 9
- Zakonodaja upravljanja nepremičnin / Legislation of Real Estate Management | ECTS 4
- Analiza opazovanj v geodeziji I / Analysis of Monitoring in Geodesy I | ECTS 4
- Inženirska matematika II / Engineering Mathematics II | ECTS 5
- Kartografija in topografija / Cartography and Topography | ECTS 6
- Razvoj in načrtovanje v prostoru / Spatial Development and Planning | ECTS 7
- Terestrična detajlna izmera / Terrestrial Detailed Survey | ECTS 7
- Statistika z elementi informatike / Statistics with Elements of Informatics | ECTS 5

2. letnik / 2nd year

- Analiza opazovanj v geodeziji II / Analysis of Monitoring in Geodesy II | ECTS 4
- Avtomatska obdelava podatkov / Automatic Data Processing | ECTS 4
- Geodezija pri gradnji objektov / Geodesy in Construction | ECTS 6
- Ekonomika in organizacija geodetskih del / Economics and Organization of Surveying | ECTS 7
- Daljinsko zaznavanje in fotogrametrija / Remote Sensing and Photogrammetry | ECTS 7
- Geodetski instrumenti in metode / Geodetic Instruments and Methods | ECTS 6
- Geografski informacijski sistemi / Geographic Information Systems | ECTS 6
- Katastri nepremičnin / Real Estate Cadastres | ECTS 8
- 1. izbirni predmet FGG ali zunanji / 1st Elective Course (FGG or External) | ECTS 9
- Praktično usposabljanje / Practical Training | ECTS 4

3. letnik / 3rd year

- Upravljanje stavbnih zemljišč in vrednotenje / Building Land Management and Valuation | ECTS 5
- Metode prostorskih analiz v GIS / Methods of Spatial Analyses in GIS | ECTS 5
- Satelitsko podprta geodetska izmera / Satellite Supported Surveying | ECTS 6
- Referenčni sistemi v geodeziji / Reference Systems in Geodesy | ECTS 5
- 2 izbirni predmet FGG / 2nd Elective Course (FGG or External) | ECTS 9
- 3. izbirni predmet FGG ali zunanji / 3rd Elective Course (FGG or External) | ECTS 9
- Podrobno urbanistično načrtovanje / Detailed Urban Planning | ECTS 5
- Zemljiški management / Land Management | ECTS 5
- Terensko delo / Field Work | ECTS 6
- 4. izbirni predmet FGG / 4th Elective Course (FGG or External) | ECTS 9
- Diplomsko delo / Diploma Work | ECTS 8

Izbirni predmeti / Elective Courses

- Topografska fotogrametrija / Topographic Photogrammetry | ECTS 4
- Množično vrednotenje nepremičnin v GIS / Mass Real Estate Valuation in GIS | ECTS 4
- Standardi v geodeziji in inženirstvu / Standards in Geodesy and Engineering | ECTS 4
- Meritve povečane natančnosti / Measurements of Increased Precision | ECTS 5
- Lokacijske storitve / Location Services | ECTS 5
- Stanovanjsko in komunalno gospodarstvo / Housing and Municipal Economics | ECTS 4
- Varstvo okolja in prostorsko načrtovanje / Environmental Protection and Spatial Planning | ECTS 4
- Uporabno daljinsko zaznavanje / Applied Remote Sensing | ECTS 4
- Geodezija v inženirstvu / Engineering Surveying | ECTS 5
- Agrarne operacije / Agrarian Land Operations | ECTS 5
- Kartografska reprodukcija / Cartographic Reproduction | ECTS 4

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE GEODEZIJA IN GEOINFORMATIKA

Magistrski študijski program druge stopnje Geodezija in geoinformatika traja dve leti (štiri semestre) in obsega skupaj 120 kreditnih točk. Študijski program ne vključuje smeri.

Temeljni cilji programa in splošne kompetence

Temeljni cilj študijskega programa je izobraziti strokovnjake, sposobne analitičnega in sintetičnega mišljenja, kreativnega, kritičnega, učinkovitega in tvornega reševanja kompleksnih razvojno-raziskovalnih problemov ter projektno-aplikativnih nalog s področij geodezije in geoinformatike. Program zagotavlja, da bodo strokovnjaki sposobni interdisciplinarnega povezovanja, in jim hkrati omogoča odlične temelje za nadaljevanje študija na tretji stopnji katerekoli naravoslovno tehnične smeri. Omogoča jim pridobitev licence odgovornega geodeta pri Inženirski zbornici Slovenije. Študijski program zagotavlja študentom primerljivost dosežene izobrazbe tudi v mednarodnem merilu.

Splošne kompetence, ki se pridobijo s programom so splošna razgledanost in poznavanje akademskih področij in znanstvenih metod dela, kritično branje in razumevanje besedil, samostojno pridobivanje znanja in iskanje virov, usposobljenost za prenos in uporabo teoretičnega znanja v prakso, razvijanje visokih profesionalnih in etičnih meril ter poklicne, okoljske in socialne odgovornosti, razvijanje znanstvene pismenosti, javnega nastopanja in sporazumevanja s strankami, posredovanje in podajanje znanja in rezultatov, zmožnost uporabe domačega in tujega strokovnega jezika v pisni in govorni komunikaciji, komunikacije v mednarodnih in nacionalnih znanstvenih krogih, zmožnost uporabe in razvijanja geoinformacijske tehnologije, usposobljenost za vodenje strokovnih procesov v geodetskih podjetjih in javnih službah ali agencijah s področij geodezije ali prostora.

Predmetnospecifične kompetence, ki jih diplomanti pridobijo s programom so samostojno rešuje vse vrste strokovnih in razvojnih nalog s področij geodezije in geoinformatike, razume, uporablja in razvija sodobne geodetske metodologije in tehnologije ter jih zna nadgrajevati, načrtuje, organizira, vodi in izvaja geodetska dela pri vzpostavitvi, vzdrževanju in obnovi osnovnega geodetskega sistema, načrtuje, organizira, izvaja ali vodi geodetska dela pri geodetski izmeri, pri graditvi vseh vrst objektov oz. splošno pri izvajanju vseh infrastrukturnih posegov v prostor, pri postopkih katastrskega (pre)urejanja in evidentiranja nepremičnin, s področij topografije in kartografije, fotogrametrije in daljinskega zaznavanja, pri vzpostavljanju, vzdrževanju in nadgrajevanju geografskih, kartografskih in zemljiških informacijskih sistemov, sodeluje pri pripravi prostorskih aktov in pozna pravni, upravni in ekonomski sistem, pomemben za geodeta.

SECOND CYCLE ACADEMIC STUDY PROGRAM GEODESY AND GEOINFORMATION (MA)

The second cycle master's study programme Geodesy and Geoinformation consists of 2 years (4 semesters) and amounts to 120 ECTS points. The study programme does not include orientations.

Basic goals of the programme and general competences

The basic goal of the study programme is to educate experts capable of analytical and synthetic thinking, creative, critical, efficient and constructive solving of complex research and development problems and project-applied tasks in the fields of geodesy and geoinformation. The program ensures interdisciplinary integration of the experts and at the same time it provides excellent foundation for further studies at the third cycle of any natural science and technical programmes. It enables students to obtain a license of Responsible Surveyor by the Slovenian Chamber of Engineers. The study programme provides students comparability of educational attainment also in an international context.

General competences acquired by the graduates of the study are generally well-informed experts, knowledge about academic areas and scientific work methods, critical reading and understanding of texts, independent upgrading of knowledge and search for sources, ability to transfer and use theoretic knowledge in practice, development of high professional and ethical standards and professional, environmental and social responsibility, development of scientific literacy, skills of public appearance and communication with clients, transfer and presentation of knowledge and results, ability to use domestic and foreign professional language in written and oral communication, communications in international and national scientific circles, ability to use and develop geo-information technology, capacity to manage professional processes in surveying companies, public services or agencies in the fields of geodesy or spatial planning,

Course-specific competences acquired with the programme independently solves all kinds of professional and development tasks in the fields of geodesy and geoinformation, understands, applies and develops modern surveying methodologies and technology and is able to upgrade it, plans, organizes, manages and carries out surveying tasks for the establishment, maintenance and restoration of the basic geodetic reference system, plans, organizes, executes or leads geodetic works in land surveying, in the construction of all types of buildings or generally in all types of infrastructural development in the physical environment, in the procedures of cadastral regulation and real estate registration, in the fields of topography and cartography, photogrammetry and remote sensing; at the establishment, maintenance and upgrading of geographic, cartographic and land information systems, participates in the preparation of spatial planning documents and knows the legal, administrative and economic system, important for the surveyor.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika III / Mathematics III | ECTS 5
- Geodetski merski sistemi / Geodetic Measuring Systems | ECTS 8
- Geoinformatika II / Geoinformatics II | ECTS 6
- Izravnalni račun III / Adjustment Computations III | ECTS 4
- Urbanistično načrtovanje / Urban Planning | ECTS 4
- Satelitska geodezija in navigacija / Satellite Geodesy and Navigation | ECTS 9
- Fizikalna geodezija / Physical Geodesy | ECTS 9
- Daljinsko zaznavanje in fotogrametrija II / Remote Sensing and Photogrammetry | ECTS 8
- Analize prostorskih podatkov / Spatial Data Analyses | ECTS 4
- Večpredstavnostna kartografija / Multimedia Cartography | ECTS 7
- 1. izbirni predmet / 1st Elective Course (FGG or External) | ECTS 9

2. letnik / 2nd year

- Geodezija v inženirstvu II / Engineering Surveying II | ECTS 6
- Prostorska statistika / Spatial Statistics | ECTS 4
- 2. izbirni predmet FGG ali zunanji / 2nd Elective Course (FGG or External) | ECTS 9
- Zložba in preurejanje zemljišč / Land Consolidation and Rearrangement | ECTS 9
- Množično vrednotenje nepremičnin / Mass Real Estate Valuation | ECTS 4
- Projektna naloga / Project Work | ECTS 10
- Magistrsko delo / MSc Thesis | ECTS 18

Izbirni predmeti / Elective Courses

- Športna vzgoja / Physical Education | ECTS 3
- Terensko projektno delo / Field Project Work | ECTS 4
- Izbrana poglavja iz prostorskega planiranje / Selected Topics in Spatial Planning | ECTS 6
- Geoinformatika III / Geoinformatics III | ECTS 4
- Izbrana poglavja iz kartografije / Selected Chapters from Cartography | ECTS 3
- Bližnjeslikovna fotogrametrija / Close-Range Photogrammetry | ECTS 3
- Geofizika / Geophysics | ECTS 3
- Optimizacija geodetskih tehničnih del / Optimisation of Geodetic Technical Tasks | ECTS 4

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE PROSTORSKO NAČRTOVANJE

Drugostopenjski magistrski študijski program Prostorsko načrtovanje traja dve leti (štiri semestre) in obsega skupaj 120 kreditnih točk. Študijski program ne vključuje smeri in se izvaja le kot redni študij.

Program omogoča pridobivanje strokovnega znanja ter kompetenc, predvsem glede prostorskega načrtovanja na državni, regionalni in lokalni ravni, v upravi, razvoju, raziskovanju in pedagoškem delu. S študijem se oblikujejo strokovnjaki s širokim spektrom znanja na različnih tematskih področjih, s poznavanjem prostorskih evidenc, metod obdelave podatkov in z veščinami interdisciplinarnega dela. Zaradi svoje interdisciplinarne naravnanosti je študij zanimiv tudi za študente drugih fakultet z opravljeno prvo stopnjo. Za študente, ki že imajo različne vrste temeljnega znanja iz prostorskih ved, vpisnih pogojev ni, preostali morajo opraviti diferencialne izpite.

Študijski program je raznolik, vključuje predmete s področja prava, ekonomije, sociologije, kartografije, analize in obdelave prostorskih podatkov, katastrov, komunalnega gospodarstva ter prostorskega načrtovanja na različnih ravneh in v različnih merilih. V vsakem semestru študija je predmet z do 10 kreditnimi točkami, usmerjen v projektno in interdisciplinarno delo z navezavo na konkretne probleme. Med študijem je organizirana večdnevna strokovna ekskurzija v tujino. Študijske vsebine programa so usmerjene v oblikovanje razgledanih strokovnjakov, z zmožnostjo kritičnega, analitičnega in sintetičnega mišljenja ter s profesionalno in etično odgovornostjo.

Magistranti so usposobljeni za delo v interdisciplinarno oblikovanih družbah, usmerjenih v vse aktivnosti prostorskega načrtovanja, dela s prostorsko podatkovno infrastrukturo in v delo v strokovnih službah javne uprave. Raznolikost študijskega programa pa našim magistrantom omogoča, da se zaposlijo tudi na drugih področjih.

Splošne kompetence:

- razvijanje sposobnosti za definiranje, raziskovanje, razumevanje in kreativno reševanje problemov, načel in teorij,
- usposobljenost za prenos in uporabo teoretičnega znanja v prakso in reševanje strokovnih in delovnih problemov,
- splošne komunikacijske kompetence, ki se pridobijo zlasti na zagovoru seminarjev in na terenskem delu kot pripravi za praktične naloge,
- usposobljenost za interdisciplinarno povezovanje, ustvarjanje objektivnega pogled na okolje in družbo,
- sprejemanje strokovne odgovornosti do udeležencev v prostorskem načrtovanju in do celotne družbe.

Strokovni oz. znanstveni naslov: magister/magistrica prostorskega načrtovanja (mag. prost. načrt.)

SECOND CYCLE ACADEMIC STUDY PROGRAM SPATIAL PLANNING (MA)

The second cycle master study program Spatial Planning consists of 2 years (4 semesters) and amounts to 120 credit points. It is open for enrolment every second year.

The program offers professional knowledge and competences, mainly from the area of spatial planning at the national, regional and local levels, in administration, development, research and education. The program qualifies to professionals with a wide spectrum of knowledge from different areas, with knowledge about spatial records and data processing methods and skills of interdisciplinary work. Owing to its interdisciplinary nature, the study is also interesting for the students from other faculties after finished first cycle studies. For those students with basic knowledge from spatial sciences, there are no enrolment conditions, whereas others need to pass additional exams.

The study program is diversified and includes courses from the areas of law, business, sociology, cartography, analysis and processing of spatial data, cadastres, municipal economics and spatial planning at different levels and in different scales. In each semester there is one course with 10 credit points oriented into project and interdisciplinary work linked to real-life case studies. During the study a multi-day field trip abroad is foreseen. The contents of the program are aimed at educating well-informed experts with the ability of critical, analytical and synthetic thinking and with professional and ethical responsibility.

The graduates are qualified for the work in companies with interdisciplinary nature, focusing on all activities related to spatial planning and work with spatial data infrastructure, as well as work in professional public administration services. Due to the diversity of the study program the graduates have many job opportunities in other areas as well.

General competences

- development of skills to define, research, understand and creatively solve problems, principles and theories,
- qualified for the transfer and use of theoretic knowledge in practice and solving of professional and practical problems,
- general communication competences acquired mainly through presentations and discussions in seminars and within field work as preparation for practical tasks,
- skills for creating interdisciplinary connections, building an objective view to the environment and society,
- acceptance of professional responsibilities to participants in spatial planning and to society as a whole.

Qualification, professional or academic title: magister/magistrica prostorskega načrtovanja (second cycle graduate in spatial planning) (mag. prost. načrt.).

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

Stvarno pravo
/ Property Law | ECTS 4

1. izbirni predmet
/ 1st Elective Course | ECTS 9

Osnove prostorske sociologije
/ Basics of Spatial Sociology | ECTS 3

Urejanje krajine in varstvo okolja
/ Landscaping and Environment Protection | ECTS 9

Kartografska upodobitev
/ Cartographic Representation | ECTS 9

Metodika prostorskega načrtovanja s projektnim delom
/ Spatial Planning Methodology with Project Work | ECTS 9

Urbanistično načrtovanje s projektnim delom
/ Urban Planning with Project Work | ECTS 9

Analize prostorskih podatkov
/ Spatial Data Analyses | ECTS 4

Ruralno planiranje
/ Rural Planning | ECTS 9

Katastrsko preurejanje zemljišč
/ Cadastral Land Rearrangement | ECTS 9

Komunalno in stanovanjsko gospodarstvo
/ Municipal Economics and Housing Policies | ECTS 9

2. letnik / 2nd year

Prostorska statistika
/ Spatial Statistics | ECTS 4

Regionalno prostorsko planiranje
/ Regional Spatial Planning | ECTS 4

Prostorska ekonomika
/ Spatial Economics | ECTS 3

Infrastrukturni sistemi s seminarjem
/ Infrastructural Systems with Seminar | ECTS 10

Gospodarjenje z nepremičninami
/ Real Estate Management | ECTS 5

2. izbirni predmet
/ 2nd Elective Course | ECTS 9

Projektna naloga s seminarjem
/ Project Task with Seminar | ECTS 10

Magistrsko delo
/ MSc Thesis | ECTS 18

Izbirni predmeti / Elective Courses

Daljinsko zaznavanje
/ Remote Sensing | ECTS 3

Vrednotenje nepremičnin
/ Real Estate Valuation | ECTS 6

Pozicioniranje in zajem prostorskih podatkov
/ Positioning and Acquisition of Spatial Data | ECTS 6

Varstveno načrtovanje
/ Environment Planning and Impact | ECTS 3

Urbana prenova
/ Urban Renewal | ECTS 3

Prostočasne aktivnosti in vodni prostor
/ Water-Related Outdoor Activities | ECTS 6

KADER / PERSONNEL

- Predstojnik
  Head
  izr. prof. dr. Dušan Kogoj
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Tomaž Ambrožič
- Pedagogi
  Educators
  doc. dr. Simona Savšek
  doc. dr. Aleš Marjetič
  asist. dr. Klemen Kregar
  asist. Gašper Štebe

članI Katedre za geodezijo
Members of Chair of Geodesy

KATEDRA ZA GEODEZIJO

Katedra za geodezijo je vodilna pedagoška in raziskovalna enota, ki se ukvarja s področjem precizne geodetske izmere in sodobnih geodetskih merskih sistemov.

Z razvijanjem in spremljanjem sodobnih tehnoloških rešitev, ki jih vključujemo v pedagoški proces, izobražujemo samostojne, kompetentne in zaposljive kadre. Na področju pregradnega inženirstva izvajamo za upravljavce pregradnih objektov celovit monitoring za spremljanje stabilnosti ter posodobitev geodetskih tehničnih opazovanj. Na ta način postavljamo visoke strokovne standarde na področju preciznih meritev. Naročnikom ponujamo sodobne in inovativne rešitve, ki v stroki postajajo »pravila dobre prakse«.

Raziskovalna in strokovna dejavnost

V okviru znanstvenoraziskovalne dejavnosti se na Katedri za geodezijo intenzivno ukvarjamo s problemi izmer v mikro geodetskih mrežah s klasičnimi terestričnimi metodami z največjo možno natančnostjo. Pri tem uporabljamo najsodobnejšo mersko tehnologijo in rešujemo probleme vplivov okolja na meritve. Pri vrednotenju rezultatov iščemo nove možnosti v postopkih ocene kakovosti geodetskih meritev. Metodologijo terestričnih izmer mikro mrež dopolnjujemo in testiramo na konkretnih primerih mikro mrež.

Področje raziskovalnega dela je tudi ukvarjanje s postopki deformacijske analize, kjer z metodami statistične analize na osnovi geodetskih meritev in naknadnega preračunavanja odkrijemo in določimo prostorske premike točk in iz njih deformacije opazovanega objekta. Vse postopke, ki jih prištevamo med kongruenčne modele obravnavanja v deformacijski analizi, smo obravnavali teoretično in vsak postopek predstavili v posebnem članku, izdelali pa smo tudi računalniške programe, s katerimi obravnavamo realne primere iz prakse.

V zadnjih letih smo bili strokovno precej dejavni, saj smo sodelovali pri vzpostavitvi in izmeri geodetskih mrež nad predorom Markovec, ko smo s pomočjo laserskega skeniranja določili stabilna in nestabilna območja nad najbolj kritičnim delom predora, izvedli smo izmere geodetskih mrež na hidroelektrarnah na Soči, Savi in Dravi, pokazali pa smo možnosti sodelovanja geodetske stroke pri energetski sanaciji kompleksnejših stavb, ki zahtevajo izdelavo gradbenih načrtov na osnovi 3D-grafičnih modelov stavb.

Tehnologijo laserskega skeniranja uvajamo tudi na druga področja izmer. Odmeven je primer merjenja geometrije tirnic žerjavnih prog s terestričnim laserskim skenerjem.

CHAIR OF GEODESY

Chair of Geodesy is the leading Faculty's educational and research unit engaged in precise terrestrial surveying and contemporary surveying systems.

By developing and using modern technological solutions and including them in the educational process, we educate independent, competent and employable graduates. In the field of dam engineering, we offer to the managers of dam structures comprehensive monitoring in order to assist them in monitoring stability and updating technical surveying records. In this way, we establish high professional standards in precise terrestrial surveying. We offer our customers modern and innovative solutions that are becoming »rules of good practice« in our profession.

Research and professional activity

The research activity of the Chair of Geodesy involves the issues of measurements in micro geodetic networks with classical terrestrial methods of the highest possible precision. We use cutting-edge measuring technology and solve problems of environmental impacts on measurements. When evaluating the results, we look for new possibilities in the procedures for the evaluation of the quality of geodetic measurements. The methodology of terrestrial surveying of micro networks is complemented by and tested on real examples of micro networks.

Research work also involved procedures of deformation analysis, where methods of statistical analysis based on geodetic measurements were used. Further calculations allowed us to discover and define spatial movements of points, resulting in deformations of the monitored structure. All procedures considered as congruent models used in the deformation analysis were analysed theoretically. Each procedure was presented in a special article, and we also elaborated software programs dealing with real cases from practice.

In the last few years we intensified our professional activity. Thus, we cooperated in the establishment and surveying of geodetic networks above the Markovec tunnel. With the help of laser scanning, we defined stable and unstable areas above the most critical part of the tunnel. We also performed surveying of geodetic networks at the hydro power plants on the rivers Soča, Sava and Drava. We demonstrated the possibilities how the geodetic profession can cooperate in the energy renovation of complex buildings that require building plans based on 3D graphic models of buildings.

The laser scanning technology is being introduced also to other surveying areas. Prominent is the example of measuring the rail geometry at a crane line using terrestrial laser scanning.

Educational activity

In the educational field, our mission is to educate students at the full-time undergraduate studies of geodesy, civil engineering, and water science and environmental engineering, as well as at both cycles of the Bologna study programs Geodesy and Geoinformation, and Technical Real Estate Management.

Part of our educational activity is also the doctoral study program Built Environment. Our educational areas are basic geodetic and precise surveying, management of the economic public infrastructure cadastre, precise terrestrial surveying, geodetic measuring systems, optimisation of geodetic grids, standards in geodetic measuring practice and field project work.

We transfer to our students knowledge of the methods of spatial data point recording, where they learn about the latest measuring procedures, equipment and technology for the acquisition, processing and analysis of spatial data. They learn to value quality of the recorded data and how to locate them into space. They acquire knowledge necessary to draw up a geodetic plan, perform cadastral procedures for the arrangement and equipment of land with economic infrastructure and to arrange engineering procedures for setting out building structures and monitoring their stability.

Students are included in field projects and practice-oriented professional tasks. With our positive educational approach, we encourage students to think creatively. Thus, we are successful in our role of mentors of individual years and supervisors to final theses. We are also actively involved in the education of young researchers, master and PhD students.

Outstanding achievements

The Chair produced a new doctor of science. Assistant Klemen Kregar finished his PhD degree in 2016 with his doctoral dissertation titled Optimization of Terrestrial Laser Scanner Procedures for High Accuracy Measurements. Assist. Prof. Dr. Dušan Kogoj was also supervisor to two doctoral students in the area of geodesy at the Faculty of Civil Engineering of University of Sarajevo, as a result of 15 years of his cooperation with this institution.

Members of the Chair published several articles in high ranking journals, as is evident in our bibliographies available in the online cooperative bibliographic system COBISS.

Pedagoška dejavnost

Svoje pedagoško poslanstvo izvajamo na rednem dodiplomskem študiju geodezije, gradbeništva ter vodarstva in okoljskega inženirstva ter študiju geodezije po bolonjskih smernicah Geodezija in geoinformatika ter Tehnično upravljanje nepremičnin.

Pouk izvajamo tudi na doktorskem študijskem programu Grajeno okolje. Naša izobraževalna področja so temeljna geodetska in detajlna izmera, vodenje katastra GJI, precizna terestrična izmera, geodetski merski sistemi, optimizacija geodetskih mrež, standardi v geodetski merski tehniki ter terensko projektno delo.

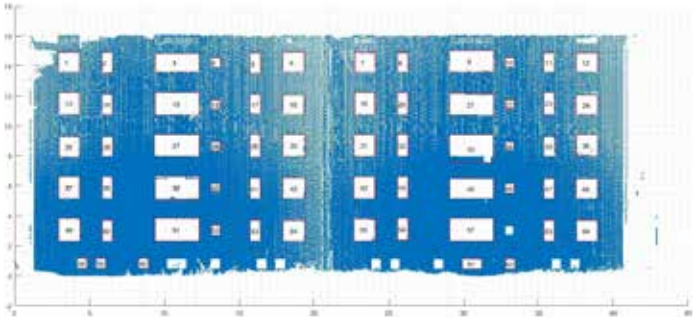
Študentom posredujemo znanja, povezana s klasično geodetsko izmero, kjer se srečajo z najsodobnejšimi merskimi postopki, opremo in tehnologijami za pridobivanje, obdelavo in analizo merskih podatkov. Naučijo se oceniti kakovost zajetih podatkov. Pridobijo potrebna znanja s področja izdelave geodetskega načrta in inženirskih postopkov zakoličbe gradbenih objektov in spremljanja njihove stabilnosti.

Študente vključujemo v terenske projektne in aplikativno usmerjene strokovne naloge. S svojim pozitivnim pedagoškim pristopom študente spodbujamo k razmišljanju, zato uspešno opravljamo vlogo mentorjev letnikov in diplomantom. Skrbimo tudi za vzgojo mladih raziskovalcev, magistrov in doktorjev.

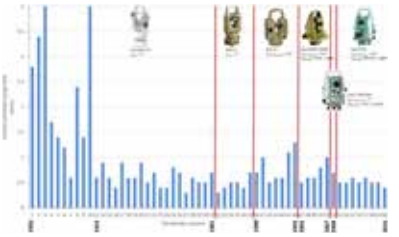
Izjemni dosežki

Katedra je vzgojila novega doktorja znanosti. Asistent Klemen Kregar je doktoriral leta 2016 z doktorsko disertacijo z naslovom Optimizacija postopkov terestričnega laserskega skeniranja za meritve visoke natančnosti. Izr. prof. dr. Dušan Kogoj je bil tudi mentor dvema doktorskima študentoma geodezije na Gradbeni fakulteti Univerze v Sarajevu, kar je posledica njegovega 15-letnega sodelovanja na tej ustanovi.

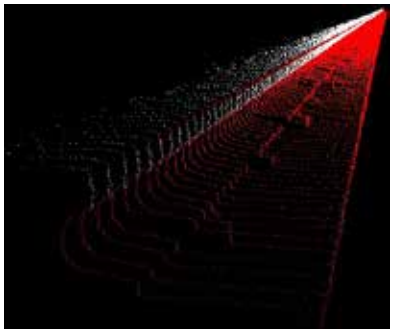
Člani katedre smo objavili nekaj člankov v visoko rangiranih revijah, kar je razvidno iz naših bibliografij, ki jih vsakdo lahko dobi v Kooperativnem online bibliografskem sistemu COBISS.



Robovi oken na ravnini filtriranih točk
Edges of windows on the plane of filtered points



Dolgoletno geodetsko spremljanje stabilnosti pregrade HE Moste
Several years of geodetic monitoring of stability at the HP Moste dam



Filtrirani oblak točk žerjavne tirnice
Filtered point cloud of crane line

KADER / PERSONNEL

- Predstojnica
  Head
  izr. prof. dr. Anka Lisec
- Namestnik predstojnice
  Deputy head
  viš. pred. dr. Miran Ferlan
- Pedagogi
  Educators
  prof. dr. Krištof Oštir
  izr. prof. dr. Radoš Šumrada
  (upokojen od oktobra 2016)
  doc. dr. Samo Drobne
- Asistenta
  Assistants
  dr. Marjan Čeh
  Jernej Tekavec
- Tehnična sodelavka
  Technical associate
  Barbara Trobec

Člani Katedre za geoinformatiko in katastre nepremičnin leta 2015
Members of Chair of Geoinformatics and Real Estate Cadastres in 2015

KATEDRA ZA GEOINFORMATIKO IN KATASTRE NEPREMIČNIN

Katedra pedagoško in raziskovalno deluje na področjih geoinformatike in upravljanja nepremičnin. Zametki razvoja področij delovanja katedre so povezani z razvojem geografskih informacijskih sistemov (GIS) in so se oblikovali v okviru nekdanje Katedre za matematično geodezijo in geoinformatiko, ki se je v letu 2001 preimenovala v katedro z današnjim imenom. Področja delovanja katedra so se od takrat zelo razširila. Danes delovanje katedre zaznamujeta izredno hiter razvoj tehnoloških rešitev za zajem in obdelavo množice prostorskih podatkov ter v družbi vse bolj prepoznavna in vse večja vloga prostorskih podatkov z geoinformacijskimi rešitvami. Slednje so postale nepogrešljive na mnogih področjih, kjer se posredno ali neposredno ukvarjamo s prostorom: od geodezije, gradbeništva, prostorskega načrtovanja in urbanizma, do kmetijstva, gozdarstva, zaščite in reševanja ter obrambe, logistike, turizma in varstva okolja.

Na katedri smo zaposleni habilitirani visokošolski učitelji in habilitirani visokošolski sodelavci. Področja prava, stvarnega prava in ekonomike pokrivajo zunanji sodelavci s Pravne fakultete in Ekonomske fakultete pri Univerzi v Ljubljani. Pri svojem delu smo vključeni v nacionalne in mednarodne projekte. Poseben poudarek je na bilateralnem sodelovanju. Tako smo med drugim v tem obdobju utrdili oziroma razvili dobro sodelovanje predvsem s TU Dunaj (Avstrija), KU Leuven (Belgija), Aalto University Espoo (Finska), FBK (Italija), TU München (Nemčija), UTwente in TU Delft (Nizozemska), Univerzo v Beogradu (Srbija), KTH Stockholm (Švedska) in Iowa State University (ZDA).

Raziskovalna in strokovna dejavnost

Znanstvenoraziskovalno in strokovno delo katedre je usmerjeno na področje razvoja sodobnih modelov prostora ob uporabi različnih virov podatkov ter na področje razvoja geoinformacijskih rešitev in algoritmov analiz prostorskih podatkov in prostorskih pojavov. Pomemben poudarek je na razvoju sistemov nepremičninskih administrativnih sistemov, kar vključuje izzive katastrskega (pre) urejanja nepremičnin ter zagotavljanja kakovostnih podatkov v okviru prostorske podatkovne infrastrukture. Trenutno predstavljajo velik raziskovalni izziv geoinformacijske rešitve v povezavi z obdelavo zelo velike množice prostorskih podatkov in računalništva v oblakih, modeli prostora v treh in štirih razsežnostih (3D in 4D) ter sodobne geoinformacijske rešitve v podporo odločanju pri upravljanju nepremičnin in širše prostora. Leta 2016 se je skupini pridružil prof. dr. Krištof Oštir, ki s svojim znanjem in referencami močno prispeva k usmeritvam in razširitvam delovanja katedre, predvsem na področju daljinskega zaznavanja, obdelave prostorskih podatkov in prostorske analitike.

Dosežke znanstvenoraziskovalnega in strokovnega dela predstavljamo v mednarodno uveljavljenih revijah ter na domačih in mednarodnih znanstvenih in strokovnih srečanjih. Dejavni smo v različnih nacionalnih združenjih, kot so Zveza geodetov Slovenije, Inženirska

CHAIR OF GEOINFORMATION AND REAL ESTATE CADASTRES

The Chair's educational and research work focuses on the areas of geoinformatics and real estate management. The beginnings of the areas representing the Chair's activity are related to the development of geographic information systems (GIS) and they were formed within the former Chair of Mathematical Geodesy and Geoinformation, which changed its name as it is today in 2001. Since then, the areas of our activities have spread considerably. Today, our activities are marked by extremely fast development of technological solutions for the acquisition and processing of mass spatial data as well as the role of spatial data with geoinformation solutions that are gaining recognition in society. Such solutions have become indispensable in many areas that represent our direct or indirect areas of activity, ranging from geodesy, civil engineering, spatial planning and urbanism, to agriculture, forestry, rescue and protection services, defence, logistics, tourism and environmental protection.

Members of the Chair are higher education teachers and associates. The areas of law, material law and economics are the responsibility of external partners coming from the Faculty of Law and Faculty of Economics, University of Ljubljana. We also work in national and international projects. A special emphasis is on bilateral cooperation. Thus, in the reported period we strengthened or developed, among others, cooperation with TU Vienna (Austria), KU Leuven (Belgium), Aalto University Espoo (Finland), FBK (Italy), TU Munich (Germany), UTwente and TU Delft (Netherlands), University of Belgrade (Serbia), KTH Stockholm (Sweden), and Iowa State University (USA).

Research and professional activity

The Chair's scientific, research and professional work is focused on the development of contemporary models of space by using different data sources, and on the area of developing geoinformation solutions and algorithms of spatial data, as well as spatial phenomena analyses. Special emphasis is given to the development of real estate administration systems, which includes challenges of cadastral (re) arrangement of real estate and quality assurance of database within spatial data infrastructure. For the moment, an important research challenge is geoinformation solutions related to the processing of large mass of spatial data and computer science in clouds, spatial model in three and four dimensions (3D and 4D) as well as contemporary geoinformation solutions supporting the decision-making process in real estate management and in wider space. In 2016, Prof. Dr. Krištof Oštir joined our Chair; with his knowledge and references he contributes significantly to the orientations and expansion of the Chair's activity, mainly in the field of remote sensing, spatial data processing and spatial analytics.

The members of the Chair present the achievements of their research and professional work in internationally recognised journals as well as at national and international professional conferences.

We are active in various national associations, such as the Slovenian Association of Surveyors, Chamber of Engineers of Slovenia, Slovenian Standardisation Institution, Slovenian Association Informatika, Statistical Office of the Republic of Slovenia. At the international level, we are included in important international associations, such as European Space Agency ESA, Copernicus Academy, European Academy for Land Use and Development EALD, International Federation of Surveyors FIG, International Society for Photogrammetry and Remote Sensing ISPRS, UN Food and Agriculture Organization, Organization for Economic Cooperation and Development OECD, COST. As (co) organisers, we cooperate in international and national scientific or expert events and are editors or members of editorial boards for professional journals and proceedings. We are actively involved in international environment in the area of development of higher education in geodesy and geoinformatics.

Educational activity

In the field of education, the mission of the Chair is education of professionals who are able to solve problems in practice, including from the scientific points of view, in the field of geoinformatics and real estate administration, which includes implementation, maintenance, standardization and presentation of spatial data, application of GIS technology within the framework of spatial data infrastructure and real estate administration systems, establishment and maintenance of real estate cadastres, real estate (re)arrangements and land management. We try to convey knowledge in ways that ensure its consistency with the development of international geodetic and geoinformation profession and science, as well as with the needs of the organizations that employ the majority of the geodesy professionals.

Exceptional achievement

In 2017, we succeeded as lead partner in the application for a project within the Horizon 2020 call Spreading Excellence, titled SLICE3D. The aim of the project is preparation of a detailed plan for the establishment of a centre of excellence for the area of 3D geoinformatcs.

zbornica Slovenije, Slovenski inštitut za standardizacijo, Slovensko društvo Informatika, Urad RS za statistiko. Na mednarodni ravni smo vključeni v pomembna mednarodna združenja, predvsem smo dejavni v Evropski vesoljski agenciji ESA, akademiji Copernicus, Evropski akademiji za upravljanje in razvoj zemljišč EALD, Mednarodni zvezi geodetov FIG, Mednarodnem združenju za fotogrametrijo in daljinsko zaznavanje ISPRS, Organizaciji za prehrano in kmetijstvo pri OZN, Organizaciji za ekonomsko sodelovanje in razvoj OECD, COST. Kot (so) organizatorji sodelujemo pri mednarodnih in domačih znanstvenih ali strokovnih dogodkih ter smo uredniki in člani uredniških odborov strokovnih revij in zbornikov posvetov. Aktivno smo vpeti v mednarodno okolje na področju razvoja visokošolskega izobraževanja v geodeziji in geoinformatiki.

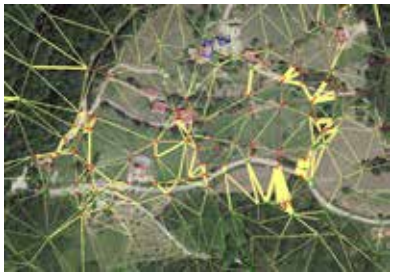
Pedagoška dejavnost

Na področju izobraževanja je poslanstvo katedre usposabljanje strokovnjakov za reševanje problemov v praksi ter za raziskovalno delo na področjih geoinformatike in nepremičninske administracije, kar vključuje obdelavo in analizo podatkov daljinskega zaznavanja; vzpostavitev, vzdrževanje, varovanje, standardizacijo in prikazovanje prostorskih podatkov v okviru GIS; povezovanje ter obdelave podatkov in prostorske analize; uporabo tehnologije GIS v okviru prostorske podatkovne infrastrukture in nepremičninskih administrativnih sistemov; vzpostavitev in vzdrževanje katastrov nepremičnin ter (pre)urejanje nepremičnin oziroma zemljiški management. Znanje poskušamo posredovati na tak način, da je v čim večji meri usklajeno z razvojem geodetsko-geoinformacijske stroke in znanosti v svetu ter s potrebami v organizacijah, ki zaposlujejo večino kvalificiranega kadra.

Izjemni dosežek

V letu 2017 smo bili kot koordinatorji projekta uspešni pri prijavi v okviru razpisa Obzorje 2020 sheme širjenja odličnosti. Pridobili smo EU projekt SLICE3D, katerega cilj je priprava podrobnega poslovnega načrta za ustanovitev centra odličnosti na področju 3D-geoinformatike.

Spletna aplikacija, ki smo jo razvili za potrebe pregleda nepremičnin Univerze v Ljubljani v 3D-okolju
Web application developed for the needs of 3D environment overview of the real estate owned by University of Ljubljana



Ocena in izboljšava kakovosti podatkov zemljiškega katastra z membransko metodo (razvojno-strokovna naloga)
Estimation and improvement of land cadastre data quality using the membrane method (professional development task)

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Božo Koler
- Pedagog
  Educators
  asist. Tilen Urbančič
- Tehnični sodelavec
  Technical associate
  mag. Janez Goršič

KATEDRA ZA INŽENIRSKO GEODEZIJO

Gradnja objektov je vedno povezana z geodetskimi deli, ki jih štejemo med inženirsko geodezijo. Tako geodet sodeluje v vseh fazah pri gradnji objektov. Kakovostno opravljanje geodetskih del se začne z vzpostavitvijo geodetske mreže, ki predstavlja enotno koordinatno osnovo v državnem koordinatnem sistemu. Projektant projektira in umešča nov objekt v prostor na podlagi geodetskega načrta, ki ga geodet izdela pred gradnjo objekta. Projektirani objekt z zakoličbo detajlnih točk objekta prenesemo v naravo. Med gradnjo objekta izvajamo monitoring objekta, s katerim določimo in spremljamo premike objekta v prostoru ter deformacije. Izvajamo tudi kontrolne meritve, s katerimi preverjamo skladnost grajenega objekta s projektno dokumentacijo. Po izgradnji je treba izdelati geodetski načrt novega stanja in pripraviti elaborate za vpis novega objekta v uradne evidence. Poseben razvojni in strokovni izziv predstavljajo geodetska dela, ki jih izvajamo pri montaži strojne opreme različnih proizvodnih linij, saj moramo v teh primerih običajno zagotoviti izredno visoko natančnost izvajanja geodetskih del. Poseben izziv predstavljajo tudi premiki zemeljskega površja, ki so posledica različnih vplivov in nepremišljenega poseganja v naravno okolje.

Sodelavci Katedre za inženirsko geodezijo posebno pozornost namenjamo kakovostnemu izvajanju inženirsko-geodetskih del, ki je povezano z razvojem sodobnih merskih instrumentov in programske opreme. V zadnjem času je izredno pomembna tudi uporaba terestričnih laserskih skenerjev za potrebe geodezije v inženirstvu, pri čemer uspešno sodelujemo s preostalimi katedrami Oddelka za geodezijo.

Raziskovalna in strokovna dejavnost

Znanstvenoraziskovalno delo poteka predvsem v okviru raziskovalnega programa Geoinformacijska infrastruktura in trajnostni prostorski razvoj Slovenije (P2-0227). V okviru tega programa smo analizirali model geoida v osrednjem delu Slovenije. Za potrebe vzpostavitve globinskega referenčnega sistema sodelujemo pri projektu »Določitev globinskega referenčnega sistema na morju«, ki ga ob finančni podpori Ministrstva za infrastrukturo izvaja Geodetski inštitut Slovenije. Pri tem projektu sodelujemo predvsem pri nalogah, povezanih z vzpostavitvijo globinskega datuma, kakovostnega modela geoida na morju, ki bo omogočal kakovostno uporabo višinomerstva GNSS pri hidrografskih meritvah na morju.

Pedagoška dejavnost

Katedra za inženirsko geodezijo skrbi za izobraževalno delo na področju inženirske geodezije. Glede na to, da se ukvarjamo s področjem geodezije, ki je izrazito interdisciplinarno, skušamo to sodelovanje med strokami predstaviti študentom. Posredujemo jim znanje o sodobnih merskih tehnologijah in postopkih prenosa objektov v naravo, pri čemer namenjamo ustrezno pozornost pravilni oceni kakovosti merskih podatkov, ki jih geodeti posredujemo drugim strokam.

CHAIR OF ENGINEERING GEODESY

Construction of structures and buildings is always associated with execution of geodetic works that are a part of the engineering surveying. The geodetic engineer is consequently present in all phases of construction. Quality execution of geodetic works starts with the creation of the geodetic network that provides a uniform coordinate basis within the state coordinate system. The design engineer designs and locates the new structure into the nature on the basis of the geodetic plan. The designed structure is transferred into the nature by using stake-out of the detailed points. During construction, monitoring of the structure by which we determine and survey the displacements of the structure in space and deformations is performed. Further, we perform control measurements, by which we check the compliance of the structure being built to the project documentation. After construction, geodetic plan of the new condition needs to be prepared, along with the documentation required to list the new structure into the official evidences. Special developmental and professional challenges are present when mechanical equipment for various production lines is being installed, as extremely high precision of the execution of geodetic works is required in these cases. Geodetic works executed with high quality ensure that the designed geometry of the production line is achieved, and uninterrupted and quality production of various products is enabled. Particular challenges are also the movements of the earth surface that are the consequence of various influences, as well as poorly thought-out actions into the natural environment.

Members of the Chair of Engineering Geodesy devote special attention to the quality of the execution of geodetic works that is associated with the development of the modern measuring equipment and software. Recently, the importance of the area of terrestrial laser scanner application, where we successfully collaborate with other Chairs of Department of Geodesy, is very important.

Research and professional activities

Scientific research work is carried out within the research program Geoinformation infrastructure and sustainable spatial development of Slovenia (P2-0227). Within this program, we analised a geoid model in the central part of Slovenia. In order to implement the state geodetic reference system, we cooperate in the project »Definition of depth reference system at sea«, financed by the Ministry of infrastructure and coordinated by the Geodetic Institute of Slovenia. We participate in this project mainly at tasks related to the establishment of depth datum, quality geoid model at sea that will allow quality use of GNSS levelling in gydrographic measurements at sea.

Educational activities

Chair of Engineering Geodesy takes care of the educational activities in the field of engineering surveying. Considering the fact that we deal with an area of geodesy with clear interdisciplinary nature, we strive to present this collaboration also to the students.

Knowledge from the field of contemporary measuring technologies and procedures of transfer of structures to nature is being conveyed to the students. Special attention is placed to correct assessment of the quality of the measurement data that are transferred to professionals from other disciplines.

At the first cycle studies of Technical Real Estate Management and Geodesy and Geoinformation, students are acquinted with tasks and role of geodetic engineer in different stages of construction and special features encountered in planning, execution and quality analysis of geodetic works during construction. Elective course Engineering Surveying (B.Sc. Technical Real Estate Management) provides to the student the knowledge related to execution of geodetic works in case of demanding structures and control measurements. They get acquinted with various measurement methods used in the determination of displacements of structures in space and deformation of structures. The acquired knowledge from the area of stake-out of structures and control measurements on B.Sc. level is upgraded with practical execution within the course Terrain work.

On M.Sc. level, the students gain in-depth knowledge about geodetic works that are executed during construction of tunnels, bridges, precast structures, steel structures and mechanical engineering.

At the end of the B.Sc. or M.Sc. programme, the students select the topic of the final work out of a wide range of topics. Collaboration with various enterprises is encouraged at this stage.

We also teach a range of courses within B.Sc. level study programmes of Biotechnical Faculty

UL (Department of forestry and renewable forest resources) and at Faculty of Architecture within the study program Urbanism. The students are acquinted with fundamental activities within geodesy, such as size and shape determination of Earth, geodetic instruments, methods for the position determination of a point in space, geodetic databases and fundamentals of cartography.

Exceptional achievements

Members of the Chair of Engineering Geodesy are proud of the awards Teacher of the year awarded in 2016 and 2017 to Assistant Tilen Urbančič for his high quality work with students, awarded by the Student Council of UL FGG.

Na I. stopnji TUN in I. stopnji GIG študente seznanimo z nalogami in vlogo geodeta v različnih fazah gradnje objekta in s posebnostmi, ki jih srečamo pri načrtovanju, izvajanju in analizi kakovosti izvajanja geodetskih del pri gradnji objektov. Pri izbirnem predmetu na I. stopnji TUN študente seznanimo z izvajanjem geodetskih del pri zahtevnejših objektih in kontrolnih meritvah. Seznanijo se z različnimi merskimi metodami, ki jih uporabljamo pri določevanju premikov objektov v prostoru in deformacij na objektih. Pridobljeno znanje o zakoličevanju objektov in kontrolnih meritvah študenti prvostopenjskih študijev GIG in TUN dopolnijo s praktično izvedbo pri predmetih, ki sodijo v Terensko delo.

Na II. stopnji GIG študenti poglobijo svoje znanje in vedenje z geodetskimi deli, ki jih izvajamo pri gradnji predorov, premostitvenih objektov, montažnih objektov, jeklenih konstrukcij in v strojništvu.

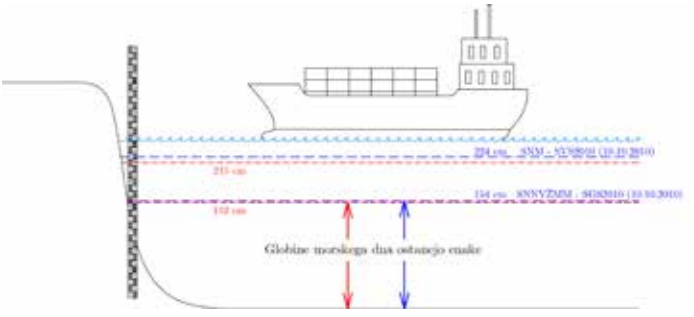
Sodelujemo tudi pri izvedbi izbirnega predmeta Terensko projektno delo, pri čemer študentom običajno ponudimo projektne naloge s področja kontrolnih oz. preciznih meritev višin.

Ob zaključku I. ali II. stopnje lahko študenti izbirajo med različnimi temami zaključnih del, pri čemer spodbujamo sodelovanje z različnimi podjetji.

Poučujemo tudi predmete na prvostopenjskih študijskih programih Biotehniške fakultete UL na Oddelku za gozdarstvo in obnovljive gozdne vire, na Fakulteti za arhitekturo UL na študiju Urbanizem in Fakulteti za družbene vede UL na študiju Obramboslovja. Študente seznanimo z osnovnimi dejavnostmi geodezije, kot so določitev velikosti in oblike Zemlje, z geodetskimi instrumenti, metodami določitve položaja točke v prostoru, geodetskimi evidencami in osnovami kartografije.

Izjemni dosežki

Na Katedri za inženirsko geodezijo smo ponosni na priznanji Pedagog leta, ki ju je v letih 2016 in 2017 za svoje kakovostno delo s študenti od Študentskega sveta UL FGG prejel asistent Tilen Urbančič.



Primerjava novega in starega globinskega datuma (vir: Določitev državnega globinskega referenčnega sistema na morju, metodološki del, letno poročilo za 2017)
Comparison of new and old depth datum (Source: Definition of national depth reference system at sea, methodological part, annual report for 2017)

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Dušan Petrovič
- Namestnica predstojnika
  Deputy head
  doc. dr. Mojca Kosmatin Fras
- Pedagoga
  Educators
  asist. dr. Dejan Grigillo
  asist. dr. Klemen Kozmus Trajkovski
- Tehnični sodelavec
  Technical associate
  mag. Janez Goršič

KATEDRA ZA KARTOGRAFIJO, FOTOGRAMETRIJO IN DALJINSKO ZAZNAVANJE

Karte so eno najbolj osnovnih sredstev za komuniciranje, saj so jih naši predniki uporabljali že pred več 10.000 leti. Kartografija se ukvarja s preučevanjem, zasnovo, izdelavo, distribucijo ter uporabo kart oz. zemljevidov in drugih sorodnih oblik predstavitve prostorskih podatkov. Ima lastnosti znanosti, umetnosti in tehnologije.

Fotogrametrija je znanost in tehnologija, ki se ukvarja s pridobivanjem zanesljivih geometričnih in semantičnih informacij iz fotografij, v sodobnem času pa tudi iz drugih virov. Prepoznaven in pogosto uporabljen izdelek je ortofoto. Bližnjeslikovna fotogrametrija se uporablja za 3D zajem in prikaz manjših objektov v najrazličnejših aplikacijah (industrija, gradbeništvo, arhitektura, arheologija, konservatorstvo, strojništvo idr.). Uporaba daljinsko vodenih letalnikov in obdelava posnetkov s sodobnimi postopki strukture iz gibanja (angl. structure from motion) omogoča hitro izdelavo fotogrametričnih izdelkov tudi težje dostopnih območij v zelo kratkem času.

Daljinsko zaznavanje je znanost in tehnologija o zajemu, obdelavi in analiziranju podob, v povezavi z drugimi podatki o fizičnem površju Zemlje in drugih planetov. Podobe pridobimo s senzorji v vesolju, zraku in na tleh. Zaznavamo in zapisujemo odbito ali sevano elektromagnetno valovanje v različnih spektralnih območjih, tudi z vidnega spektra. Pridobljeni prostorski podatki se uporabljajo za spremljanje stanja in napovedovanje sprememb v prostoru.

Raziskovalna in strokovna dejavnost

Glavna raziskovalna področja in strokovna dela so: bližnjeslikovna fotogrametrija, zajem in vzdrževanje topografskih podatkov iz različnih virov, kontrola kakovosti izdelkov, uporaba daljinsko vodenih letalnikov za zajem prostorskih podatkov, oblikovanje trirazsežnostnih znakovnih in večpredstavnostnih upodobitev, povezava uporabe kart z navigacijsko tehnologijo, oblikovanje upodobitev navidezne in obogatene resničnosti. Sodelujemo v strokovnih mednarodnih organizacijah (International Society for Photogrammetry and Remote Sensing, International Cartographic Association, EuroSDR) in domačih organizacijah (Zveza geodetov Slovenije, Sekcija za kartografijo ter Sekcija za fotogrametrijo in daljinsko zaznavanje) ter pri evropskih in domačih raziskovalnih projektih.

Sodelujemo s številnimi uspešnimi gospodarskimi podjetji (Modri planet, C-Astral, Geavis, DFG Consulting idr.), z Geodetsko upravo RS in Geodetskim inštitutom Slovenije, Planinsko zvezo Slovenije, Zvezo tabornikov Slovenije, Orientacijsko zvezo Slovenije idr. Kot recenzenti sodelujemo pri domačih in tujih znanstvenih revijah s področja geodezije in geoinformatike.

CHAIR OF CARTOGRAPHY, PHOTOGRAMMETRY AND REMOTE SENSING

Maps are one of the most basic forms of communication – the oldest date back tens of thousands of years BC. Cartography focuses on the study, design, elaboration, distribution and use of charts or maps and other related forms of spatial data presentation. It has characteristics of science, art and technology.

Photogrammetry is a science dealing with the acquisition of reliable geometric and semantic data from photographs, and in modern times also from other sources. A recognisable and frequently used product is orthophoto. Close range photogrammetry is used for 3D acquisition and presentation of small structures in various applications (industry, construction, architecture, archaeology, conservation, machinery, etc.). The use of drones and processing of photos using contemporary structure from motion procedures enables fast elaboration of photogrammetric products at territories that are difficult to access, in a very short time.

Remote sensing is a science about acquisition, processing and analysis of images related to other data about physical surface of the Earth and other planets. Images are acquired by sensors in the universe, in the air and on the ground. We observe and record reflected and radiated electromagnetic waves in various spectral ranges, including in the visual spectrum. The obtained spatial data are used for monitoring the status and for predicting changes in space.

Research and professional work

The main research and professional areas are: close-range photogrammetry, acquisition and maintenance of topographic data from different sources, quality control of products, application of small drones for the acquisition of spatial data, design of three-dimensional cartographic and multimedia presentations, connecting the map use with navigational technology, design of representations of virtual and augmented reality. We cooperate in professional international organisations (International Society for Photogrammetry and Remote Sensing, International Cartographic Association, EuroSDR) and national organisations (Association of Surveyors of Slovenia, Section for Cartography and Section for Photogrammetry and remote sensing), and in European and national research projects. We consult numerous successful business companies (Modri planet, C-Astral, Geavis, DFG Consulting etc.), Surveying and Mapping Authority of RS and Geodetic Institute of Slovenia, Alpine Association of Slovenia, National Scouting organisation, Slovenian Orienteering Association, etc. As reviewers we participate in national and international scientific journals from the areas of geodesy and geoinformation.

Educational activity

We provide teaching for all study programs at the Department of Geodetic Engineering within UL FGG, in the study program Water Science and Environmental Engineering at UL FGG, as well as at other faculties of the University of Ljubljana, such as Urbanism at the Faculty of Architecture, Political Science – Defense Studies at the Faculty of Social Sciences, and in the programs Landscape Architecture and Forestry and Renewable Forest Resources at the Biotechnical Faculty. In our teaching we combine lectures, seminars and laboratory tutorials, where students learn about essential procedures and methods as well as how to make their own products. Occasionally we invite practitioners who present practical cases from our home environment, and we organise visits and expert field trips. We cooperate in the organisation and implementation of field work for students, and include project work to specific courses, mainly in the second cycle studies. For all study cycles and study programs where we cooperate, we offer students various themes for their final theses. In the final theses, we encourage cooperation with companies and institutions in Slovenia as well as faculties from abroad, mainly through Erasmus+ programs and bilateral agreements.

Exceptional achievement

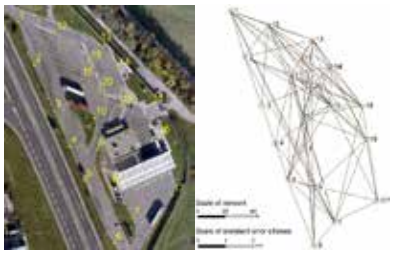
Research of the quality of procedures and products of photogrammetric survey using drones is important from scientific as well as applicative aspects. For this purpose, we established a test field with stabilised terrain points, which was surveyed with high precision. With extensive processing and analysis of results we established the influence of various recording parameters and processing principles of the images on the elaborated point clouds and orthophoto. Part of the research was published in an international journal. Further research in this area is still ongoing. Using a drone, we conducted several demanding surveying, mainly the survey of the extensive and demanding area of the empty reservoir lake Doblar at Soča, and prepared different products, including a 3D model.

Pedagoška dejavnost

Pedagoško delo poteka na vseh študijskih programih Oddelka za geodezijo UL FGG, na študijskem programu Vodarstvo in okoljsko inženirstvo UL FGG, na študijskih programih Urbanizem Fakultete za arhitekturo UL, Politologije – obramboslovje Fakultete za družbene vede UL in programu Krajinska arhitektura Biotehniške fakultete UL. Pedagoško delo obsega predavanja, seminarske in laboratorijske vaje, pri katerih študenti spoznavajo postopke, metode in tudi sami izdelujejo izdelke, nekatere predmete organiziramo kot projektno delo. Občasno gostimo vabljene predavatelje iz prakse, predstavljamo praktične primere iz domačega okolja, organiziramo oglede in strokovne ekskurzije. Študentom na vseh stopnjah študija in študijskih programih nudimo različne teme za zaključna dela, pri katerih sodelujemo, pri zaključnih nalogah spodbujamo sodelovanje s podjetji in institucijami v Sloveniji ter s fakultetami v tujini, predvsem v okviru programov Erasmus+ in bilateralnih pogodb.

Izjemni dosežek

Raziskovanje kakovosti postopkov in izdelkov fotogrametričnega snemanja z daljinsko vodenimi letalniki je pomembno tako z znanstvenega kot uporabnega vidika. Za ta namen smo vzpostavili testno polje s stabiliziranimi terenskimi točkami, ki smo jih geodetsko izmerili z visoko natančnostjo. Z obsežnimi obdelavami in analizo rezultatov smo ugotavljali vpliv različnih parametrov snemanja in načinov obdelave posnetkov na izdelane oblake točk in ortofoto. Del raziskav smo objavili v mednarodni reviji, nadaljnje raziskave na tem področju so še v teku. Z daljinsko vodenim letalnikom smo opravili nekatera zahtevna snemanja, predvsem snemanje obsežnega in zahtevnega območja izpraznjenega akumulacijskega jezera Doblar na Soči, in izdelali različne izdelke, vključno s trirazsežnim modelom.



Testno polje (Vipava) z geodetsko mrežo za preizkušanje kakovosti izdelkov, pridobljenih z uporabo daljinsko vodenih letalnikov
Test field (Vipava) with a geodetic network for testing product quality, acquired by drones

Gost oblak točk izpraznjenega akumulacijskega jezera Doblar
Thick point cloud of the empty reservoir lake Doblar

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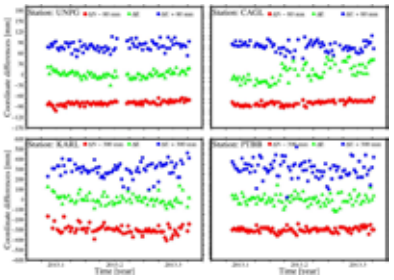


Prikaz razpršenosti ocenjenih koordinat na osnovi opazovanj GNSS ene frekvence, v smereh N, E in h, za štiri stalno delujoče postaje (UNPG, CAGL, KARL in PTBB). Postaja UNPG prikazuje rezultate z najnižjo stopnjo razpršenosti, postaja CAGL pa najnižjo stopnjo razpršenosti na nivoju centimetra. Spodnji dve postaji pa prikazujeta razpršenost koordinat, ki so dobljene na nivoju decimetra in so posledica nižje kakovosti kodnih opazovanj GNSS
Graph represents estimated coordinates dispersion for four continuously operating stations (UNPG, CAGL, KARL and PTBB) on a basis of single-frequency PPP and for coordinates N, E and h, respectively. Results for station UNPG represent the lowest level of dispersion, whereas results for station CAGL represent the highest level of dispersion, however both of them still on centimetre level. Results for stations KARL and PTBB represent dispersion on decimetre level due to a lower quality of code observations

KATEDRA ZA MATEMATIČNO IN FIZIKALNO GEODEZIJO TER NAVIGACIJO

Državni geodetski referenčni sistem je sistemska državna infrastruktura, ki omogoča določanje in predstavljanje položaja v prostoru na ozemlju države. Pomen državnega koordinatnega sistema sega od splošnega poznavanja prostora, upravljanja naravnih virov, zaščite in reševanja, obrambe, prometa, kmetijstva, do urejanja lastniških razmerij v prostoru. Hiter tehnološki razvoj prinaša številne nove tehnologije za pridobivanje prostorskih podatkov, vsesplošna digitalizacija pa vse bolj obsežno in kompleksno uporabo prostorskih podatkov. Prostorski podatki postajajo vse pomembnejši, vendar so uporabni le, če so ustrezne kakovosti, kar pomeni, da morajo biti pridobljeni z upoštevanjem geometrijskih in fizikalnih lastnosti prostora, v ustreznih koordinatnih sistemih z vrednotenjem kakovosti v vseh fazah njihove pridobitve.

Raziskovalna in strokovna dejavnost

Raziskovalno in pedagoško delujemo na področjih vzpostavitve in vzdrževanja referenčnih koordinatnih sistemov v geodeziji, modeliranja težnostnega polja Zemlje, analiziranja, vrednotenja in optimizacije opazovanj v geodeziji ter uporabe globalnih navigacijskih satelitskih sistemov v nalogah visoke točnosti.

Raziskovalno delo poteka v okviru raziskovalnega programa ARRS »Geoinformacijska infrastruktura in trajnostni prostorski razvoj Slovenije«, različnih projektov ter v sodelovanju z različnimi institucijami v Sloveniji in tujini. Usmerjeno je v razvoj algoritmov in programskih rešitev za določitev položaja v GNSS, modeliranje vplivov na opazovanja GNSS, študij težnostnega polja Zemlje, geodinamičnih raziskav, razvoj modelov transformacij med geodetskimi koordinatnimi sistemi ter optimizacijo vseh vrst opazovanj v geodeziji.

Z Geodetsko upravo RS in Geodetskim inštitutom Slovenije sodelujemo pri vzpostavitvi in vzdrževanju državnega geodetskega referenčnega koordinatnega sistema, pri vzpostavitvi državne geodetske kombinirane geodetske mreže, pri kateri gre za povezavo vseh sestavin koordinatnega sistema na osnovi neprekinjenega in/ali periodičnega izvajanja vseh vrst geodetskih meritev najvišje kakovosti.

Udeležujemo se znanstvenih in strokovnih srečanj, rezultate znanstveno raziskovalnega dela objavljamo v domačih in tujih znanstvenih revijah.

Pedagoška dejavnost

Poučujemo predmete na univerzitetnem študijskem programu prve stopnje Geodezija in geoinformatika, na visokošolskem študijskem programu prve stopnje Tehnično upravljanje nepremičnin ter na magistrskem študijskem programu druge stopnje Geodezija in

CHAIR OF MATHEMATICAL AND PHYSICAL GEODESY AND NAVIGATION

The national geodetic reference system is a systemic national infrastructure that enables the definition and presentation of a position in the territory of a state. The national coordinate system's importance reaches from general knowledge about space, natural resources management, rescue and protection, defence, traffic, agriculture, as well as arrangement of land ownership. Fast technological development brings new technologies for the acquisition of spatial data, while general digitalisation provides extensive and complex use of spatial data. Spatial data are becoming increasingly important, but they are useful only if they are of adequate quality. This means that they need to be acquired by taking into account geometrical and physical properties of space in adequate coordinate systems, with evaluation of quality required in all stages of their acquisition.

Research and professional activity

Our research and educational work is focused on the establishment and maintenance of reference coordinate systems in geodesy, modelling of the Earth's gravity field, analysis, evaluation and optimisation of geodetic measurements, and the use of global navigation satellite systems in high precision applications.

Research work runs under the umbrella of the research programme financed by the National Research Agency Geoinformation Infrastructure and Sustainable Spatial Development of Slovenia, within various projects and in cooperation with numerous institutions in Slovenia and abroad. It is focused on the development of algorithms and software solutions for the position determination in GNSS, modelling of impacts on GNSS observations, study of the Earth's gravity field, geodynamic investigations, development of transformations among geodetic coordinate systems and optimisation of all types of observations in geodesy.

We cooperate with the Geodetic Administration of RS and the Slovenian Geodetic Institute in the establishment and maintenance of the national geodetic reference coordinate system, in the establishment of the national geodetic combined network, with the emphasis on the connection of all constitutive parts of the coordinate system based on continuous and/or periodic high precision geodetic measurements of all kinds.

We take part at scientific and professional events and publish the results of our scientific and research work in national and international scientific journals.

Educational activity

We teach courses at the first cycle academic study program Geodesy and Geoinformation, at the first cycle higher education professional study Technical Real Estate Management and at the second cycle master study program Geodesy and Geoinformation. We bring students knowledge about the theory of

measurements in geodesy, the basics of the Earth's geometric properties, basic coordinate systems and surfaces, definition of coordinates in various coordinate systems and at various reference surfaces, as well as transformations among them. We present the basic properties of the gravity field, the problem and importance of heights in geodesy, and the preparation, implementation, processing and analysis of GNSS observations for the elaboration of various geodetic products. We cooperate with other chairs of our department in activities related to fieldwork lasting for several days. At the second cycle master study program Geodesy and Geoinformation we convey to our students knowledge about detailed procedures how to process GNSS observations. Under our supervision, students make their own program solutions for the determination of high precision coordinates in GNSS, which helps them strengthen their knowledge about satellite supported position determination. We also participate in courses where students are directed towards finding solutions to specific geodetic professional and research problems. At all cycles and orientations of studies at the Department of Geodetic Engineering we supervise students in their final theses.

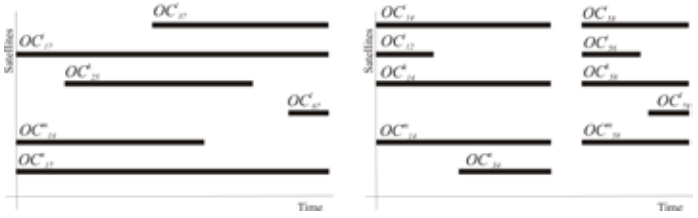
Exceptional achievements

We analytically analysed Precise Point Positioning (PPP) method that uses single-frequency GNSS measurements only and published our results in the most prestigious scientific journal in the field of geodesy, the Journal of Geodesy. We used a special linear combination of GNSS measurements that is free of ionosphere bias however, we obtained a singular mathematical model. We have shown that the deficiency in design matrix rank equals to the number of all ambiguity clusters, where each ambiguity cluster contains all ambiguities that are overlapping in time. We have proven that using such a design matrix, coordinates and troposphere parameters estimates are unbiased but ambiguities and receiver clock errors estimates are biased. The solution to the problem of single-frequency PPP was illustrated in the case of continuously operating stations in Europe and obtained centimetre level of accuracy for coordinates in case of static measurements and decimetre level of accuracy for coordinates in case of kinematic measurements.

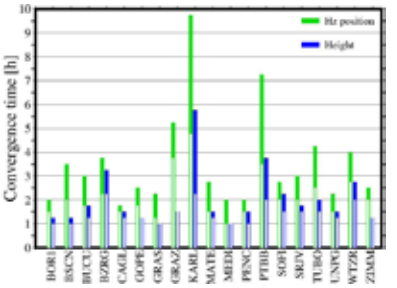
geoinformatika. Študente seznanjamo s teorijo meritev v geodeziji, z osnovnimi geometrijskimi lastnostmi Zemlje, osnovnimi koordinatnimi sistemi in ploskvami, določitvijo koordinat v različnih koordinatnih sistemih in na različnih referenčnih ploskvah ter transformacijami med njimi. Predstavimo jim osnovne lastnosti polja sile teže, problem in pomen višin v geodeziji, seznanimo jih s pripravo, izvedbo, obdelavo in analizo opazovanj GNSS za izdelavo različnih geodetskih izdelkov. Z drugimi katedrami sodelujemo pri izvedbi večdnevnega terenskega dela. Na magistrskem študijskem programu druge stopnje Geodezija in geoinformatika študente podrobno seznanimo s postopki obdelave opazovanj GNSS. Študenti pod našim vodstvom izdelajo lastne programske rešitve za določitev koordinat visoke kakovosti v GNSS ter tako poglobijo znanje satelitsko podprtega določanja položaja. Sodelujemo pri predmetih, pri katerih študente vodimo in usmerjamo pri reševanju specifičnih geodetskih strokovnih in raziskovalnih problemov. Na vseh stopnjah in smereh študijev na Oddelku za geodezijo delujemo kot mentorji zaključnih delih študentov.

Izjemni dosežki

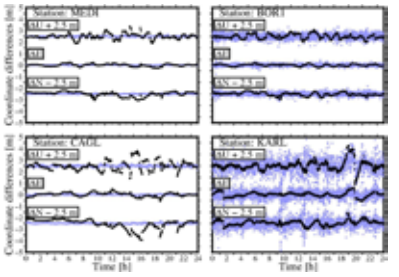
V članku, objavljenem v najuglednejši znanstveni reviji s področja geodezije, Journal of Geodesy, smo analitično obdelali metodo Precise Point Positioning (PPP) pri uporabi opazovanj signala GNSS na eni frekvenci nosilnega valovanja. S sestavo linearne kombinacije opazovanj, ki ni občutljiva za vpliv ionosfere, odstranimo vpliv ionosfere, vendar pridobimo singularen matematični model, ki je singularen, ker je rang modelne matrike matematičnega modela enak številu skupin faznih nedoločenosti, ki se med seboj prekrivajo v času. Dokazali smo, da s tako sestavljeno modelno matriko lahko pridobimo nepristransko oceno za koordinate in parametre troposferske refrakcije ter pristransko oceno za fazne nedoločenosti in pogreške ure sprejemnika. Rešitev problema enofrekvenčne določitve koordinat z metodo PPP smo ponazorili na primeru opazovanj stalno delujočih postaj GNSS na območju Evrope in pokazali, da lahko dosežemo centimetrsko točnost za statično in decimetrsko točnost za kinematično določitev koordinat.



Prikaz dveh situacij opazovanj GNSS enofrekvenčnega sprejemnika. Na levi so opazovanja šestih satelitov, ki so združena v šest skupin opazovanj, za vsak satelit ena skupina. Skupaj tvorijo eno skupino faznih nedoločenosti, saj se skupine opazovanj med seboj prekrivajo v času. Na desni imamo opazovanja GNSS šestih satelitov, ki tvorijo 10 skupin opazovanj in dve skupini faznih nedoločenosti, saj imamo prekinitev opazovanj v sredini
Two different situations of single-frequency GNSS measurements are represented above. The left graph represents measurements for six satellites that define six measurement clusters, all from one ambiguity cluster. They are clearly all overlapping in time. However, on the right-hand side, observations of six satellites define ten measurement clusters that are part of two ambiguity clusters, due to loss of lock in the middle of the interval



Graf prikazuje, koliko časa je potrebnega, da ocenjene koordinate na osnovi eno-frekvenčnih opazovanj dosežejo natančnost 10cm v horizontalni ravnini in 20cm po višini za posamezno stalno delujočo postajo pri obdelavi opazovanj GNSS ene frekvence za linearno kombinacijo kodnih in faznih opazovanj
Graph represents convergence time for each station that is needed for 10cm positional precision in horizontal plane (green bars) and 20cm positional precision for height (blue bars). White bars represent convergence time for 20cm precision in horizontal plane and 30cm precision for height



Primerjava dveh metod obdelave opazovanj GNSS eno-frekvenčnih sprejemnikov pri kinematični obdelavi opazovanj za štiri stalno delujoče postaje. Modre pike prikazujejo razpršitev kinematično določenih koordinat, ko rešitev pridobimo na osnovi linearne kombinacije faznih in kodnih opazovanj GNSS, medtem ko črne pike prikazujejo razpršitev kinematično določenih koordinat, ko v enem matematičnem modelu ločeno obdelamo fazna in kodna opazovanja GNSS
A comparison of two methods for processing single-frequency GNSS measurements in kinematic mode for four stations. Blue dots represent coordinate dispersion in case, where ionosphere-free linear combination of phase and code measurements is used, whereas black dots represent coordinate dispersion where code and phase measurements are processed separately

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KATEDRA ZA PROSTORSKO PLANIRANJE

Zaradi splošne gospodarske krize in omejitve zaposlovanja smo na KPP še vedno le trije pedagogi. Vsebine s področja prostorskega, regionalnega, urbanističnega in ruralnega planiranja poučujemo skoraj na vseh študijskih programih UL FGG, poleg tega pa še na drugostopenjskem študijskem programu Geografija (UL FF) in na prvostopenjskim študijskem programu Urbanizem (UL FA).

Ne glede na obsežno pedagoško delo in gospodarsko krizo, ki je močno prizadela tudi naše področje, ne zanemarjamo strokovnega in znanstveno raziskovalnega dela. Na strokovnem področju sodelujemo predvsem pri izdelavi strokovnih podlag za potrebe prostorskega načrtovanja na lokalni ravni, pri izdelavi različnih ekspertnih mnenj in recenzij ter pri nalogah, ki jih razpisujejo ministrstva. Pri tem, kolikor je le mogoče, ohranjamo tudi sodelovanje z občinami in podjetji s področja prostorskega načrtovanja.

Na raziskovalnem področju pa v zadnjih letih prevladujejo teme urbanega in regionalnega razvoja, razvoj metodoloških orodij in opredelitev prostorsko razvojnih konceptov ter modelov, s katerimi se ukvarjamo predvsem v okviru Ciljnega raziskovalnega programa (CRP).

Raziskovalna in strokovna dejavnost

KPP se je v tem obdobju nekoliko manj vključevala v mednarodne raziskovalne projekte. Zaključili smo s projektom 7 OP TURAS, katerega cilj je oblikovati in razvijati evropska mesta (skupaj z njihovim podeželskim zaledjem) tako, da bodo kljubovala vse pomembnejšim trajnostnim izzivom.

Mednarodne povezave pa so se krepile z neposrednim sodelovanjem s tujimi univerzami. Zelo močno sodelovanje se je vzpostavilo z Univerzo Zagrebu, še posebej s Fakulteto za arhitekturo. Področje raziskovanja je bilo usmerjeno v degradirana območja z zavarovanimi objekti kulturne dediščine. Tema se je navezovala tudi na domače raziskovalno delo, kjer smo zaključili s Ciljnim raziskovalni projektom z naslovom Celovita metodologija za popis in analizo degradiranih območij, izvedba pilotnega popisa in vzpostavitev ažurnega registra. Poleg tega smo sodelovali še pri nekaterih raziskovalnih projektih v zvezi s spremembami dejanske rabe kmetijskih zemljišč in povezovanjem razvojnega in prostorskega planiranja na regionalni ravni. Med strokovnimi nalogami pa izstopajo strokovne podlage, ki smo jih pripravili koz izhodišče za novo Strategijo prostorskega razvoja Slovenije, ki je še vedno v pripravi.

CHAIR OF SPATIAL PLANNING

Due to general economic crisis and limited employment possibilities, the Chair of Spatial Planning still has only three teachers. Contents from the areas of spatial, regional, urban and rural planning are provided to students of almost all study programmes offered at UL FGG. In addition, we cooperate at the second cycle study programme Geography (Faculty of Arts) and at the first cycle study programme Urbanism (Faculty of Architecture).

Regardless our extensive teaching activities and economic crises that severely hit also our area, we have never neglected our professional and scientific-research work. In the professional area, we cooperate mainly in the elaboration of expert bases for the needs of spatial planning at the local level, we elaborate various expert opinions and reviews, as well as apply to different calls of our ministries. At the same time, we nourish, as much as possible, our cooperation with municipalities and companies engaged in spatial planning.

In the research area, in the last few years our main focus has been urban and regional development, development of methodological tools and definition of spatial and development concepts and models. These themes are manly covered in a Targeted research project, in which we are involved.

Research and professional activity

In the period covered in this report, the Chair of Spatial Planning was less involved in international research projects. We successfully finished the 7th Framework Programme project TURAS that aimed at forming and developing European cities (including their rural background) in such way that they are able to face all major sustainability challenges.

We keep strengthening our international relations with direct cooperation with foreign universities. We have very strong cooperation with the University in Zagreb, especially with its Faculty of Architecture. Our research focus is directed to derelict land with structures protected as cultural heritage. This theme is emphasised also in our national research activity. An example of this is the Targeted research project titled Comprehensive methodology for inventory and analysis of derelict land, implementation of the pilot census and establishment of the up-to-date register. We have also cooperated in several research projects dealing with changes in the actual agricultural land use and related to the development and spatial planning at the regional level. Among the expert bases that we prepared, the most prominent ones are those used as starting points in the new Strategy of Spatial Development of Slovenia, which is still in the preparation phase.

Educational activity

With our teaching, we provide quality education to our students. Thus, we prepare improvements of individual courses each year. We also regularly subject our second cycle master study programme Spatial Planning to evaluation and propose improvements to its contents and organisation. As last change, we introduced mandatory field trip and mandatory practice in our study programme. These two new obligations allow our students to get deeper insight into issues appearing in practice. In 2016, our student Monika Dolinšek received the Faculty Prešeren Award for her diploma thesis titled Derelict Areas in the Zasavje Region. At the third, doctoral cycle, our teaching efforts are still focused on excellence in research work.

Exceptional achievements

As exceptional achievements, we wish to point out our articles published in periodic publications. They also receive the largest number of citations. Worth mentioning are especially articles Policy at the regional level in the case of Slovenia, published in the journal Prostor (Space): scientific journal for architecture and urbanism, where Alma Zavodnik Lamovšek is the lead author; and article by Mojca Foški, The (non)usefulness of the register of existing agricultural and forest land use for monitoring the processes in urban areas, published in Acta geographica Slovenica.

Pedagoška dejavnost

Na pedagoškem področju skrbimo, da študentom nudimo kakovostno izobraževanje. vsako leto zato pripravimo izboljšave pri posameznih predmetih. Poleg tega izvajamo redno evalvacijo drugostopenjskega študijskega programa Prostorsko načrtovanje in predlagamo njegove vsebinske in organizacijske izboljšave. Tako smo uvedli v študijski program obvezno strokovno ekskurzijo in obvezno prakso, s katerima študentom omogočamo, da vprašanja, ki se pojavljajo v praksi, spoznavajo še bolj poglobljeno. Tudi v letu 2016 je naša študentka Monika Dolinšek prejela fakultetno Prešernovo nagrado za svoje diplomsko delo z naslovom Degradirana območja v Zasavski regiji. Na tretji, doktorski stopnji izobraževanja so napori še naprej usmerjeni predvsem v odličnost raziskovalnega dela.

Izjemni dosežki

Med pomembnejše dosežke štejemo članke, ki jih objavljamo v periodičnih publikacijah in so tudi večkrat citirani; predvsem članka Policy at the regional level in the case of Slovenia v reviji Prostor : znanstveni časopis za arhitekturu i urbanizam, kjer je bila Alma Zavodnik Lamovšek vodila avtorica in članek avtorice Mojca Foški The (non)usefulness of the register of existing agricultural and forest land use for monitoring the processes in urban areas, objavljen v Acta geographica Slovenica.

Primer prikaza funkcionalnih degradiranih območij za Gorenjsko statistično regijo
Example of presentation of functional derelict land for the statistic region of Gorenjska

Projektno delo, ki ga izvajamo v obliki študentskih delavnic, tudi redno publiciramo
Project work implemented in the form of student workshops, with results regularly published

VSEBINA / CONTENT

ODDELEK ZA OKOLJSKO GRADBENIŠTVO

Oddelek za okoljsko gradbeništvo UL FGG združuje Katedro za mehaniko tekočin z laboratorijem, Katedro za splošno hidrotehniko, Inštitut za zdravstveno hidrotehniko in Vodnogospodarski inštitut. Pedagoško delo je naše primarno poslanstvo in obsega dva študijska programa: univerzitetni in magistrski program Vodarstvo in okoljsko inženirstvo. Izobražujemo inženirje za izzive prihodnosti, ki imajo bogato tehnično znanje, podprto z razumevanjem naravnih in družbenih procesov.
V današnjem času le interdisciplinarnost omogoča reševanje vedno kompleksnejših inženirskih problemov: obvladovanje poplav in suš, preskrbo s kakovostno pitno vodo, čiščenje odpadnih voda s sodobnimi tehnologijami, pridobivanje energije iz nizkoogljičnih virov, učinkovito gospodarjenje s sekundarnimi surovinami ter uvedbo sodobnih okoljskih tehnologij.

DEPARTMENT OF ENVIRONMENTAL CIVIL ENGINEERING

Department of Environmental Civil Engineering of the Faculty of Civil and Geodetic Engineering consists of Chair of Fluid Mechanics with laboratory, Chair of Hydraulic Engineering, Institute of Sanitary Engineering and Water Management Institute. Educational work is our primary mission and consists of two study programmes: 1st cycle academic programme Water Science and Environmental Engineering, and 2nd cycle programme with the same name. We educate engineers who will be ready for the future challenges, and have vast technical knowledge supported by the understanding of natural and social processes. In today's world, only interdisciplinarity enables solving increasingly complex engineering problems: flood and draughts management, quality water supply, waste water treatment using modern technologies, low carbon-print energy supply, efficient management of secondary resources and implementation of advanced environmental technologies.

Pri raziskovalnem delu razvijamo sodelovanje z drugimi oddelki UL FGG, fakultetami, inštituti in univerzami v Sloveniji ter tujini. Najpomembnejše raziskave zadevajo temeljna področja mehanike tekočin, hidrologije in hidravlike ter visoko specializirana področja sodobnih sistemov preskrbe z vodo in čisto energijo, hidrotehničnih objektov, naprednih tehnologij čiščenja voda, prenosa onesnažil in toplote v okolju, veliko pozornost pa posvečamo tudi proučevanju globalnih in lokalnih podnebnih sprememb. Le nenehni stik s prakso lahko pokaže potrebe družbe in znanja, ki so potrebna za obvladovanje globalnih in lokalnih izzivov sedanjosti ter prihodnosti. Sodelovanje z gospodarstvom je zato pomemben del dejavnosti oddelka. Zaposleni in študenti se zavedamo odgovornosti in priložnosti, ki jih ponujajo izzivi sodobnega časa, zato si nenehno prizadevamo za odličnost na svojem področju.

We carry out research work, and we collaborate with other departments, faculties and institutes, and universities in Slovenia and abroad. The research is carried out in fundamental areas of fluid mechanics, hydrology and hydraulics, as well as in the area of advanced water treatment technologies, green energy, transport of contaminants and heat in the environment and studying global and local climate changes. Collaboration with enterprises is an important part of Department's activities: it is clear that only regular contact with practice exhibits the real society needs, and enables the identification of the kind of knowledge, required for the management of global and local challenges of the present, as well as of the future. Faculty and the students are aware of the responsibilities and opportunities that are offered by the challenges of the modern time, and we strive for excellence within our field.

PEDAGOŠKO DELO

Študij na univerzitetnem in magistrskem programu Vodarstva in okoljskega inženirstva je sodoben in interdisciplinaren. Uspešno zapolnjuje vrzel med naravoslovnimi in tehniškimi programi Univerze v Ljubljani. Ponuja široka znanja in dojemanje problemov že na prvi stopnji študija, na drugi stopnji pa poglabljanje in specializacijo na različnih področjih urejanja voda. Študentom predajamo znanje za reševanje problemov sedanjosti in prihodnosti: poplav, suše, preskrbe s hrano, onesnaženja voda, odlaganja, ponovne uporabe in recikliranja odpadkov. Kot tipična tehniška fakulteta s tem študijem ponujamo celovit in moderen program tehniškega varstva okolja, ki bo pomembno prispeval k znanju v tretjem tisočletju. Skupaj imamo v petih letnikih v posameznem šolskem letu vpisanih od 60 do 100 študentov; majhno število študentov je ena od prednosti tega študija, ki omogoča delo v manjših skupinah ter osebnejši odnos med študenti in učitelji. Znanja posredujemo na sodoben način in s sodobno tehnologijo. Študentom so na voljo oddelčna knjižnica, sodobna laboratorijska in merska oprema ter računalniško podprt sistem s spletnimi učilnicami in spletnim referatom. Z delom v skupinah, projektnim, laboratorijskim in terenskim delom ter reševanjem konkretnih problemskih nalog študentom predajamo znanje za prakso. Študenti pod mentorstvom naših pedagogov in v sodelovanju s podjetji delujejo v številnih projektih pod skupnim naslovom Po kreativni poti do praktičnega znanja. Študente učimo tudi veščin nastopanja pred strokovno in laično javnostjo in jih seznanimo s poslovanjem s strankami v upravnih postopkih ter v postopkih javnega naročanja in projektiranja objektov in ukrepov. Pomemben cilj programa je osvojitev inženirskih vsebin v zadostnem obsegu, da lahko diplomanti uspešno nadaljujejo študij na programih druge in tretje stopnje. Diplomanti za zaključne naloge prejemajo tudi številne nagrade in priznanja, npr. Prešernovo nagrado, Pomursko raziskovalno nagrado, Goljevščkovo nagrado, Saubermacherjevo priznanje. Do sedaj je bilo tako nagrajenih že več kot 15 zaključnih del naših študentov. Sodelujemo v mednarodnem študijskem programu s področja obvladovanja tveganj pri poplavah z univerzami iz tujine (Dresden, Barcelona in Delft). Sporazum s Zurich University of Applied Sciences omogoča študentom magistrskega študija Vodarstvo in okoljsko inženirstvo pridobitev dveh certifikatov o zaključku študija (dvojna diploma). Posodabljanje in internacionalizacija študijskih programov zahtevata vzporedno izvedbo predmetov v angleščini, na kar smo na Oddelku za okoljsko gradbeništvo že pripravljeni.

EDUCATIONAL ACTIVITIES

The University and Masters study programs of Water Science and Environmental Engineering are modern and interdisciplinary. They successfully bridge the gap between science and engineering programs offered at the University of Ljubljana. They provide a wide spectrum of knowledge and understanding of problems already within the 1st cycle, and in-depth knowledge and specialization in different areas of water management. The knowledge provided to the students enables solving the problems of the present and the future: floods, draughts, food supply, water contamination, disposal, re-use and recycling of waste. As a typical engineering faculty, we are offering, by this study programme, a comprehensive and modern study programme of engineering environmental protection that will provide an important contribution to the challenges of the 3rd millennium. Altogether, we have, in each study year, 60 to 100 students; the small number of students is one of the advantages of this study programme that enables work in smaller groups and more personal relations between students and teachers. Knowledge is conveyed by using up-to-date technology. Students can use the Department's library, modern laboratory and measuring equipment, as well as a computer supported system of web classrooms and web registrar's office. Through teamwork, project, laboratory and field work, and solving real-life tasks, knowledge is transferred to the practitioners. Over the past years, our students were included, under the supervision of our teachers and in cooperation with various companies, into numerous projects with common name Creative Way to Practical Knowledge. Public presentation skills, to be used in front of the professional and lay public are also taught, along with conveying the knowledge related to dealing with citizens in administrative procedures, public procurement procedures, as well as designing of structures and measures. An important part of the programme is also to acquire adequate engineering knowledge that enable our graduates to continue their studies in 2nd and 3rd cycle programmes. Our graduates receive numerous awards for their final theses, such as the Student Prešeren Award, Pomurje Research Award, Goljevšček Award or Saubermacher Award. So far, more than 15 theses of our students were awarded. We actively participate in the international study programme from the field of flood risk management together with the Universities from Dresden, Barcelona and Delft. Agreement with Zurich University of Applied Sciences allows students of the master study program Water Science and Environmental Engineering to obtain double degree. Modernisation and internationalisation of our study programmes require that the courses are given in parallel, both in Slovenian and English language; the Department is fully prepared for this.

SCIENTIFIC, RESEARCH AND PROFESSIONAL WORK

Despite the small number of researchers in the group, we lead or cooperate as partners within a UNESCO international programme, European Framework Programmes, cross-border cooperations and bilateral projects, within national fundamental and applied projects, and in the programme Water Science and Technology, and Geotechnics. Hydraulic Laboratory enables research in fundamental areas of water flow, heat and mass transport, as well as conceptual and detailed design, and safety of hydraulic structures. Research is related to drinking water supply problems, to up-to-date treatment technologies based on hydrodynamic cavitation and ultrafiltration, as well as to losses in pipeline networks and transnational cooperation in the area of water supply. Research related to advanced technologies for industrial waste water treatment, and biogas power supply is conducted in two sanitary engineering laboratories. The measuring equipment enables more demanding analyses as well. We carry out research in the field of infrastructure and cities of the future with minimum energy consumption and generation of secondary resources. We develop advanced software: numerical models for simulating dam-breaks and embankment failures, floods, landslides and debris flows, and models simulating transport and decay of pollutants in the natural environment. Furthermore, a part of our research is dedicated to development and production of specific equipment for complex measurements in rivers and field-to-laboratory data transfer. Department of Environmental Civil Engineering hosts the Editor's Office of the single Slovenian scientific journal from the field of water science and hydraulic engineering, and other water related issues, Acta hydrotechnica.

We strive to achieve rapid transfer of our research results into practice. By nurturing collaboration with the industry, public services, Ministries and large companies, our research results become useful for the entire society. The developed applications are used in the fields of hydropower supply, extreme events forecasting and environmental protection. Cooperation with smaller companies in the areas of water science and hydraulic engineering, as well as secondary raw materials management enables transfer and practical application of specific knowledge. The experts of the Department act as design engineers, and even more frequently, they carry out reviews of the project documentation in the field of water science and hydraulic engineering. Certain Department members are partially employed in the industry. In this way, direct transfer of research achievements into practice is enabled, and, even more importantly, such cooperation enables direct transfer of experience, skills and knowledge from the engineering practice into pedagogical process: the latter is the first and the most important task of the University, our Faculty and also the Environmental Civil Engineering Department.

ZNANSTVENO, RAZISKOVALNO IN STROKOVNO DELO

Kljub majhni skupini raziskovalcev vodimo ali kot partnerji sodelujemo pri mednarodnih programih UNESCO, projektih iz evropskih okvirnih programov, čezmejnih sodelovanjih in bilateralnih projektih, prav tako pri nacionalnih temeljnih in aplikativnih projektih ter v programski skupini Vodarstvo in geotehnika. Hidravlični laboratorij omogoča raziskave osnovnih področij toka vode ter transporta snovi in toplote pa tudi zasnove in varnosti hidrotehničnih objektov. Raziskave povezujemo s problemi preskrbe s pitno vodo, tako najsodobnejšimi tehnologijami čiščenja s hidrodinamsko kavitacijo in ultrafiltracijo kot z izgubami v vodovodnih omrežjih in čezmejnim povezovanjem pri vodooskrbi. V dveh laboratorijih zdravstvene hidrotehnike potekajo raziskave naprednih tehnologij čiščenja industrijskih odpadnih vod, pridobivanja energije iz bioplina, merska oprema pa omogoča tudi zahtevnejše analize. Ukvarjamo se z raziskavami infrastrukture in mest prihodnosti z majhno porabo energije in minimalno količino sekundarnih surovin. Razvijamo sodobno programsko opremo, numerične modele porušitev pregrad in nasipov, dogajanja ob poplavah, zemeljskih plazovih in drobirskih tokovih ter modele za transport in razgradnjo onesnažil v naravnem okolju. Prav tako je del naših raziskav namenjen razvoju in izdelavi specifične opreme za izvajanje zahtevnih meritev na vodotokih in prenosa podatkov s terena v laboratorije. Na Oddelku za okoljsko gradbeništvo urejamo edino slovensko znanstveno revijo s področja vodarstva, hidrotehnike in druge problematike, povezane z vodami, Acta hydrotechnica.

Prizadevamo si, da bi izsledki raziskav čim prej prešli v prakso. Ob sodelovanju z gospodarstvom in negospodarstvom, ministrstvi ter velikimi podjetji in družbami postanejo rezultati našega raziskovalnega dela uporabni za širšo družbo. Izdelane aplikacije se uporabljajo v hidroenergetiki, napovedovanju ekstremnih dogodkov in varovanju okolja. Sodelovanje z manjšimi podjetji s področja vodarstva, hidrotehnike in gospodarjenja s sekundarnimi surovinami omogoča prenos in praktično uporabo specifičnih znanj. Strokovnjaki z Oddelka sodelujejo kot projektanti, še pogosteje pa kot revidenti projektne dokumentacije na področju vodarstva in hidrotehnike. Nekateri sodelavci so delno zaposleni tudi v podjetjih. Tako je mogoč neposredni prenos iz znanstvenih raziskav v prakso in, kar je morda še pomembnejše, neposredni prenos izkušenj, veščin in znanj iz inženirske prakse v pedagoško delo; slednje pa je prva in najpomembnejša naloga Univerze, naše fakultete in tudi Oddelka za okoljsko gradbeništvo.

UNIVERZITETNI ŠTUDIJSKI PROGRAM PRVE STOPNJE VODARSTVO IN OKOLJSKO INŽENIRSTVO

Prvostopenjski univerzitetni študijski program Vodarstvo in okoljsko inženirstvo poteka na Oddelku za okoljsko gradbeništvo UL FGG. Študij je sodoben in interdisciplinaren ter dopolnjuje druga dva univerzitetna študijska programa na UL FGG. Diplomant študijskega programa pridobi pregledno splošno temeljno naravoslovno in družboslovno znanje, hkrati pa osnovno temeljno in uporabno (gradbeno) tehniško znanje za reševanje enostavnih upravnih postopkov ter planiranje, načrtovanje, izvedbo in vzdrževanje manj zahtevnih (po Zakonu o graditvi objektov) gradbenih inženirskih objektov (po enotni klasifikaciji vrst objektov CC-SI) s področja vodarskega, okoljskega in komunalnega inženirstva.

Pri študiju študent ob teoretičnem temeljnem znanju spozna tradicionalna načela vodarstva, nadgrajena z najnovejšimi dognanji stroke, posredovanimi na sodoben način, s sodobno tehnologijo. Z delom v skupinah, projektnim delom, terenskim delom in reševanjem problemskih nalog se privaja na interdisciplinarno delo v skupini, uči veščine nastopanja pred strokovno in laično javnostjo ter seznani s poslovanjem s strankami v upravnih postopkih, v postopkih javnega naročanja ter projektiranja objektov in ukrepov. Pridobljeno teoretično znanje kar najbolj preizkusi na primerih vaj in realnih primerih uporabe, kar mu omogoča lažjo vključitev v prakso po končanem prvostopenjskem študiju. Hkrati je cilj programa tudi osvojitev zadostnega obsega temeljnih inženirskih vsebin, ki omogočajo razvoj abstraktnega mišljenja in uspešno nadaljevanje študija na različnih programih druge stopnje.

FIRST CYCLE ACADEMIC STUDY PROGRAM WATER SCIENCE AND ENVIRONMENTAL ENGINEERING (BA)

The first cycle academic study program of Water Science and Environmental Engineering is offered by the Department of Environmental Engineering of the Faculty of Civil and Geodetic Engineering. The program is modern and interdisciplinary, and it supplements previous academic study programs at our Department. The graduates acquire comprehensive general knowledge of natural and social sciences, as well as fundamental and applied (civil) engineering knowledge. Thus, they are qualified for solving simple administrative procedures and plan, implement and maintain less demanding structures according to the Construction Act (according to the uniform classification of construction types CC-SI) for the areas of water science, environmental and municipal engineering.

Besides gaining general theoretic knowledge about water science, students also learn about the modern principles of the profession, presented in a modern way using state-of-the-art technology. By working in groups, with project and field work, and by solving problem tasks, they acquire essential teamwork and public speaking skills and will be able to coherently present scientific and engineering ideas to expert and lay public. They become acquainted with communication with customers in administrative and public procurement procedures, about the design of structures and measures. The students have the opportunity to test all the acquired expert knowledge to the largest possible extent within practical tutorials and real-life case studies, which allows them quick transition into practical work after the first cycle studies. Another goal of the program is to provide the graduates with a sufficient range of basic engineering contents that allow the development of abstract thinking and successful continuation of studies at various second cycle programs.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Matematika I / Mathematics I | ECTS 10
- Fizika / Physics | ECTS 9
- Osnove ekologije celinskih voda / Fundamentals of Freshwater Ecology | ECTS 4
- Uvod v okoljsko inženirstvo / Introduction to Environmental Engineering | ECTS 6
- Matematika II / Mathematics II | ECTS 8
- Osnove kemije / Basic Chemistry | ECTS 4
- Geodezija / Geodetic Engineering | ECTS 4
- Hidrologija / Hydrology | ECTS 6
- Gradiva / Construction and Building Materials | ECTS 4
- Digitalno načrtovanje in programiranje / Digital Design and Programming | ECTS 5

2. letnik / 2nd year

- Statistične metode v gradbeništvu / Statistical Methods in Civil Engineering | ECTS 4
- Hidromehanika / Hydromechanics | ECTS 5
- Osnove mehanike / Introduction to Structural Mechanics | ECTS 8
- Matematika III / Mathematics III | ECTS 7
- Gospodarjenje s sekundarnimi in odpadnimi snovmi / Secondary and Waste Materials Management | ECTS 6
- Osnove zdravstvene hidrotehnike / Introduction to Sanitary Engineering | ECTS 4
- Hidravlika / Hydraulics | ECTS 5
- 1. izbirni predmet / 1st Elective Course | ECTS 4
- Mehanika tal in inženirska geologija / Soil Mechanics and Engineering Geology | ECTS 7
- Uporabna ekologija in ekotoksiologija / Applied Ecology and Ecotoxicology | ECTS 4
- Organizacija gradbenih del in poslovanje / Organization of Construction Works and Operation | ECTS 6

3. letnik / 3rd year

- Temelji ekonomske analize / Introduction to Economic Analysis | ECTS 3
- Ceste in promet / Roads and Traffic | ECTS 6
- Osnove lesenih in jeklenih konstrukcij / Introduction to Timber and Steel Structures | ECTS 4
- Geotehnika / Geotechnical Engineering | ECTS 6
- Vodne gradnje / Introduction to Drainage Engineering | ECTS 4
- Temelji prostorskega načrtovanja / Fundamentals of Spatial Planning | ECTS 7
- Osnove betonskih in zidanih konstrukcij / Introduction to Concrete and Masonry Structures | ECTS 6
- Praktično usposabljanje / Practical Training | ECTS 4
- 2. izbirni predmet / 2nd Elective Course | ECTS 8
- 3. izbirni predmet / 3rd Elective Course | ECTS 8
- Komunalne naprave / Communal Technical Infrastructure | ECTS 4
- Diplomsko delo / Diploma Work | ECTS 8

Izbirni predmeti / Elective Courses

- Operacijske raziskave v gradbeništvu / Operational Research in Civil Engineering | ECTS 5
- Hidroinformatika / Hydroinformatics | ECTS 4
- Gradbene tehnologije v vodarstvu / Construction Technology in Water Works | ECTS 4
- Projektno delo / Project Work | ECTS 8
- Naravne nesreče in njihov vpliv na okolje, prostor in družbo / Natural Disasters and Their Impact on the Environment and Society | ECTS 6

MAGISTRSKI ŠTUDIJSKI PROGRAM DRUGE STOPNJE VODARSTVO IN OKOLJSKO INŽENIRSTVO

Magistrski študijski program druge stopnje Vodarstvo in okoljsko inženirstvo traja dve leti (štiri semestre) in obsega 120 kreditnih točk. Študijski program ne vsebuje smeri.

Diplomant magistrskega študijskega programa Vodarstvo in okoljsko inženirstvo bo pridobil poglobljeno temeljno naravoslovno znanje, nadgrajeno s temeljnim in predvsem uporabnim strokovnim (gradbeno) tehniškim znanjem za reševanje zahtevnejših upravnih postopkov ter planiranje, načrtovanje, izvedbo in vzdrževanje zahtevnejših (po Zakonu o graditvi objektov) gradbenih inženirskih objektov (po enotni klasifikaciji vrst objektov CC-SI) s področja vodarskega, komunalnega in okoljskega inženirstva.

Pri študiju bo študent ob teoretičnem temeljnem znanju s področja hidrotehnike in geotehnike spoznal moderna načela vodarstva, nadgrajena z najnovejšimi dognanji stroke na posameznih področjih okoljskega inženirstva in gradbeništva, posredovanimi na moderen način z uporabo sodobnih tehnologij. Z delom v skupinah, projektnim in terenskim delom ter reševanjem problemskih nalog bo razvijal veščine, pomembne za interdisciplinarno delo v skupini, nastopanje pred strokovno in laično javnostjo ter se seznanil z vodenjem projektov, povezanih z okoljskim gradbeništvom, vodarstvom in okoljskim inženirstvom, še posebej s projektiranjem posameznih specialnih vrst objektov in načrtovanjem ukrepov. Vse pridobljeno strokovno znanje bo študent tekom študija lahko preizkusil na primerih vaj in realnih primerih uporabe v praksi. To mu bo skupaj s praktičnim usposabljanjem kot sestavnim delom študijskega programa omogočalo lažje delovanje v praksi po končanem magistrskem študiju. Cilj programa je tudi osvojitev zadostnega obsega temeljnih inženirskih vsebin, ki omogočajo razvoj abstraktnega mišljenja in uspešno nadaljevanje študija na različnih programih tretje stopnje (npr. s področja gradbeništva ali varstva okolja).

SECOND CYCLE ACADEMIC STUDY PROGRAM WATER SCIENCE AND ENVIRONMENTAL ENGINEERING (MA)

The second cycle master study programme Water Science and Environmental Engineering is a 120-credit 2-year program (4 semesters). The study program does not include orientations.

Graduates of the master study programme Water Science and Environmental Engineering acquire fundamental knowledge of natural sciences, as well as applicable expert (civil engineering) skills for solving demanding administrative procedures and for the designing, planning, implementing and maintaining more demanding (according to the Construction Act) civil engineering structures (according to the uniform classification of construction types CCSI) in the areas of water management, municipal and environmental engineering. Besides gaining general theoretic knowledge about hydraulic and geotechnical engineering, students also learn about the modern principles of water science and the latest achievements of the profession in individual areas of environmental and civil engineering, presented in a modern way using state-of-the-art technological approaches. By working in groups, with project and field work, and by solving problem tasks, students acquire essential teamwork and public speaking skills and will be able to coherently present scientific and engineering ideas to expert and lay public. They become acquainted with project management in the fields of environmental civil engineering and water management, and especially related to the design of specialised construction types and planning measures.

The students have the opportunity to test all the acquired expert knowledge to the largest possible extent within practical tutorials and real-life case studies, which allows them, together with practical training as part of the study, quick transition into practical work after the finished master study. Another goal of the programme is to provide the students with sufficient basic engineering knowledge to allow them to develop abstract thinking and successfully continue the study at different third cycle (i.e. doctoral) programmes (e.g. civil engineering or environment protection).

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

- Hidravlično modeliranje / Hydraulic Modelling | ECTS 8
- Hidrološko modeliranje / Hydrological Modelling | ECTS 6
- Vodovod in priprava pitne vode / Drinking Water Supply and Treatment | ECTS 8
- Vodenje projektov / Project Management | ECTS 4
- Osnove prostorske sociologije / Basics of Spatial Sociology | ECTS 3
- Kanalizacija in čiščenje odpadnih voda / Sewerage and Waste Water Treatment | ECTS 8
- Matematično modeliranje okoljskih procesov / Mathematical Modelling of Environmental Processes | ECTS 6
- Meteorologija / Meteorology | ECTS 4
- Morje in obalni pas / Open Sea and Coastal Area | ECTS 4
- Geotehnika okolja / Environmental Geotechnics | ECTS 5
- Daljinsko zaznavanje v okoljskem gradbeništvu / Remote Sensing in Environmental Civil Engineering | ECTS 4

2. letnik / 2nd year

- Urejanje vodotokov / River Engineering | ECTS 8
- Vodarstvo / Water Management | ECTS 4
- 1. izbirni predmet FGG ali zunanji / 1st Elective Course (FGG or External) | ECTS 8
- Dreniranje in namakanje / Drainage and Irrigation | ECTS 6
- Zaščita voda / Water Protection | ECTS 4
- Vodnogospodarski sistemi / Water Management Systems | ECTS 4
- 2. izbirni predmet FGG ali zunanji / 2nd Elective Course (FGG or External) | ECTS 5
- Praktično usposabljanje / Practical Training | ECTS 6
- Magistrsko delo / MSc Thesis | ECTS 15

Izbirni predmeti / Elective Courses

- Prostorsko planiranje in ogroženost pred poplavami / Spatial Planning for Flood Protection | ECTS 5
- Sociološko ekonomska ocena ogroženosti pred poplavami / Socio-Economical Assessment of Flood Protection | ECTS 5
- Pobočni procesi / Slope Processes | ECTS 4
- Urejanje hudournikov in povirij / Torrent and River Control | ECTS 4
- Okoljske tehnologije / Environmental Technologies | ECTS 4
- Numerične metode v dinamiki tekočin / Numerical Methods in Fluid Dynamics | ECTS 5
- Hidravlični stroji in naprave / Hydraulic Machines and Devices | ECTS 4
- Vodne moči / Water Powers | ECTS 4
- Orodja za podporo odločanju / Decision Support Systems in Water Management | ECTS 5
- Hidrotehnični objekti / Hydraulic Structures | ECTS 8
- Urejanje krajine / Landscape Management | ECTS 4
- Uvod v raziskovalno delo / Introduction to Research Work | ECTS 4
- Projekt iz infrastrukturnih sistemov / Project in Infrastructural Systems | ECTS 4
- Izbrana poglavja iz matematike III / Selected Topics from Mathematics III | ECTS 3

KADER / PERSONNEL

- Predstojnik
  Head
  doc. dr. Andrej Kryžanowski
- Namestnik predstojnika
  Deputy head
  doc. dr. Simon Rusjan
- Pedagogi
  Educators
  prof. dr. Mitja Brilly
  izr. prof. dr. Mojca Šraj
  viš. pred. mag. Andrej Vidmar
- Asistenti
  Assistants
  asist. dr. Nejc Bezak
  asist. Klaudija Sapač
  asist. dr. Mira Kobold
- Strokovna sodelavka
  Professional Associate
  Mojca Vilfan

KATEDRA ZA SPLOŠNO HIDROTEHNIKO

Nastanek Katedre za splošno hidrotehniko (KSH) sega v sedemdeseta leta 20. stoletja, ko sta se združili Katedra za izrabo vodnih sil ter Katedra za hidrologijo in melioracije. S tem je katedra prevzela skrb za razvoj naslednjih pedagoških, raziskovalnih in strokovnih področij: hidrologije, erozije in sedimentacije, urejanja voda, melioracij, hidrotehničnih objektov, izrabe vodnih moči, vodarstva in upravljanja naravnih tveganj.

Raziskovalna in strokovna dejavnost

KSH skrbi za razvoj raziskovalne in strokovne dejavnosti na svojih področjih. Bila je koordinator projekta *LIFE Ljubljanica povezuje* (2012–2016), katerega glavni cilj je bil izboljšati življenjske razmere ogroženih vrst v reki Ljubljanici. V okviru projekta je bil vzpostavljen sistem za video monitoring ribjih stez na Ambroževem trgu in Fužinah. V okviru mednarodnega hidrološkega programa *IHP UNESCO* katedra sodeluje v mednarodnem programu *Več prostora za vode*, se udeležuje konferenc in sestankov IHP, opravlja monitoring ter vzdržuje merilno opremo na eksperimentalnih porečjih. Člani katedre se aktivno vključujejo v raziskovalne dejavnosti Unescove Katedre za zmanjšanje tveganj ob vodnih ujmah (UNESCO Chair on Water-related Disaster Risk reduction – WRDRR), ki je bila ustanovljena leta 2016. Vključeni so tudi v projekt programa COST CA16209: LAND4FLOOD – Natural Flood Retention on Private Land (2017–2021).

Na nacionalni ravni člani katedre raziskujejo v okviru raziskovalnega programa P2-0180 »Vodarstvo in geotehnika: orodja in metode za analize in simulacije procesov ter razvoj tehnologij« in temeljnih raziskovalnih projektov Modeliranje hidrološkega odziva nehomogenih povodij, Proučevanje premikanja plazov od izvornih območij do mesta odlaganja z deterministčnim pristopom in Prepoznavanje potencialno nevarnih hudourniških vršajev z metodami geomorfometrije in simulacijami nastanka vršajev.

Svoje raziskovalno delo člani KSH še naprej združujejo z drugimi katedrami na UL FGG, in sicer v Raziskovalnem inštitutu za geo in hidro tveganja (RIGHT). KSH krepi mednarodno prepoznavnost UL FGG z aktivno vlogo pri raziskovanju zemeljskih plazov, saj ima UL FGG že od leta 2009 status Svetovnega centra odličnosti na področju varstva pred zemeljskimi plazovi. Člani KSH so v letu 2017 odigrali osrednjo vlogo pri organizaciji 4. svetovnega foruma o zemeljskih plazovih v Ljubljani, aktivno so sodelovali tudi pri izvedbi 2. slovenskega kongresa o vodah in 4. trienalnega znanstvenega posveta Naravne nesreče v Sloveniji.

Sodelavci KSH objavljajo v uglednih znanstvenih revijah, pri številnih revijah so recenzenti in člani uredniških odborov.

CHAIR OF HYDROLOGY AND HYDRAULIC ENGINEERING

The origins of the Chair of Hydrology and Hydraulic Engineering go back into the 1970s, when the units Chair of Utilization of Hydropower and Chair of Hydrology, Irrigation and Drainage merged into one. With this merger the Chair of Hydrology and Hydraulic Engineering became responsible for the following educational, research and expert areas: hydrology, erosion and sedimentation, river regulation, irrigation and drainage, hydraulic structures, utilization of hydropower, water management and managing natural risks.

Research and professional activity

The Chair is in charge of research and professional activity in its areas of work. The Chair coordinated the *LIFE project Ljubljanica Connects* (2012–2016), aimed at improving the living conditions of targeted endangered species in the Ljubljanica river. Within the project, a system of video monitoring of fish passes at Ambrožev trg and in Fužine was established. In the international hydrologic program *IHP UNESCO* the Chair cooperates in the international program *More Room for Water*, by taking part at IHP conferences and meetings, performing monitoring and maintaining measuring equipment at experimental rivers. The Chair members are actively involved in research activities of the UNESCO Chair on Water-related Disaster Risk reduction (WRDRR), established in 2016, and are also involved in a COST project CA16209: LAND4FLOOD – Natural Flood Retention on Private Land (2017–2021).

At the national level, the Chair members research within the national research program P2-0180 Water Science and Technology, and Geotechnical Engineering: Tools and Methods for Process Analyses and Simulations, and development of Technologies and basic research projects Modelling the Hydrologic Response of Nonhomogeneous Catchments, Studying Landslide Movements from Source Areas to the Zone of Deposition Using a Deterministic Approach and Recognition of Potentially Hazardous Torrential Fans Using Geomorphometric Methods and Simulating Fan Formation.

The Chair members continue to link their research work with other UL FGG chairs, mainly within the Research Institute for Geo and Hydro Threats (RIGHT). We work to strengthen the international recognition of UL FGG with an active role in the research of landslides. Thus, UL FGG has had a status of the World Centre of Excellence in the area of landslide protection since 2009. In 2017, the Chair members played a central role in the organisation of the 4th World Landslide Forum in Ljubljana, and were also actively involved in the organisation of the 2nd Slovenian Water Congress and 4th triennial scientific conference Natural Disasters in Slovenia.

The Chair members publish in major scientific journals. In numerous journals we are reviewers and members of editorial boards.

Pedagoška dejavnost

Sodelavci KSH kot pedagogi sodelujejo pri predmetih na vseh treh stopnjah študija UL FGG. Na dodiplomskem študiju (I. stopnja) pedagoško skrbijo v celoti ali delno za naslednje predmete: Hidrologija, Gradbene tehnologije v vodarstvu, Vodne gradnje, Inženirska hidrotehnika, Uvod v okoljsko inženirstvo, Tehnološki procesi, Tehnologija ter Naravne nesreče in njihov vpliv na okolje, prostor in družbo. Na magistrskih študijih (II. stopnja) poučujejo predmete: Hidrološko modeliranje, Dreniranje in namakanje, Vodarstvo, Hidrotehnični objekti, Vodne moči, Urejanje vodotokov, Pobočni procesi in Hudourništvo. Na doktorskih študijih (III. stopnja) Grajeno okolje in Varstvo okolja so sodelavci KSH nosilci naslednjih predmetov: Orodja in metode v raziskovanju grajenega okolja, Hidrološke meritve in hidrološko modeliranje, Hidrološko in geotehnično raziskovanje zemeljskih plazov, Meritve in modeliranje erozije in sedimentacije, Urejanje vodnega režima, Zajem in modeliranje zemeljskega površja pri ocenah naravnih tveganj, Ekohidrologija ter Naravna tveganja v gorskem okolju.

V šolskih letih 2015/16 in 2016/17 je pod mentorstvom članov katedre končalo študij 55 študentov 1. in 2. stopnje ter predbolonjskih študijev. Od tega je bila ena zaključna naloga nagrajena z Univerzitetno Prešernovo nagrado (Blaž Barič) in tri z Goljevščkovo nagrado.

Katedra je bila vodilni partner projekta Environmental Protection and Natural Disasters (Erasmus+, 2015–2017), v okviru katerega smo na Univerzi v Ljubljani organizirali dve mednarodni doktorski poletni šoli (leta 2016 in 2017).

Pedagogi KSH sodelujejo tudi pri izvajanju mednarodnega magistrskega študijskega programa Upravljanje poplavnega tveganja (Erasmus Mundus Flood Risk Management), ki ga obiskujejo študenti z vsega sveta.

Izjemni dosežek

Izr. prof. dr. Mojca Šraj je v soavtorstvu z raziskovalci iz 30 evropskih držav objavila znanstveni članek v prestižni reviji Science: Blöschl et al., 2017. *Changing climate shifts timing of European floods*. Science 357, 588–590 (IF = 41,06).

Izpostavljamo tudi članek, ki prikazuje način, kako se dva hidrološka koncepta (analizo upadanja pretokov in dvokomponentno ločitev hidrogramov) lahko skupaj uporabi za modeliranje padavinskega odtoka: Rusjan, Simon, Mikoš, Matjaž, 2015. *A catchment as a simple dynamical system: characterization by streamflow component approach*. Journal of Hydrology 527, 794–808 (IF (2015)= 3.043 (x = 1.519)).

Educational activity

Members of the Chair of Hydrology and Hydraulic Engineering teach at all three study cycles at the Faculty of Civil and Geodetic Engineering. At the undergraduate studies (first cycle) we participate at or coordinate the courses: Hydrology, Building Technologies in Water Science, Introduction to Drainage Engineering, Engineering Hydraulics, Introduction to Environmental Engineering, Technological Processes, Technology and Natural Disasters and Their Impact on the Environment, Space and Society. At the second cycle master studies we teach the courses: Hydrological modelling, Drainage and Irrigation, Water Science, Hydraulic Structures, Water Power, River Engineering, Slope Stability and Torrent and Erosion Control. At the third cycle doctoral studies Built Environment and Environmental Protection the Chair members are coordinators of the courses: Tools and Methods in Research of the Built Environment, Hydrologic Measurements and Modelling, Hydrologic and Geotechnical Research on Landslides, Measurements and Modelling of Erosion and Sedimentation, Management of Water Regime, Data Acquisition and Modelling of the Earth's Surface in Natural Risk Assessment, Ecohydrology and Natural Risks in Alpine Environment.

In the academic years 2015/16 and 2016/17, the Chair members successfully supervised 55 final theses in the 1st and 2nd study cycles and pre-Bologna studies. Of that, one final thesis was awarded with the University Prešeren Award (Blaž Barič) and three with the Goljevšček Award.

The Chair was the lead partner of the project Environmental Protection and Natural Disasters (Erasmus+, 2015–2017), within which we organised two international doctoral summer schools at the University of Ljubljana (in 2016 and 2017).

The Chair's teachers are also active in the international Erasmus Mundus Flood Risk Management program, attended by students from all around the world.

Exceptional achievements

Along with co-authors and researchers from 30 European countries, Assoc. Prof. Dr. Mojca Šraj published a scientific article in the prestigious journal Science: Blöschl et al., 2017. *Changing climate shifts timing of European floods*. Science 357, 588–590 (IF = 41.06).

Moreover, the article by Rusjan, Simon, Mikoš, Matjaž, 2015. *A catchment as a simple dynamical system: characterization by streamflow component approach*. Journal of Hydrology 527, 794–808 (IF (2015)= 3.043 (x = 1.519)) presents the way how two hydrological concepts (analysis of streamflow recession and two-component hydrograph separation) can be used together to model rainwater runoff.

Predavanje v okviru mednarodne doktorske poletne šole Environmental Protection and Natural Disasters leta 2017
A lecture within international doctoral summer school Environmental Protection and Natural Disasters in 2017

Meritve s študenti
Measurements with students

Meritve ob visokih vodah
Highwater measurements

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Matjaž Četina
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Dušan Žagar
- Pedagoga
  Educators
  asist. dr. Daniel Kozelj
  viš. pred. dr. Gašper Rak
- Strokovni sodelavec
  Professional associate
  asist. dr. Gorazd Novak

KATEDRA ZA MEHANIKO TEKOČIN Z LABORATORIJEM

Katedra za mehaniko tekočin z laboratorijem (KMT) kot ena od treh pedagoško-raziskovanih enot Oddelka za okoljsko gradbeništvo sodeluje v pedagoškem procesu s prenosom znanj študentom na širšem področju mehanike tekočin. Osnovna znanja hidromehanike in hidravlike podajamo na prvostopenjskih študijih gradbeništva ter vodarstva in okoljskega inženirstva, specializirane vsebine pa na magistrskih študijskih programih. Pedagoško delo je podprto tako s temeljnim kot aplikativnim raziskovalnim delom in strokovnimi nalogami, kjer izvajamo zahtevne numerične in eksperimentalne raziskave tokov pod tlakom, toka s prosto gladino in širjenja onesnažil v vodnih telesih.

Pedagoško delo

V pedagoškem procesu sodelujemo pri študijskih programih vseh treh oddelkov UL FGG. Osnovna znanja s področja gradbeništva in infrastrukture ter okoljskega inženirstva prenašamo študentom prve stopnje gradbeništva, geodezije ter vodarstva in okoljskega inženirstva. Poleg področja mehanike tekočin, kjer poučujemo predmete s področij hidromehanike in hidravlike na prvostopenjskih študijih gradbeništva ter vodarstva in okoljskega inženirstva ter specializiranih vsebin mehanike tekočin in hidravlike na drugi stopnji, so aktivnosti članov katedre na magistrskih študijih vseh oddelkov usmerjene tudi na področje inženirske hidrotehnike, vodnega gospodarstva in okoljskega inženirstva. Z več predmeti sodelujemo tudi na skupnem magistrskem programu s Zürich University of Applied Sciences. Na doktorskih študijih Grajeno okolje in univerzitetnem programu Varstvo okolja pedagogi KMT predavamo o eksperimentalnih metodah in numeričnih modelih gibanja kapljevin, širjenja onesnažil ter vodnogospodarskih sistemih in ureditvah. Na vseh stopnjah uspešno delujemo tudi kot mentorji pri zaključnih delih.

Raziskovalno delo

Najobsežnejše raziskave potekajo na področju razvoja in uporabe numeričnih matematičnih modelov in orodij za račun gibanja vode v naravnih vodnih telesih. Poseben poudarek je na razvoju modelov za račun porušitvenih, visokovodnih in obratovalnih valov v odprtih vodotokih ter deročem toku in spremljajočim pojavom, podprtih z eksperimentalno hidravliko in sodobnimi metodami neintruzivnega daljinskega zaznavanja tokov in vodne gladine. Znaten napredek smo dosegli na področju modeliranja okoljskih procesov, ki zajema predvsem prenos in pretvorbe onesnažil ter privzdigovanja sedimenta v vodnem okolju. Pomembno novost predstavlja eksperimentalno podprto numerično modeliranje tokov v ribjih stezah. Modeliranje zajema tudi vodnogospodarske sisteme, naprave in ureditve, ocene tveganja in varstvo pred poplavami. Na sistemih preskrbe z vodo uvajamo nove metode, podprte s teorijo grafov, genetskimi algoritmi in drugimi sodobnimi matematičnimi orodji. Razvoj na področju

CHAIR OF FLUID MECHANICS WITH LABORATORY

The Chair of Fluid Mechanics with Laboratory, as one of the three educational and research units of the Department of Environmental Engineering, cooperates in the educational process with transfer of knowledge to students from the wider area of fluid mechanics. The basic knowledge of hydromechanics and hydraulics is conveyed to students at the first cycle studies of civil engineering, and water science and environmental engineering. Specialised contents are part of master study programs. The educational work is supported by basic as well as applied research and professional work, including demanding numerical and experimental research of pressurised flows, free surface flow and spreading of pollutants in water bodies.

Educational work

We participate in the educational process in study programs of all three UL FGG departments. We provide basic knowledge from civil engineering and infrastructure as well as environmental engineering, conveyed to the first cycle students of civil engineering, geodesy and water science and environmental engineering. Beside the area of fluid mechanics, where we teach courses from hydromechanics and hydraulics at the first cycle studies of civil engineering and water science and environmental engineering, and specialised contents of fluid mechanics and hydraulics at the second cycle studies, the Chair members are involved in master studies of all departments, dealing with the areas of engineering hydraulics, water management and environmental engineering. We also participate with several courses in a double degree master program with Zürich University of Applied Sciences. At the doctoral study programs Built Environment and Environmental Protection, our teachers hold lectures on experimental methods and numerical modelling of liquids, spreading of pollutants and water management systems and arrangements. At all three cycles, our teachers successfully supervise students in their final theses.

Research work

The most extensive research is carried out in the area of the development and use of numerical mathematical models and tools for the calculation of water movements in natural water bodies. Special emphasis is on the development of models for the calculation of flood, dam-break and operational waves in open water courses and torrential flows with the accompanying phenomena, supported by experimental hydraulics and contemporary methods of non-intrusive remote sensing of flows and water surface. Considerable progress has been achieved in the area of modelling environmental processes consisting mainly of transfer and transformation of pollutants and sediment elevation in water environment. An important novelty is experimentally supported numerical modelling of flows in fishways. The modelling includes also water management systems, devices and arrangements, risk assessments and flood protection. We are

introducing new methods in water supply systems, supported by graph theory, genetic algorithms and other contemporary mathematical tools. The development in the area of non-Newtonian fluids and flows with explicitly demanding free surface flow is focused on the use of modern particle methods (smoothed-particle hydrodynamics).

We participate in the program group P2-0180 Water Science and Geotechnical Engineering and in the international project CAMARO-D (Cooperating towards Advanced MAnagement ROutines for land use impacts on the water regime in the Danube river basin - Strengthen transnational water management and flood risk prevention, Danubian Transnational Programme).

Within several projects and the program group we also cooperate with other UL FGG units and research institutions in Slovenia and abroad. This has resulted in several joint publications with researchers from abroad and invited lectures at professional and scientific events and at foreign universities.

Professional work

An important guiding line for our research is the use of our findings in practice. We cooperate as consultants or reviewers in studies related to water management and electricity industry, as well as with Slovenian ministries. The tools that we develop are used for the protection against floods and other natural phenomena or disasters. Studies for contracting parties from the economy and other companies (IBE, HSE, NEK, HESS, MOP) include flood, dam-break and operational waves at the middle and lower Sava river, flows in fishways, cooling of the Krško Nuclear Power Plant and studies of safety barriers. Studies of pressurised flows include water distribution networks and modelling of water hammer in pipelines, and in the area of environmental engineering they include simulations of spreading of pollutants and hazardous materials in water bodies.

Exceptional achievements

In 2015 we published a paper in Ecological Engineering, a renowned journal from environmental engineering, titled Extensive Field Measurements of Flow In Vertical Slot Fishway as Data for Validation of Numerical Simulations, which deals with numerical modelling of flows in fishways using our own model PCFLOW2D, supported with field measurements.

modeliranja nenewtonskih tekočin in tokov z izrazito zahtevnim potekom proste gladine je usmerjen v uporabo sodobnih delčnih metod (hidrodinamika zglajenih delcev).

Sodelujemo v programski skupini P2-0180 Vodarstvo in geotehnika in mednarodnem projektu CAMARO-D (Cooperating towards Advanced MAnagement ROutines for land use impacts on the water regime in the Danube river basin – Strengthen transnational water management and flood risk prevention, Danubian Transnational Programme).

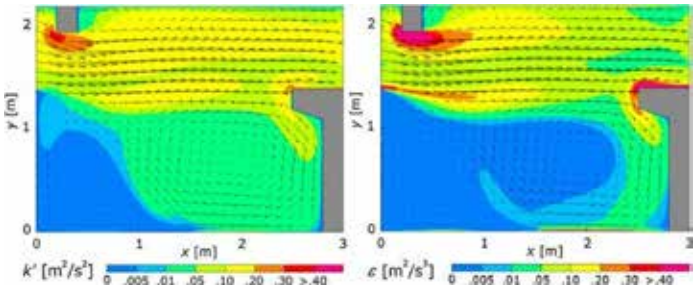
V okviru projektov in programske skupine sodelujemo z drugimi enotami UL FGG ter raziskovalnimi institucijami v Sloveniji in tujini, iz česar izvirajo skupne objave z raziskovalci iz tujine in vabljena predavanja na strokovnih in znanstvenih srečanjih ter univerzah v tujini.

Strokovno delo

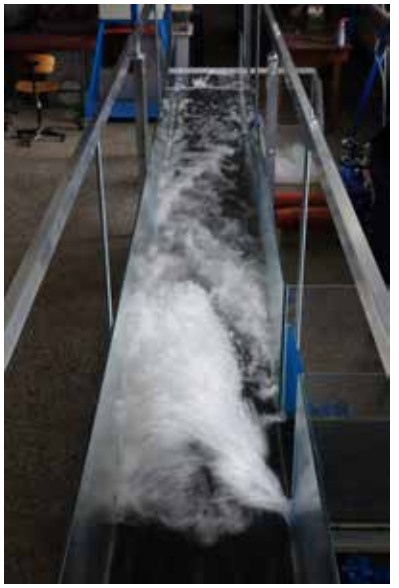
Pomembno vodilo raziskav, ki jih izvajamo na KMT, je uporaba izsledkov v praksi. Sodelujemo kot svetovalci ali recenzenti pri študijah v vodnem in elektro gospodarstvu ter z ministrstvi RS. Orodja, ki jih razvijamo, se uporabljajo pri varovanju pred poplavami in drugimi naravnimi pojavi ali nesrečami. Študije za naročnike iz gospodarstva in negospodarstva (IBE, HSE, NEK, HESS, MOP) zajemajo visokovodne in obratovalne valove na srednji in spodnji Savi, tokove v ribjih stezah, hlajenje NEK Krško in študije varnosti pregrad. Študije toka pod tlakom zajemajo vodovodna distribucijska omrežja in modeliranje vodnega udara v cevovodih, na področju okoljskega inženirstva pa simulacije širjenja onesnažil in nevarnih snovi v vodnih telesih.

Izjemni dosežek

Leta 2015 smo v Ecological Engineering, priznani reviji s področja okoljskega inženirstva, objavili članek Extensive field measurements of flow in vertical slot fishway as data for validation of numerical simulations, ki obravnava numerično modeliranje tokov v ribji stezi z lastnim modelom PCFLOW2D podprto z meritvami v naravi.



Modelni rezultati simulacije v ribji stezi – tokovna slika ter produkcija in disipacija turbulentne kinetične energije
Model results of simulation in the fishway – the flow field, production and dissipation of turbulent kinetic energy



Laboratorijski model sotočja – deroči tok v obeh kanalih
Laboratory confluence model – supercritical flow in both channels

Ribja steza ob hidroelektrarni Blanca na reki Savi
Fishway at the hydro power plant Blanca on the Sava river

KADER / PERSONNEL

- Pedagogi
  Educators
  doc. dr. Darko Drev
  izr. prof. dr. Jože Panjan
  prof. dr. Franci Steinman
- Asistenti
  Assistants
  doc. dr. Mario Krzyk
  asist. dr. Sabina Kolbl
  asist. dr. Matej Uršič
- Strokovni sodelavci
  Professional associates
  izr. prof. dr. Tjaša Griessler Bulc
  dr. Aleksandra Krivograd Klemenčič
  izr. prof. dr. Blaž Stres
  doc. dr. Primož Banovec
  doc. dr. Nataša Atanasova
  Klara Jarni
  Miha Žitnik

Obnovljeni laboratorij IZH
Renovated laboratory of our Institute

INŠTITUT ZA ZDRAVSTVENO HIDROTEHNIKO

Predstojnik katedre je bil do leta 2016 izr. prof. dr. Jože Panjan. To funkcijo je leta 2017 prevzel prof. dr. Franci Steinman. Namestnik predstojnika je doc. dr. Mario Krzyk.

Inštitut za zdravstveno hidrotehniko (IZH) je bil ustanovljen leta 1946. Leta 2015 je bila prenovljena in posodobljena merilna oprema laboratorija. Laboratorij se je dodatno specializiral za področje anaerobne presnove. Posodobili smo pilotno čistilno napravo velikosti 50 PE. Izdelali smo spletno stran http://fgg-web.fgg.uni-lj.si/IZH/.

Glavne raziskovalne, pedagoške in strokovnega naloge IZH so:

- oskrba s pitno vodo,
- odvodnja in čiščenje onesnaženih voda,
- zaščita voda za ohranjanje in izboljševanje stanja naravnih voda,
- ekološko inženirstvo in integralno gospodarjenje z okoljem, predvsem z vodami,
- ravnanje s sekundarnimi viri surovin,
- anaerobna presnova.

Raziskovalna in strokovna dejavnost

Dejavnosti zajemata terensko delo, vzorčenje in laboratorijske raziskave kakovosti naravnih vodotokov, monitoring komunalnih čistilnih naprav (ČN), analize industrijskih, komunalnih odpadnih voda, izcednih voda iz deponij in blata iz ČN. IZH raziskuje postopke čiščenja odpadnih voda za določanje optimalnih procesov biokemijske razgradnje in dimenzioniranja ČN. Pri tem se uporablja pilotna naprava za izvajanje naprednih oksidacijskih postopkov dezinfekcije (UV, oksidacija). IZH sodeluje pri razvoju postopkov dezinfekcije s hidromehansko in ultrazvočno kavitacijo ter pri uporabi membranske filtracije za doseganje kakovostnega stanja voda in preprečitev nastajanja trihalometanov. S povezovanjem z UL BF in UL FE smo vzpostavili metansko bazo (http://methane.fe.uni-lj.si/), katere informacije operaterjem na čistilnih napravah in bioplinskih elektrarnah pomagajo pri sprejemanju odločitev za uporabo različnih substratov in njihovih kombinacij. V tem obdobju smo obravnavali in preverili delovanje nekaterih industrijskih ČN: papirniške industrije, proizvodnje PVC-folij ter preverili učinkovitost zadrževanja in shranjevanja olj in maščob s površin storitvenih obratov. Podali smo predloge zasnove kanalizacijskih sistemov in ustreznih postopkov čiščenja večjega števila naselij, predvsem tistih z manjšim številom prebivalcev. Analizirali smo različne postopke dimenzioniranja kanalizacijskih zadrževalnih bazenov in alternativne načine ravnanja z blatom iz ČN. Izvedli smo raziskave na primerih naravnih in antropogenih vplivov na kakovost rek ter jezer. Sodelovali smo pri ugotavljanju poplavne varnosti potencialno ogroženih območij v primeru porušitve akumulacijskih pregrad ter obravnavali načine upravljanja s hidromehansko opremo na pregradah.

INSTITUTE OF SANITARY ENGINEERING

Until 2016, the Institute's Head was Assoc. Prof. Dr. Jože Panjan. In 2017, the position was taken over by Prof. Dr. Franci Steinman. Deputy-Head is Assist. Prof. Dr. Mario Krzyk.

The Institute of Sanitary Engineering was established in 1946. In 2015, the measuring equipment of the laboratory was renovated. The laboratory is additionally specialised for the area of anaerobic digestion. We renovated the 50 PE wastewater treatment plant. We established our web page http://fgg-web.fgg.uni-lj.si/IZH/.

The main research, educational and professional tasks of our Institute are:

- drinking water supply,
- drainage and treatment of polluted (waste)waters,
- water protection to preserve and improve the conditions of natural waters,
- ecologic engineering and integral environmental management, mainly of waters,
- treatment of secondary raw material resources,
- anaerobic digestion.

Research and professional activity

These two activities consist of fieldwork, sampling and laboratory tests of the quality of natural water bodies, monitoring of municipal wastewater treatment plants (WWTP), analysis of industrial waste waters, drainage water from landfills and sludge from WWTP. The Institute investigates the procedures for waste water treatment in order to define optimum processes of biochemical decomposition and WWTP design. For this purpose, we use a pilot plant for the implementation of advance oxidation procedures of disinfection (UV, oxidation). The Institute cooperates in the development of disinfection procedures using hydromechanical and ultrasound cavitation, and in the use of membrane filtrations to achieve sufficient quality of waters and to prevent the production of trihalomethanes. In cooperation with the Biotechnical Faculty and Electrotechnical Faculty of the University of Ljubljana, we established a methane yield database (http://methane.fe.uni-lj.si/). Information gained from this base allows the operators at biogas and wastewater treatment plants to adopt decisions for the use of various substrates and their combinations. In the reported period we treated and monitored the operations of several industrial WWTPs: paper industry, PVC foil manufacturers. We also assesed the efficiency of retenting and storing oils and fats from the surfaces of service plants. We prepared proposals for the conceptual design of sewage systems and appropriate treatment processes for a large number of urban areas, mainly those with fewer inhabitants. We analysed different procedures for dimensioning sewage stormwater retention tanks and alternative ways of treatment of sludge from WWTPs. We investigated natural and anthropological impacts on river and lake water quality. We cooperated in the establishment of flood safety of potentially endangered areas in case of dam break and analysed different management principles with hydromechanical equipment on dams.

Educational activity

We transfer our knowledge to the educational process. Students are trained to solve tasks in the design, construction, maintenance of structures of municipal and water management infrastructure, as well as in the management of water resources. In our laboratory, they learn about the procedures for the definition of basic technological parameters. The laboratory aerobic reactors, pilot WWTP, devices for advance drinking water treatment and AMPTS II are used for research purposes, mainly in final theses.

Engineering activity

We are actively involved in the activities of the Chamber of Engineers of Slovenia (authorised engineers and reviewers) and participate in demanding engineering contents within studies, conceptual projects, opinions of impacts on the environment, reviews for building permit and projects for implementation, etc., in Slovenia and beyond.

Exceptional achievements

In the reported period, we published the following articles and applied for two patents:

- KOLBL, Sabina, PANJAN, Jože, STRES, Blaž. Mixture of primary and secondary municipal wastewater sludge as a short-term substrate in 2 MW agricultural biogas plant: site-specific sustainability of enzymatic and ultrasound pretreatments. Journal of chemical technology and biotechnology.
- MUROVEC, Boštjan, KOLBL, Sabina, STRES, Blaž. Methane yield database: Online infrastructure and bioresource for methane yield data and related metadata. Bioresource technology.
- KRZYK, Mario, DREV, Darko, KOLBL, Sabina, PANJAN, Jože. Self-purification processes of Lake Cerknica as a combination of wetland and SBR reactor. Environmental science and pollution research international.
- PALOCZY, Attila, KOLBL, Sabina, STRES, Blaž. Gas analysis device : UK patent application GB 2530571 A : application no: 1417141.7. London: The Patent Office.
- STRES, Blaž, KOLBL, Sabina. Method for measuring biological oxygen demand : UK patent application GB 2531331 A : application no: 1418412.1. London: The Patent Office.

Pedagoška dejavnost

Znanje prenašamo tudi v izobraževalni proces. Študentje se usposabljajo za reševanje nalog pri projektiranju, gradnji, vzdrževanju objektov in naprav komunalne in vodnogospodarske infrastrukture ter za upravljanje in gospodarjenje z vodnimi viri. V laboratoriju spoznajo postopke določanja osnovnih tehnoloških parametrov. Laboratorijski aerobni reaktorji, pilotna ČN, naprava za napredno čiščenje pitne vode in AMPTS II se uporabljajo za raziskovalne namene, zlasti pri izdelavi zaključnih nalog.

Inženirska dejavnost

Vključeni smo v delo Inženirske zbornice Slovenije (pooblaščeni inženirji in revidenti) ter sodelujemo pri zahtevnejših inženirskih vsebinah pri izdelavi študij, idejnih projektov, presoj vplivov na okolje, revizij dokumentacije PGD in PZI itd. v domačem in mednarodnem okviru.

Izjemni dosežki

V tem obdobju smo objavili naslednje prispevke in dve patentni prijavi:

- KOLBL, Sabina, PANJAN, Jože, STRES, Blaž. Mixture of primary and secondary municipal wastewater sludge as a short-term substrate in 2 MW agricultural biogas plant: site-specific sustainability of enzymatic and ultrasound pretreatments. Journal of chemical technology and biotechnology.
- MUROVEC, Boštjan, KOLBL, Sabina, STRES, Blaž. Methane yield database: Online infrastructure and bioresource for methane yield data and related metadata. Bioresource technology.
- KRZYK, Mario, DREV, Darko, KOLBL, Sabina, PANJAN, Jože. Self-purification processes of Lake Cerknica as a combination of wetland and SBR reactor. Environmental science and pollution research international.
- PALOCZY, Attila, KOLBL, Sabina, STRES, Blaž. Gas analysis device : UK patent application GB 2530571 A : application no: 1417141.7. London: The Patent Office.
- STRES, Blaž, KOLBL, Sabina. Method for measuring biological oxygen demand : UK patent application GB 2531331 A : application no: 1418412.1. London: The Patent Office.

AMPTS II za merjenje produkcije metana
AMPTS II for measuring methane production

Nadgrajeni AMPTS II na 5 L modelno merilo
Upgraded AMPTS II at 5 L model meter

Plinski kromatograf za merjenje hlapnih maščobnih kislin
Gas chromatograph for measuring volatile fatty acids

KADER / PERSONNEL

- Predstojnik
  Head
  prof. dr. Franci Steinman
- Namestnik predstojnika
  Deputy head
  izr. prof. dr. Dušan Žagar
- Strokovna sodelavca
  Professional associates
  Matej Cerk
  Ajda Cilenšek
- Raziskovalci
  Researchers
  izr. prof. dr. Tjaša Griessler Bulc
  doc. dr. Aleksandra Krivograd Klemenčič
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  izr. prof. dr. Blaž Stres
  doc. dr. Sabina Kolbl Repinc
  asist. dr. Daniel Kozelj
  dr. Lidija Globevnik
  asist. dr. Mateja Škerjanec
  doc. dr. Gašper Rak
  doc. dr. Mario Krzyk
- Mladi raziskovalec
  Young researcher
  Matej Radinja

VODNOGOSPODARSKI INŠTITUT

Število raziskovalcev se spreminja z obsegom mednarodnih projektov, posamezni raziskovalec pa je lahko polno, delno ali dopolnilno zaposlen na različnih projektih.

Vodnogospodarski inštitut (VGI) je bil ustanovljen leta 2009, kot raziskovalni inštitut v okviru UL FGG na področju voda in vodnega gospodarstva. Od januarja 2012 se v njegovem okrilju izvajajo številni mednarodni projekti, saj takšna ureditev omogoča pregledno vključevanje raziskovalcev iz drugih slovenskih institucij v raziskovalne skupine posameznih projektov in tudi vključevanje posebnih znanj, potrebnih za uspešno prijavo in izvedbo EU projektov. Raziskovalne teme Vodnogospodarskega inštituta so zelo široke, saj celostno gospodarjenje z vodami obravnava vode in vodno okolje kot življenjsko pomemben vir in habitat, kot pogoj za razvoj družbe, kot surovino za vrsto dejavnosti, kot neposreden vir nevarnosti (poplave, suše, žled …) ali kot sprožilo za druge procese (plazovi …). Zato so potrebne tudi raziskave s področja varstva vodnega okolja in učinkovitih javnih služb, od oskrbe s pitno in tehnološko vodo, zbiranja in obdelave onesnaženih voda, zaščite in izboljševanja stanja voda in grajenih vodnih teles, do raziskav okoljskega inženirstva in integralnega gospodarjenja z naravnimi in s sekundarnimi viri surovin.

Raziskovalna dejavnost

Razvejanost raziskovalnega področja VGI je predstavljena z opisi nekaterih projektov v različnih programskih okoljih (H2020, Interreg):

- **EdiCitNet – H2020**

  Mreža bivalno prijaznih mest združuje rešitve za družbeno odgovorna in trajnostno razvojna mesta, ki izboljšajo vsakdanje življenje. Z močnim poudarkom na primerih najboljše prakse na lokalni ravni bodo raziskovalci izvajali pilotne projekte v izbranih pionirskih mestih (Rotterdam, Heidelberg, Oslo, Havana in Andernach so t. i. Front Runner Cities (FRC)), svoje ugotovitve pa bodo predlagali še za druga mesta v korist svojih prebivalcev – med njimi je tudi eno slovensko.

  EdiCitNet je osvojil prvo mesto v razpisu Evropske komisije H2020-SCC-2016-2017 in bo v naslednjih petih letih financiran v višini približno 12 milijonov evrov.

- **Framwat – Interreg Srednja Evropa**

  Namen projekta FramWat je okrepiti regionalni skupni okvir za poplave, suše in ublažitev onesnaževanja voda s povečanjem sprejemnih sposobnosti krajine. Uporabljena bo metoda naravnega (majhnega) zadrževanja vode »na vsakem koraku«, uporabljena na sistemski način.

- **Camaro-D – Danube Transnational Programme**

  Sodelovanje za uporabo naprednih načinov ravnanja oz. vplivanja na rabo zemljišč, ki vplivajo na vodni režim v porečju Donave, prinaša okvir za usklajen meddržavni sistem rabe zemljišč, ob upoštevanju zahtev varstva vodnih virov in preprečevanja poplav,

WATER MANAGEMENT INSTITUTE

The number of researchers changes with the number of international projects. Individual researchers may be employed full-time, part-time or extra time at various projects.

The Water Management Institute was established in 2009, as a research institute within UL FGG for the area of waters and water management. Since January 2012, numerous international projects have been implemented by the Institute members. Its formal structure allows for a transparent inclusion of researchers from other Slovenian institutions in research groups of individual projects, as well as integration of special knowledge required for successful application and implementation of EU projects. Research themes of the Water Management Institute are very wide; integrated water management deals with waters and the water environment as an important source of life and habitats, as a condition for the development of society, as raw material for a number of activities, as a direct source of threats (floods, draughts, sleet, etc.) and as a trigger for other processes (landslides, etc.). For this reason, investigations from the area of water environment protection and efficient public services are required, including drinking and technological water supply, waste water collection and treatment, protection and improvement of water and built water bodies, as well as investigation of water engineering and integrated management with natural and secondary raw material sources.

Research activity

Diversity of the Institute's research activity is presented with the description of some projects in different programs (H2020, Interreg, etc.):

- **EdiCitNet – H2020**

  The network of better liveable cities unites solutions for socially responsible and sustainable cities that improve everyday life. With a strong emphasis on best practice cases at the local level, researchers will implement pilot projects in selected pioneer cities (Rotterdam, Heidelberg, Oslo, Havana and Andernach, called Front Runner Cities (FRC)). Their findings will be proposed also for other cities for the benefit of their inhabitants – among them one Slovenian.

  EdiCitNet won first place in the EC call H2020-SCC-2016-2017 and will be financed for the next five years in the amount of about 12 million EUR.

- **Framwat – Interreg Central Europe**

  The purpose of the project FramWat is to strengthen the regional common framework for floods, draught and water pollution reduction with improved receivable abilities of the landscape. Natural (small) water retention measures »at each step« will be used, applied in a systematic way.

- **Camaro-D – Danube Transnational Programme**

  Cooperation for the use in advanced treatment principles or land use impacts on the water regime in the Danube river basin brings a

framework for harmonised inter-state system of land use, by taking into account the demands of water resource protection and flood prevention, to harmonise and improve the protection of water resources against negative impacts of land use and climate change, and to reduce flood threats. Expert bases for achieving the project goals will be prepared by preparing contents for the inter-state development plan and the land use protection plan.

- **Proline – Interreg Central Europe**

  The main goal is to improve protection of drinking water resources and to protect regions against floods and draughts in integrated land use management by creating improved organisation structure and improving efficiency of land use management. Cost efficient management methods and sustainable development of space will be used to provide drinking water at macro-regional level.

Educational activity

Knowledge obtained from the EU research projects is in many cases an excellent basis for the preparation of PhD and master theses by the researchers or students involved. In this way, the innovative, high level of implemented research projects is confirmed, although indirectly.

Exceptional achievement

Results of the research work at our Institute are evident in some visible publications:

- https://www.sciencedirect.com/science/article/pii/S0301479718305991
- https://www.elsevier.com/books/multiple-stressors-in-river-ecosystems/sabater/978-0-12-811713-2

za usklajevanje in izboljšanje zaščite vodnih virov pred negativnimi vplivi rabe zemljišč in podnebnih sprememb ter zmanjšanje poplavne ogroženosti. Pripravljene bodo strokovne podlage za doseganje ciljev projekta z razvojem vsebin za meddržavno načrtovanje razvoja in varovanje rabe zemljišč.

- **Proline – Interreg Srednja Evropa**

  Glavni cilj je izboljšati zaščito virov pitne vode in zaščito regij pred poplavami in sušami pri integriranem upravljanju rabe zemljišč, in sicer na podlagi izboljšane organizacijske strukture in večje učinkovitosti upravljanja rabe zemljišč. Uporabljene bodo stroškovno učinkovite metode upravljanja in zagotavljanja trajnostnega razvoja rabe prostora in zagotavljanja pitne vode na makroregionalni ravni.

Pedagoška dejavnost

Znanja, pridobljena na raziskovalnih projektih EU, so pogosto odlična podlaga za izdelavo doktorskih in magistrskih nalog vključenih raziskovalcev oz. študentov. Tako je tudi, čeprav na posreden način, potrjen inovativen in visok nivo opravljenih raziskovalnih projektov.

Izjemni dosežek

Rezultate raziskovalnega dela v okviru VGI kažejo nekatere odmevne objave:

- https://www.sciencedirect.com/science/article/pii/S0301479718305991
- https://www.elsevier.com/books/multiple-stressors-in-river-ecosystems/sabater/978-0-12-811713-2

VSEBINA / CONTENT

DOKTORSKA ŠOLA

Doktorski študijski program je vsebinsko in metodološko nadaljevanje študijev prve in druge stopnje. Predstavlja znanstveno nadgradnjo vsebin gradbeništva in okoljskega inženirstva, geodezije, načrtovanja prostora in geologije.

Osrednji poudarek doktorskega študija je na raziskovalnem delu, na interdisciplinarnosti študija in na sodelovanju mednarodno uveljavljenih domačih in tujih strokovnjakov. Po priporočilih Evropskega združenja univerz je predvidena mednarodna izmenjava študentov in objava najmanj enega znanstvenega članka v mednarodno priznani reviji kot končni rezultat raziskovalnega dela. Poseben poudarek je namenjen ustreznemu odnosu med doktorandom in mentorjem. Študentje si mentorje lahko izbirajo med mednarodno priznanimi in uveljavljenimi znanstveniki in strokovnjaki. Program je v celoti ovrednoten po Evropskem prenosnem kreditnem sistemu (ECTS) in se lahko na ta način vključuje v mednarodno izmenjavo študentov v državah, ki ta sistem uporabljajo.

DOCTORAL SCHOOL

The third cycle doctoral study programme represents from the aspect of its contents and methodology continuation of the 1st and 2nd cycle studies. It represents the scientific upgrading of the contents in the study programmes of civil and environmental engineering, geodesy, spatial planning and geology.

The main emphasis of the doctoral study is research work, the interdisciplinarity of the study and cooperation with internationally renowned Slovenian and foreign experts. According to the recommendations of the European University Association, the study foresees exchange of students and publication of at least one scientific paper in an internationally recognised journal as the result of the research work. A special emphasis is on the adequate relationship between the doctoral student and the supervisor. The students can choose their supervisors among internationally renowned and established scientists and experts. The whole programme is evaluated according to the European Credit Transfer System (ECTS) and can in this way cooperate in the international student exchange with the countries using this system.

THE THIRD CYCLE DOCTORAL STUDY PROGRAM BUILT ENVIRONMENT

The doctoral study programme Built Environment is divided into four scientific areas. The most extensive area is civil engineering, which covers topics from mathematics and physics through mechanics, construction materials and structures, seismic engineering, efficient energy use and living comfort to traffic and utility engineering, geotechnics, organization of construction work and technology and informatics. The field of geodesy covers geodesy and engineering geodesy, satellite geodesy and navigation, geophysics, cartography, photogrammetry and remote sensing, and geoinformatics. The field of planning and spatial planning is an interdisciplinary field, therefore graduates of various programs are enrolled in the studies and, as optional subjects, they select subjects other members of the University of Ljubljana,, mainly Faculty of Architecture, Faculty of Arts, Biotechnical Faculty, Faculty of Natural Sciences and Engineering, Faculty of Economics and Faculty of Social Sciences. The study area geology is designed to cover all the main areas of geological sciences and is at the same time oriented into specific geological conditions in the wider Central European and Mediterranean area.

The doctoral study programme Built Environment covers all scientific areas of the Faculty of Civil and Geodetic Engineering (UL FGG) and an additional area of natural sciences, which covers the largest part of geology at the Faculty of Natural Sciences and Engineering UL (UL NTF). Teachers and researchers from UL FGG and UL NTF also actively cooperate in other doctoral programmes, primarily the university doctoral programme Environmental Protection.

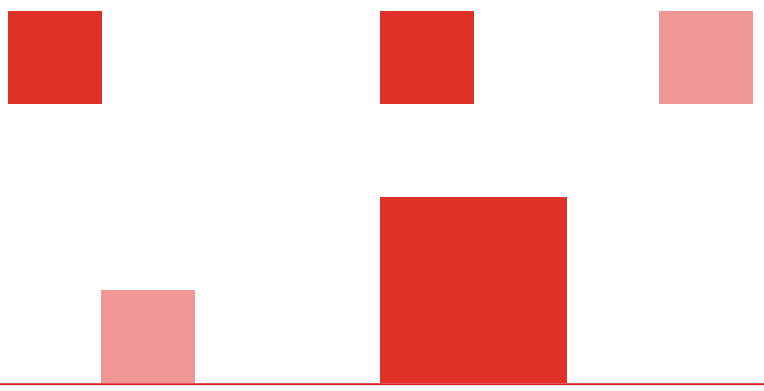
The postgraduate doctoral study programme Built Environment lasts for 3 years (6 semesters) and consists of 180 credit points. The study programme is constituted from 60 credit points of organised study activities, while the remaining 120 credit points are accumulated from individual research work for the doctoral thesis. In 2015/16 14 PhDs (2 geodesy, 2 geology, 9 civil engineering, and 1 spatial planning and land management) and in 2016/17 16 PhDs (1 geodesy, 3 geology, 11 civil engineering, and 1 spatial planning and land management) finished the programme Built Environment.

DOKTORSKI ŠTUDIJSKI PROGRAM TRETJE STOPNJE GRAJENO OKOLJE

Doktorski študijski program Grajeno okolje je razdeljen na štiri znanstvena področja. Najobsežnejše področje je gradbeništvo, ki zajema teme od matematike in fizike preko mehanike, gradbenih materialov in konstrukcij, potresnega inženirstva, učinkovite rabe energije in bivalnega udobja do prometnega in komunalnega inženirstva, geotehnike, organizacije gradbenih del in tehnologije ter gradbene informatike. Študijsko področje geodezije zajema področja geodezije in inženirske geodezije, satelitske geodezije in navigacije, geofizike, kartografije, fotogrametrije in daljinskega zaznavanja ter geoinformatike. Področje načrtovanja in urejanje prostora je interdisciplinarno področje, zato se na študij vpisujejo diplomanti različnih programov in kot izbirne predmete izbirajo predmete drugih članic Univerze v Ljubljani, predvsem Fakultete za arhitekturo, Filozofske fakultete, Biotehniške fakultete, Naravoslovnotehniške fakultete, Ekonomske fakultete in Fakultete za družbene vede. Študijsko področje geologije je zasnovano tako, da pokriva glavna polja geološke znanosti, hkrati pa se usmerja tudi v specifičnosti geoloških razmer v širšem srednjeevropskem in sredozemskem prostoru.

V doktorski študijski program Grajeno okolje so vključena vsa znanstvena področja, s katerimi se ukvarja Fakulteta za gradbeništvo in geodezijo Univerze v Ljubljani (UL FGG), ter dodatno področje naravoslovja, kamor sodi večji del področja geologije na Naravoslovnotehniški fakulteti UL (UL NTF), Oddelku za geologijo. Posamezni znanstveno uspešnejši pedagogi in raziskovalci UL FGG in UL NTF sodelujejo tudi v drugih doktorskih programih, predvsem v univerzitetnem doktorskem študiju Varstvo okolja.

Doktorski študijski program Grajeno okolje traja tri leta (šest semestrov) in obsega skupaj 180 kreditnih točk. Študijski program je sestavljen iz organiziranega dela pouka v obsegu 60 kreditnih točk, preostalih 120 kreditnih točk pa je namenjenih individualnemu raziskovalnemu delu za doktorsko disertacijo. V letu 2015/16 je program Grajeno okolje uspešno zaključilo 14 (2 geodezija, 2 geologija, 9 gradbeništvo in 1 načrtovanje in urejanje prostora), v letu 2016/17 pa 16 doktorjev (1 geodezija, 3 geologija, 11 gradbeništvo in 1 načrtovanje in urejanje prostora).



Temeljni cilji programa in pridobljene kompetence

Temeljni cilj doktorskega študijskega programa Grajeno okolje je izobraževanje visoko usposobljenih raziskovalcev za znanstvena področja, ki sestavljajo študijski program. Program omogoča pridobitev znanstvenega naslova doktor/doktorica znanosti na področjih gradbeništvo, geodezija, načrtovanje in urejanje prostora in geologija. Cilj programa je usposobiti doktoranda za znanstveno razmišljanje in reševanje znanstvenih problemov ter za sodelovanje pri reševanju zahtevnih delovnih problemov z interdisciplinarnim pristopom.

Doktorand je po končanem študiju sposoben za kreativno in samostojno znanstveno raziskovalno delo in reševanje znanstvenih problemov bodočih delodajalcev. Usposobljen je za obravnavo raziskovalnega problema po najsodobnejših znanstvenih metodah, kritično presojo raziskovalnih rezultatov, za razvoj novih raziskovalnih metod in prenos novih tehnologij in znanja v prakso.

Basic goals of the programme and competences

The basic goal of the doctoral programme Built Environment is to educate highly qualified researchers for individual scientific areas comprising the study programme. The programme leads to the award of the scientific title Doctor of Science from the scientific areas of civil engineering, geodesy, spatial planning and land management, and geology. The goal of the programme is to qualify graduates for a scientific way of thinking and solving scientific problems, as well as for cooperation in solving demanding practical problems with the interdisciplinary approach.

Graduates from the doctoral study will be capable of creative and independent scientific research work and of solving demanding problems for future employers. They will be qualified to approach problems in a scientific way by using the latest scientific methods, to critically assess the research results, to develop new research methods and to transfer new technologies and knowledge into practice.

Izbirni predmeti znanstvenih področij / Elective courses in scientific fields

Znanstveno področje: Gradbeništvo / Scientific field: Civil engineering

Bioklimatsko načrtovanje / Bioclimatic Design | ECTS 5

Dinamika gradbenih konstrukcij z uporabo v potresnem inženirstvu / Dynamics of Structures with Applications to Earthquake Engineering | ECTS 5 in 10

Duktilnost in stabilnost jeklenih konstrukcij / Ductility and Stability of Steel Structures | ECTS 5 in 10

Dnevna svetloba / Daylighting | ECTS 5

Eksperimentalno podprto projektiranje zidanih objektov / Experimentally Supported Design of Masonry Buildings | ECTS 5 in 10

Hidrološke meritve in hidrološko modeliranje / Hydrologic Measurements and Modelling | ECTS 5 in 10

Hidrološko in geotehnično raziskovanje zemeljskih plazov / Hydrologic and Geotechnical Research on Landslides | ECTS 5 in 10

Inteligentni sistemi v modeliranju in vodenju / Intelligent Systems in Modeling and Management | ECTS 10

Lupine in membrane / Shell and Membrane Structures | ECTS 5

Matematično modeliranje in turbolenca v hidravliki / Mathematical Modelling and Turbulence in Hydraulics | ECTS 5 in 10

Matematično modeliranje v prometnem inženirstvu / Mathematical Models in Traffic Engineering | ECTS 5

Meritve in modeliranje erozije in sedimentacije / Measurements and Modelling of Erosion and Sedimentation | ECTS 5 in 10

Metode končnih elementov za konstrukcije / Finite Element Methods for Structures | ECTS 5 in 10

Metode numeričnega modeliranja / Computational Engineering Methods | ECTS 5 in 10

Modeliranje podzemnih objektov / Modelling of Underground Structures | ECTS 5

Modeliranje prenosa in pretvorb snovi v vodnem okolju / Modelling Transport and Transformation of Substances in Water Systems | ECTS 5

Na znanje odprto inženirstvo / Knowledge Based Engineering | ECTS 5 in 10

* Napredne metode planiranja in spremljanja projektov / Advanced Methods of Project Planning and Monitoring | ECTS 5

Napredne tehnologije malt in betonov / Advanced Mortars and Concretes Technologies | ECTS 5

Nelinearna analiza betonskih konstrukcij / Nonlinear Analysis of Concrete Structures | ECTS 5 in 10

Nelinearna analiza in projektiranje potresno odpornih armiranobetonskih stavb / Inelastic Analysis and Design of Earthquake Resistant Reinforced Concrete Buildings | ECTS 5 in 10

Nelinearna analiza kompozitnih konstrukcij / Nonlinear Analysis of Composite Structures | ECTS 10

Nelinearna dinamika / Non-linear Dynamics | ECTS 5

Nelinearna mehanika deformiranih teles / Non-linear Continuum Mechanics | ECTS 5 in 10

Nelinearna mehanika konstrukcij / Non-linear Structural Mechanics | ECTS 10

Nelinearna požarna analiza / Nonlinear Fire Analyses | ECTS 10

Novi materiali / New Materials | ECTS 5 in 10

Numerične metode v mehaniki konstrukcij / Numerical Methods in Structural Mechanics | ECTS 5

Numerične metode za elastoplastičnost / Numerical Methods for Elastoplasticity | ECTS 5

Optimizacija konstrukcij / Optimization of Structures | ECTS 5

Potresnoodporno projektiranje zidanih stavb / Seagull-resistant Design of Masonry Buildings | ECTS 5

Prenova nepremične kulturne dediščine / Restoration of Immovable Cultural Heritage | ECTS 5

Presoja vodnogospodarske urejenosti / Assessment of Water Management Impact on the River Basin | ECTS 5

Programiranje distribuiranih aplikacij / Programming Distributed Engineering Applications | ECTS 5 in 10

Projektiranje in utrditev armiranobetonskih mostov na potresnih območjih / Seismic Design and Strengthening of Reinforced Concrete Bridges | ECTS 5 in 10

Prostorske linijske konstrukcije / Spatial Beam Structures | ECTS 5

Stabilnost konstrukcij / Stability of Structures | ECTS 5

Teorija zanesljivosti konstrukcij / Reliability of Structures | ECTS 5

Toplotni in sevalni tokovi v ovojnem sklopu zgradbe / Heat and Radiation Flows in the Building Envelope | ECTS 5

Uporaba umetnih nevronskih mrež v inženirstvu / Use of Artificial Neural Networks in Engineering | ECTS 5

Urejanje vodnega režima / Management of Water Regime | ECTS 5

Verjetnostne metode v grajenem okolju / Probability Methods in Built Environment Studies | ECTS 5

Zajem in modeliranje zemeljskega površja pri ocenah naravnih tveganj / Data Acquisition and Relief Modelling in Natural Risk Assessments | ECTS 5

Zanesljivost konstrukcij z uporabo v potresnem inženirstvu / Reliability of Structures with Application in Earthquake Engineering | ECTS 5 in 10

Zaščita hidrosfere / Protection of the Hydrosphere | ECTS 5

Predmetnik / Curriculum

Letniki / years

1. letnik / 1st year

Orodja in metode v raziskovanju grajenega okolja / Tools and Methods in Research of the Built Environment | ECTS 10
- Uvod v znanstveno raziskovanje grajenega okolja / Introduction to scientific research of the built environment | ECTS 5
- Izbrana poglavja iz matematike v raziskavah grajenega okolja / Selected topics from mathematics in research of the built environment | ECTS 5

Predmeti znanstvenega področja / Courses of scientific field | ECTS 25

Individualno raziskovalno delo / Individual research work | ECTS 25

2. letnik / 2nd year

Izbirni predmeti / Elective Courses | ECTS 10

Izdelava in predstavitev teme doktorske disertacije / Elaboration and presentation of doctoral theme | ECTS 5

Individualno raziskovalno delo / Individual research work | ECTS 45

3. letnik / 3rd year

Individualno raziskovalno delo / Individual research work | ECTS 50

Predstavitev doktorske disertacije pred javnim zagovorom / Presentation of PhD thesis before public defence | ECTS 5

Izdelava in javni zagovor doktorske disertacije / Elaboration and public defence of PhD thesis | ECTS 5

Znanstvena področja / Scientific fields

Geodezija / Geodesy

Raziskovanje v geodeziji / Research in Geodesy | ECTS 10

Izbirni predmeti / Elective Courses | ECTS 15

Načrtovanje in urejanje prostora / Planning and arranging space

Prostorsko načrtovalsko raziskovanje / Spatial Planning and Development | ECTS 10
- Načrtovanje podeželskega prostora / Rural Planning | ECTS 5
- Tehnično upravljanje nepremičnin - izbrana poglavja / Technical Real-estate Management - Selected Chapters | ECTS 5

Izbirni predmeti / Elective Courses | ECTS 15

Gradbeništvo / Civil Engineering

Izbirni predmeti / Elective Courses | ECTS 25

Geologija / Geology

Izbirni predmeti / Elective Courses | ECTS 25

Znanstveno področje: Geologija / Scientific field: Geology

- Aplikativna geokemija okolja / Applied Environmental Geochemistry | ECTS 5
- Biotski odgovor na paleoekološke spremembe / Biotic Response to Global Paleoecological Change | ECTS 5
- Fraktalne in izbrane računalniške metode v geologiji / Fractal and Selected Computer Methods in Geology | ECTS 5
- Geoarheologija / Geoarchaeology | ECTS 5
- Geofizikalne metode raziskav / Geophysical Investigation Methods | ECTS 5
- Geoinformatika v znanosti in ontologija nepremičnin / Geoinformatics in Science and Ontology of Real Properties | ECTS 5
- Geokemijski procesi / Geochemical Processes | ECTS 5
- Geologija naravnih nesreč / Geology of Natural Disasters | ECTS 5
- Hidrogeologija krasa in medzrnskega poroznega medija / Hydrogeology of Karst and Intergranular Porous Media | ECTS 5
- Kraški procesi in pojavi / Karst Processes and Fractals | ECTS 5
- Preiskave umetnih mineralnih snovi / Investigations of Artificial Mineral Substances | ECTS 5
- Metode inženirskogeoloških raziskav za zahtevne objekte / Engineering Geology Methods for Complex Structures | ECTS 5
- Napredna petrologija magmatskih in metamorfnih kamnin / Advanced Petrology of Igneous and Metamorphic Rocks | ECTS 5
- Regionalna geodinamika / Regional Geodynamics | ECTS 5
- Rentgenska strukturna analiza / X-ray Diffraction Structural Analysis | ECTS 5
- Sedimentarna evolucija Tetide / Sedimentary Evolution of Tethyan Realm | ECTS 5
- Sedimentalni bazeni / Sedimentary Basins and Sedimentary Environments | ECTS 5
- Seizmološke analize in raziskave / Seismological Analyses and Investigations | ECTS 5
- Stabilni izotopi in fiziološki procesi / Stable Isotopes and Physiological Processes | ECTS 5
- Strategija fanerozoika / Stratigraphy of the Phanerozoic | ECTS 5
- Strukturna analiza / Structural Analysis | ECTS 5
- Teoretska mineralogija / Theoretical Mineralogy | ECTS 5

Znanstveno področje: Geodezija / Scientific field: Geodesy

- Deformacijska analiza naravnega in grajenega okolja / Deformation Analysis of Natural and Built Environment | ECTS 5
- GNSS v geodeziji in geofiziki / GNSS in Geodesy and Geophysics | ECTS 5
- Gravimetrija v geodeziji / Gravimetry in Geodesy | ECTS 5
- Obdelava podob daljinskega zaznavanja / Remote Sensing Image Processing | ECTS 5
- Raziskovanje vzpostavitve in vodenja topografskih podatkov / Research of Topographic Data Establishment and Management | ECTS 5
- Sodobna terestrična geodetska merska tehnologija / Modern Terrestrial Geodetic Measurement Technology | ECTS 5
- Uporaba umetnih nevronskih mrež v inženirstvu / The Use of Artificial Neural Networks in Engineering | ECTS 5
- Upravljanje s kakovostjo prostorskih podatkov / Management of Spatial Data Quality | ECTS 5 in 10
- Verjetnostne metode v grajenem okolju / Probability Methods in Built Environment Studies | ECTS 5
- Zajem in modeliranje zemeljskega površja pri ocenah naravnih tveganj / Data Acquiring and Relief Modelling in Natural Risk Assessments | ECTS 5

Znanstveno področje: Načrtovanje in urejanje prostora / Scientific field: Spatial Planning and Development

- Načrtovanje podeželskega prostora / Rural Planning | ECTS 5
- Pristopi k raziskovanju in načrtovanju rabe prostora / Approaches to Spatial Development and Land Use Research | ECTS 5
- Tehnično upravljanje nepremičnin - izbrana poglavja / Technical Real-estate Management - Selected Chapters | ECTS 5

Znanstveno področje: Vsa področja / Scientific field: all fields

- Numerične metode in dinamični sistemi v raziskovanju grajenega okolja / Numerical Methods and Dynamic Systems in Research concerned with the Built Environment | ECTS 5 in 10

* Predmet, ponujen tudi v nabor generičnih predmetov UL

INTERDISCIPLINARNI DOKTORSKI ŠTUDIJSKI PROGRAM TRETJE STOPNJE VARSTVO OKOLJA

Problemi varstva okolja so celostni, interdisciplinarni in združujejo naravoslovne, družboslovne, tehnične, medicinsko-higienske in druge vsebine. Ekološke probleme, ki jih pogosto povzročajo premalo premišljeni gospodarski ukrepi, opredelimo z naravoslovnim znanjem in rešujemo s tehničnimi ukrepi, ki so pogojeni z ekonomsko-pravnimi izhodišči in obremenjeni s socialnimi posledicami. Zato vidimo v integraciji različnih disciplin možnost za uspešno urejanje problemov varstva okolja. Na mejnih področjih različnih ved praviloma nastajajo novo znanja, spoznanja in nove tehnične rešitve.

Program je sestavljen interdisciplinarno in združuje znanstvena področja 13 fakultet Univerze v Ljubljani. Program je predviden kot interdisciplinarni študij za doktorande naravoslovnih, tehniških, biotehniških, družboslovnih, humanističnih in medicinskih ved, ki bodo pri izdelavi doktorske disertacije potrebovali znanja več področij. Doktorandi bodo poglobili svoje specialno znanje, hkrati pa se usposobili za skupinsko in interdisciplinarno delo pri urejanju najzahtevnejših problemov okolja.

Interdisciplinarni doktorski študijski program Varstvo okolja traja tri leta in obsega 180 kreditnih točk. Organiziranega dela pouka je v obsegu 60 kreditnih točk, preostalih 120 kreditnih točk pa je namenjenih individualnemu raziskovalnemu delu za doktorsko disertacijo. V letu 2015/16 je program Varstvo okolja uspešno zaključilo 6, v letu 2016/17 pa 7 doktorjev.

Temeljni cilji programa in pridobljene kompetence

Namen študija je vzgajati strokovnjake, ki bodo problematiko okolja znali reševati pred onesnaževanjem in po njem. Ti bodo v prvem primeru ravnali preventivno in preprečevali poškodbe okolja: z javnim družbenim delovanjem, z ustreznejšo razmestitvijo dejavnosti v prostoru, s pravilnimi tehničnimi ukrepi itn. V drugem primeru bodo odpravljali posledice, zmanjševali onesnaženje in sanirali stanje - predvsem s tehničnimi, renaturacijskimi, medicinsko-higienskimi, prostorsko-načrtovalskimi in drugimi ukrepi.

Osrednji poudarek doktorskega študija je na interdisciplinarnem raziskovalnem delu in na sodelovanju mednarodno uveljavljenih domačih in tujih strokovnjakov. Doktorski študij varstva okolja na Univerzi v Ljubljani povezuje strokovnjake z različnih fakultet in oddelkov, številni izbirni predmeti pa ponujajo študentom širok izbor znanj o varstvu okolja. Doktorandi bodo poglobili svoje specialno znanje, hkrati pa se usposobili za skupinsko - interdisciplinarno delo pri urejanju najzahtevnejših problemov okolja.

Fakulteta za gradbeništvo in geodezijo je vključena v izvajanje programa skupaj s še dvanajstimi članicami Univerze v Ljubljani. Pri tem FGG skrbi za predmete povezane z vodo, prostorskim planiranjem in daljinskim zaznavanjem.

INTERDISCIPLINARY DOCTORAL PROGRAM IN ENVIRONMENTAL PROTECTION

The problems of environmental protection are integrated, interdisciplinary and combined knowledge from natural sciences, social sciences and humanities, technical sciences, medicine and hygiene, and others. Ecological problems that are often induced by poorly thought out economic measures, are defined by knowledge from natural sciences and solved with technical measures, having economic and legal bases and loaded with social consequences. Hence, the integration of different disciplines can provide the basis for successful problem-solving in the field of environmental protection. As a rule, new knowledge and technical solutions typically emerge in border areas of different disciplines.

The duration of the interdisciplinary doctoral programme Environmental Protection is three years, 180 ECTS credits. The programme consists of 60 credits of organised classes and 120 credits of individual research work for the doctoral thesis. In 2015/16, 6 PhDs finished the programme Environmental Protection and in 2016/17 7 PhDs.

Basic goals of the programme and competences

The aim of the study programme is to generate experts who will be able to protect the environment against pollution prior to and after it takes place. In the first case, prevention measures will be taken: with public participation, proper distribution of activities in space, proper technical measures, etc. In the second case, they will have to help eliminate the consequences, reduce pollution and introduce measures of environmental upgrading – primarily with technical, remediation, medical and hygienic measures, measures of spatial planning, and other.

The main emphasis of the doctoral study is on research work with its interdisciplinary character and cooperation with internationally established local and foreign experts. The Interdisciplinary Doctoral Programme in Environmental Protection at the University of Ljubljana links together experts from various faculties and departments with the common interest of protecting the environment. The goal of the programme is to qualify doctoral candidates in scientific thinking and in solving the demanding scientific problems in the area of environmental protection with an interdisciplinary approach. UL FGG is involved in implementing the program for the subjects associated with water, physical planning and remote sensing.

Predmetnik / Curriculum

Letniki / Years

1. letnik / 1st year

Metodološki predmet / Methodological Course | ECTS 10
- Interdisciplinarno znanstveno raziskovalno delo / Interdisciplinary Scientific Research Work | ECTS 10

Temeljna predmeta / Fundamental Courses | ECTS 20
- Zrak / Air | ECTS 10
- Klima / Climate | ECTS 10
- Vode / Water | ECTS 10

Izbirni predmet / Elective Course | ECTS 10

Individualno raziskovalno delo / Individual Research Work | ECTS 20

2. letnik / 2nd year

Izbirni predmet / Elective Course | ECTS 10

Doktorski seminar s predstavitvijo teme doktorske disertacije / Elaboration and Presentation of Doctoral Theme | ECTS 5

Individualno raziskovalno delo / Individual Research Work | ECTS 45

3. letnik / 3rd year

Individualno raziskovalno delo / Individual Research Work | ECTS 55

Doktorski seminar s predstavitvijo doktorske disertacije pred javnim zagovorom in javni zagovor / Presentation of Doctoral Thesis Before Public Defence Elaboration and Public Defence of Doctoral Thesis | ECTS 5

Izbirni predmeti / Elective Courses

Ekohidrologija / Ekohydrology | ECTS 10

Hibridno modeliranje okoljskih sistemov / Hybrid Modelling of Environmental Systems | ECTS 10

Inženirsko modeliranje ekoloških procesov v površinskih vodah / Engineering Modelling of Ecological Processes in Surface Waters | ECTS 10

Naravna tveganja v gorskem okolju / Natural Hazards in Mountainous Environment | ECTS 10

Umeščanje rizičnih tveganj objektov v socialno okolje / Placement of Risky Buildings in the Social Environment | ECTS 10

Uporaba daljinskega zaznavanja / Application of Remote Sensing | ECTS 10

Vrednotenje zemljišč in gospodarjenje / Land Evaluation and Management | ECTS 10

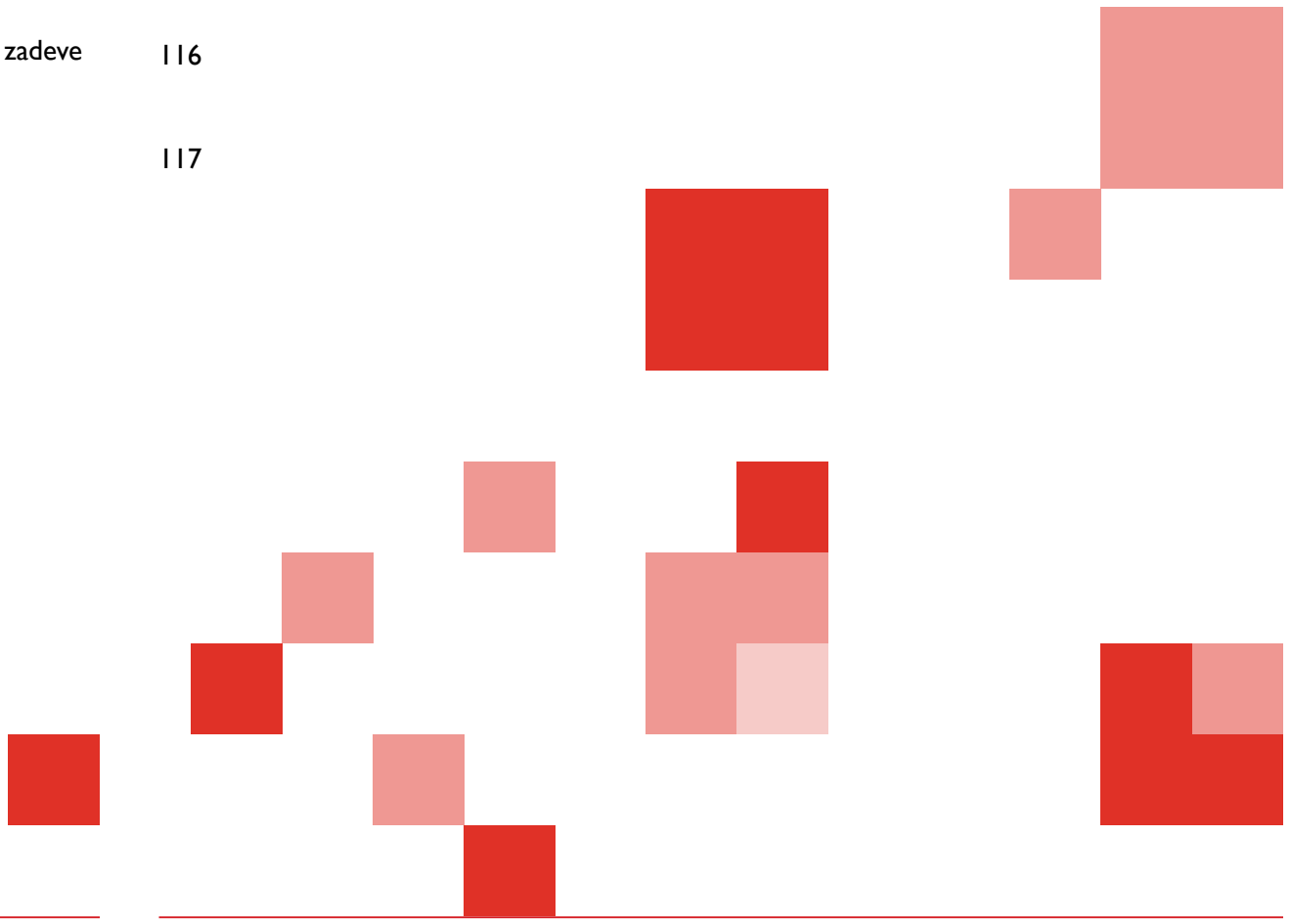
Zaščita hidrosfere / Protection of Hydrosphere | ECTS 10

Prostor in okolje / Spatial Planning and the Environment | ECTS 10

OSTALE DEJAVNOSTI

Other activities

VSEBINA / CONTENT



STUDENTS

Student Council UL FGG

In the academic year 2017/18 the UL FGG Student Council (UL FGG SC) was presided by Amel Emkić, with the assistance of vice-president Maruša Cestnik. In 2017/18, the UL FGG SC stated its opinions, views and solutions related to study issues and quality of studies at UL FGG as well as UL. Based on the proposals by the UL FGG SC, students obtained an additional computer room, P-II/3A, which is available at all times. Also the student canteen is, thanks to UL FGG SC, still operating. Their opinions included educational work of assistants, assistant professors and associate professors who applied for the election into teaching titles, as well as for the awards for the best teachers at UL FGG. The UL FGG SC actively monitored the implementation of the study plans for individual study programs, presented its opinion and proposals to the Dean's document Analysis of the Implementation of Study Programs at UL FGG, contributing in this way to the development and improvement of quality at UL FGG. At the meeting with working mentors, the UL FGG SC presented it vision of implementation of practical training at UL FGG. Last year, the Working Saturday of UL FGG SC was implemented. During the year the UL FGG SC published four issues of the journal Študentski most (Student Bridge). The UL FGG SC continued the coordination of student tutorship at UL FGG. We keep close cooperation with the student organisation and societies.

UL FGG Student Organization

Since the academic year 2014/15, the Student organisation of the Faculty of Civil and Geodetic Engineering, UL, has been led by a team called SILE FGG (Forces of FGG). In the academic year 2015/16, it was presided by Dejan Bolarič, and in 2016/17 by Maja Mauko. During these two academic years, the largest number of sports, educational and other social activities were organised. Thus, students could take part at

ŠTUDENTI

Študentski svet UL FGG

V študijskem letu 2017/18 je Študentski svet UL FGG (ŠS UL FGG) deloval pod okriljem predsednika Amela Emkića in podpredsednice Maruše Cestnik. ŠS UL FGG je v letu 2017/2018 podajal svoja mnenja, poglede in rešitve v zvezi s študijsko problematiko in kakovostjo študija na UL FGG kot tudi UL. Na podlagi predlogov ŠS UL FGG so študentje pridobili računalniško učilnico P-II/3A, ki je ves čas na voljo, študentska menza pa, po njihovi zaslugi, še vedno obratuje. Podajali so mnenja o pedagoškem delu asistentov, docentov in izrednih profesorjev, ki so zaprosili za izvolitev v pedagoške nazive, prav tako so izbrali in podelili nagrade najboljšim pedagogom na fakulteti. Aktivno so spremljali izvajanje študijskih načrtov posameznih študijskih programov, podali svoje stališče in predloge na dekanov dokument Analiza izvajanja študijskih programov na UL FGG ter tako prispevali k razvoju in izboljšanju kakovosti na UL FGG. Na srečanju z delovnimi mentorji je ŠS UL FGG predstavil svojo vizijo izvajanja praktičnega usposabljanja na UL FGG. V prejšnjem letu je bila izvedena Delovna sobota ŠS UL FGG. Tekom leta je ŠS UL FGG štirikrat izdal revijo Študentski most. ŠS UL FGG je nadaljeval koordinacijo študentskega tutorstva na fakulteti. Tudi sodelovanje s študentsko organizacijo in društvi se nadaljuje.

Člani Študentskega sveta UL FGG
Members of the UL FGG Student Council

VSEBINA / CONTENT

SILE FGG: Ekskurzija v Split
SILE FGG: Field trip to Split

Študentska organizacija UL FGG

Študentsko organizacijo Fakultete za gradbeništvo in geodezijo UL (ŠO FGG) od leta 2014/15 vodi ekipa SILE FGG. V študijskem letu 2015/16 ji je predsedoval Dejan Bolarič, v letu 2016/17 pa je predsedstvo prevzela Maja Mauko. Tekom obeh let je bilo izvedeno večje število športnih, izobraževalnih in drugih družabnih dogodkov. Organizirani so bili tako tečaji programa AutoCad in nemškega jezika, kot tudi dobrodelni dogodek Wings For Life World Run, kjer smo se pridružili teku za tiste, ki tega ne morejo. Študentje so bili izjemno zadovoljni z ekskurzijami, še posebej z ekskurzijo v Split, kjer smo si ogledali aktualna gradbišča.

Ekskurzija v Gradec in ogled hidravličnega laboratorija, maj 2017
Field trip to Graz and visit of the hydraulic laboratory, May 2017

Društvo študentov vodarstva (DŠV)

V študijskem letu 2015/16 smo bruce na Oddelku za okoljsko gradbeništvo pozdravili s popečenimi kruhki in čajem, oktobra pripravili še kostanjev piknik, novembra pa brucovanje vodarjev. Zatem smo gostili predavatelja iz podjetja Klarwin, v mesecu novembru pa je bilo na zboru članov izvoljeno novo vodstvo. Decembra smo organizirali prevoz v Maribor na 26. Mišičev vodarski dan in kasneje bowling večer. Spomladi smo za aktivne člane organizirali delovni posvet v Žužemberku. Med prvomajskimi prazniki smo soorganizirali večdnevno ekskurzijo v Split. Organizirali smo tudi dve gostujoči predavanji: doktorski študent Juraj Škvarka s Slovaške je predaval o malih HE in nasutih pregradah, mladi profesor z Univerze v Tennesseeju, Bradford P. Collett, pa o urbani odvodnji. Ob koncu študijskega leta smo se zbrali na pikniku vodarjev in naročili ponatis puloverjev Oddelka za okoljsko gradbeništvo.

V študijskem letu 2016/17 smo pripravili dobrodošlico brucem in kostanjev piknik. Decembra smo organizirali prevoz v Maribor na 27. Mišičev vodarski dan, bowling večer in dobrodelno obarvan praznični bazar v podporo graditeljski odpravi v Ugandi. Spomladi smo odšli na strokovno ekskurzijo v Gradec, kjer smo si ogledali hidravlični laboratorij TUG, junija pa sodelovali pri skupnem študentskem pikniku fakultete.

Ekskurzija DŠGS v Bosno in Hercegovino
Field trip to Bosnia and Herzegovina

Društvo študentov geodezije Slovenije (DŠGS)

V študijskem letu 2015/2016 smo v okviru Društva študentov geodezije Slovenije organizirali tradicionalne dogodke, kot so karaoke, geodetsko brucovanje in za zaključek študijskega leta geodetski piknik v Rožni dolini. Vmes smo se udeležili regionalnega srečanja študentov geodezije – RGSM, kjer smo navezovali nove stike in prijateljstva. Udeležili smo se tudi strokovnih predavanj ob Geodetskem dnevu v Laškem in si po zaključku ogledali znamenito pivovarno.

Študijsko leto 2016/2017 smo pričeli z zamenjavo vodstva, čemur je sledila tudi posodobitev društvenega logotipa. Za uspešnejšo promocijo društva v prihodnje smo dali izdelati večjo zastavo in puloverje za člane društva z motivom novega logotipa. Ob udeležbi na RGSM-ju smo sklenili, da prihodnje leto prevzamemo organizacijo srečanja. Seveda niso manjkali vsi tradicionalni geodetski dogodki,

AutoCad and German language seminars, as well as charity event Wings For Life World Run, where we joined the run for those who cannot run. Students enjoyed especially field trips, such as the field trip to Split, where we visited some open building sites.

Water Science Students' Association

In the academic year 2015/16 we greeted freshmen at the Department of Environmental Engineering with toasts and tea. In October we also organised a chestnut picnic, and in November the freshmen party. Then we hosted two lecturers from the company Klarwin. At the members' meeting in November, new management was elected. In December, we organised transportation to Maribor to the 26th Mišič Water Days, followed by a bowling evening. In Spring, a working conference for active members was organised in Žužemberk. During the May Day holidays, we co-organised a field trip to Split for several days. We also organised visiting lecturers: doctoral student Juraj Škvarka from Slovakia held a lecture on small HPPs and earth embankments; young professor from the University of Tennessee, Bradford P. Collett, held a lecture on urban drainage. At the end of the academic year, we had a barbeque for Water Management students and ordered a reprint of sweaters of the Department of Environmental Engineering.

In the academic year 2016/17 we prepared a welcome reception for freshmen and a chestnut picnic. In December we organised transportation to Maribor to the 27th Mišič Water Days, a bowling evening and a charity festive bazaar to support the construction mission in Uganda. In Spring, we set out to an expert field trip to Graz, where we visited the TUG hydraulic laboratory. In June we took part in the barbecue for all UL FGG students.

Slovenian Geodesy Students' Association

In the academic year 2015/2016 the Society of Slovenian Students of Geodesy organised traditional events, such as karaoke, geodetic freshmen party and a barbecue in Rožna Dolina for the end of the academic year. In the meantime, we took part at the regional meeting

of geodesy students –RGSM, where we made not contacts and friendships. We also took part at expert lectures within Geodetic Days in Laško, followed by a visit to the famous brewery.

We started the academic year 2016/2017 with new leadership, followed by modernisaiton of the Society's logo. For more successful promotion of our Society in the future, we ordered a larger flag and sweaters for the Society's members, with the new logo. During the RGSM event we decided to take over its organisation next year. Naturally, we did not leave out all the traditional geodetic events, such as karaoke, freshmen party and barbecue. Also this year, we took part at expert lectures within the Geodetic Days, this time at Brdo pri Kranju. In April, we organised expert field trip to Bosnia and Herzegovina, where we visited Sarajevo, Mostar and on the way homw also Trogir.

Civil Engineering Student Society

In the beginning of 2016, a Stand Up evening at UL FGG was organised, with the appearance of Žan Papič and Gašper Bergant. In spring 2016, we organised a field trip to Primorska and visited the pumping hydro power plant Avče and viaduct Boršt 1. We finished the day in a pleasant environment of Goriška Brda with wine tasting in the Ščurek wine cellar. At the end of the academic year, a barbecue was organised in cooperation with the UL FGG SC.

In the new term, we organised numerous fun events outside the study environment, such as FGG student in Club Shooters, FGG barbecues and Toast Day. In autumn 2017 we went to a two-day field trip to Tyrol in Austria and visited the famous Bergisel ski jump in Innsbruck. We also visited the construction site of the railway tunnel Brenner, which will connect Austria and Italy and is considered one of the largest infrastructural projects in the European Union.

It is also worth mentioning that in 2016–2017 the Civil Engineering Student Society co-financed seminars for software programs such as AutoCad, Revit and AllPlan.

torej karaoke, brucovanje in piknik. Ponovno smo se udeležili strokovnih predavanj ob geodetskem dnevu, tokrat na Brdu pri Kranju. V mesecu aprilu smo organizirali strokovno ekskurzijo v Bosno in Hercegovino, v okviru katere smo obiskali Sarajevo, Mostar in se na poti proti domu ustavili še v Trogirju.

Društvo študentov gradbeništva

V začetku leta 2016 je bil organiziran stand-up večer na UL FGG, ki sta ga vodila Žan Papič in Gašper Bergant. Spomladi 2016 je bila organizirana ekskurzija na Primorsko z obiskom črpalne hidroelektrarne Avče in viadukta Boršt 1. Zaključek je sledil v prijetnem okolju Goriških brd z degustacijo v vinski kleti Ščurek. Ob zaključku študijskega leta je bil v sodelovanju s ŠO UL FGG organiziran piknik UL FGG.

V novem mandatnem obdobju smo izvedli veliko zabavnih dogodkov zunaj študijskega okolja, kot so FGG-jevc v Klubu Shooters, FGG-piknik pa tudi Toast dan. Jeseni 2017 je sledila dvodnevna ekskurzija na avstrijsko Tirolsko z ogledom znamenite skakalnice Bergisel v Innsbrucku. Prav tako smo si ogledali gradnjo železniškega predora Brenner, ki bo povezoval Avstrijo in Italijo in velja za enega največjih infrastrukturnih projektov v Evropski uniji.

Velja omeniti, da je DŠG v obdobju 2016–2017 sofinanciralo izvedbo tečajev za programe, kot so AutoCad, Revit in AllPlan.

Skupinska slika pred vhodom v predor Brenner
Group photo in front of the Brenner Tunnel

VSEBINA / CONTENT

MEDNARODNE IZMENJAVE

Mednarodne izmenjave na Fakulteti za gradbeništvo in geodezijo se izvajajo tako v obliki študentskih izmenjav kot izmenjav učiteljev, raziskovalcev in administrativnega osebja. Za mednarodne izmenjave v obe smeri (v tujino in iz tujine) skrbi Mednarodna pisarna, ki jo vodi Romana Hudin. Mednarodna pisarna tesno sodeluje z Univerzitetno službo za mednarodno sodelovanje Univerze v Ljubljani, ki predstavlja osrednjo pisarno za vse članice univerze, in s številnimi mednarodnimi

pisarnami na partnerskih univerzah širom Evrope pa tudi zunaj evropskih meja.

Internacionalizacija, kot ena izmet prioritet v okviru strategije tako na ravni fakultete kot tudi na ravni univerze, je zelo pomembna usmeritev na vseh področjih delovanja fakultete, tako študijskem, raziskovalnem kot tudi strokovnem. Fakulteta se vedno bolj odpira navzven, kar je razvidno v vedno večjem številu študentskih izmenjav in izmenjav osebja. Večina izmenjav še vedno poteka v okviru programa Erasmus+, saj fakulteta aktivno sodeluje s približno 60 partnerskimi univerzami, kar nudi možnosti izmenjave za okoli 70 študentov letno. Tej številki smo se zelo približali pri prihajajočih študentih, kar očitno kaže, da fakulteta pridobiva na prepoznavnosti tudi zunaj naših meja. Žal ostaja število naših študentov, ki se odpravljajo v tujino, še vedno dokaj nizko, saj vsako leto izvedemo skupaj le kakih 20 izmenjav, večinoma za namen študija, nekaj pa tudi za namen praktičnega usposabljanja. Prav z namenom spodbujanja praktičnega usposabljanja smo v letu 2017 začeli z izvajanjem posebnega projekta za študentske prakse Erasmus+ KA103, v okviru katerega je predvidenih vsaj 12 dodatnih študentskih izmenjav za namen prakse.

V okviru magistrskega študijskega programa Vodarstvo in okoljsko inženirstvo skupaj z IHE Delft, Tehnično univerzo v Barceloni in Tehnično univerzo v Dresdnu sodeluje v študijskem programu Erasmus Mundus Flood Risk Management in vsako leto gosti približno 20 študentov z vsega sveta na dvomesečni izmenjavi v Ljubljani. S Zurich University of Applied Sciences pa smo sklenili dogovor o dvojnih diplomah na magistrskem študijskem programu Vodarstvo in okoljsko inženirstvo, ki omogoča študentom obeh institucij izmenjavo vsaj en semester in pridobitev dvojnih diplom.

Tudi mobilnost pedagogov in nepedagoškega kadra poteka predvsem znotraj programov Erasmus+ in CEEPUS. Pomemben napredek pri internacionalizaciji študijskih programov pa predstavlja projekt Internacionalizacija pod vodstvom Univerze v Ljubljani, ki omogoča kratke in daljše izmenjave pedagoškega osebja. Letno tako uspemo realizirati vsaj štiri gostovanja tujih pedagogov v domačih študijskih programih, približno enako število pedagogov naše fakultete pa se odpravi na pedagoško izmenjavo v tujino. Tudi izmenjave na raziskovalnem področju so še vedno živahne, predvsem v okviru bilateralnih znanstvenoraziskovalnih projektov, ki jih sofinancira ARRS.

INTERNATIONAL EXCHANGES

International exchanges at the Faculty of Civil and Geodetic Engineering consist of student exchanges as well as exchanges of teaching, research and administrative staff. The incoming and outgoing exchanges are the responsibility of the International Office, managed by Romana Hudin. The International Office works closely with the Office of International Relations at the University of Ljubljana as the central office for all members of our University, and with numerous international offices at our partner universities around Europe and beyond.

Internationalisation, as one of the priorities within the faculty's as well as the university's strategy, is very important for all areas of the faculty's activities – study, research and professional. The Faculty is increasingly oriented to international space, which is evident also in the growing number of student and staff exchanges. The majority of exchanges are still implemented within the Erasmus+ programme. The faculty has about 60 bilateral agreements signed with universities across Europe, offering exchanges for about 70 incoming and outgoing students per year. We are for the moment very near this number concerning incoming students, which shows that our faculty has gained on recognition also outside our borders. Unfortunately, the number of outgoing students is still rather low, with approximately 20 exchanges realized each year, most of them for the purpose of study and some for the purpose of practical training. This fact has stimulated us to apply for a special Erasmus+ KA103 project for student internships, which provides at least 12 more student exchanges with internships abroad.

Within the master study programme Water Science and Environmental Engineering the faculty cooperates with IHE Delft, Technical University of Barcelona and Technical University of Dresden in an Erasmus Mundus study programme Flood Risk Management. Each year about 20 students from all around the world visit our faculty for two months. We also signed an agreement on a double-degree master study programme with the Zurich University of Applied Sciences for the students of the master study programme Water Science and Environmental Engineering, allowing students of both institutions to spend at least one semester abroad and finish their studies with double diplomas.

The mobility of teachers and staff from supporting services is implemented mainly within the Erasmus+ and CEEPUS programs. An important step forward towards internationalisation of study programmes is a project Internationalisation managed by the University of Ljubljana, which allows short and long term exchanges of teachers. Each year we manage to implement about four exchanges of teachers, both incoming and outgoing. In addition, the exchanges in the research area are very lively, mainly within bilateral scientific research projects financed by the Research Agency of the Republic of Slovenia.

ALUMNI CLUB

The Alumni Club of the Faculty of Civil and Geodetic Engineering, University of Ljubljana, is a voluntary, independent, non-profit association of individuals, founded with the purpose of cooperation and social gatherings of UL FGG graduates.

The goals of the Club, consisting of approximately 800 members, are in particular: providing opportunities to the UL FGG graduates to meet each other, as professional colleagues, with teachers and other Faculty members, professional and research cooperation of UL FGG graduates with the Faculty members, nurturing the reputation of the professions covered by UL FGG study programs and their promotion, establishment of the professional field in the local as well as wider environment, concern for sustainable development of the professional field in cooperation with the University and the business environment, encouraging knowledge and personnel exchange within the professional field, providing various opportunities for professional development, support to career development of UL FGG students, support to various activities carried out by UL FGG and its students.

Each year, in addition to Annual Meetings, Alumni Club organizes professional and scientific symposia, lectures, round tables and similar events. Further, social gatherings and sport events are organized for the members, in collaboration with UL FGG.

In the academic years 2015/2016 and 2016/2017, the following lectures were held: Assist. Prof. Dr. Primož Banovec »Floods – Modelling Challenge and Search for Solutions to Reduce Flood Threats« (23 March 2016) and Ivan Krstič and Anže Andrejka (Masivna Pasivna): »Masonry Prefabricated Construction (Reason for the Innovative Approach to Construction; What makes Us Different; Digital support to Construction)« (29 March 2017).

In the international year of maps (2015–2016), the activities of the Alumni Club were supplemented by exclusive presentation of the movie »Franc Anton Steinberg: a Man of Baroque Perfection«, organized by Assist. Prof. Dušan Petrovič, PhD (18 April 2016).

In all the years of its existence, the UL FGG Alumni Club has played an active role in informing its members on employment possibilities, as notified by the Club members or its supporters.

In addition to lectures and discussions, the Alumni members are also traditionally invited to sport activities organized within UL FGG, led by Aleš Golja, PhD. In this way, the Alumni members have a chance to meet the UL FGG students while taking part in traditional excursions to Komna or Slavnik.

In the meantime, University of Ljubljana established an Alumni Club under the umbrella of the University. For this reason, the UL FGG Alumni Club passed a decision at its General Assembly on 29 March 2017 of its termination (to be effective by the end of 2018) and on the transfer of its finances to UL FGG.

KLUB DIPLOMANTOV

Društvo »Klub diplomantov Fakultete za gradbeništvo in geodezijo Univerze v Ljubljani« je prostovoljno, samostojno, nepridobitno združenje posameznikov, ki je ustanovljeno z namenom sodelovanja in druženja predvsem diplomantov Fakultete za gradbeništvo in geodezijo Univerze v Ljubljani.

Društvo, ki ima okoli 800 članov, ima predvsem naslednje cilje: druženje diplomantov UL FGG kot stanovskih kolegov med seboj, z učitelji ter sodelavci fakultete, strokovno in znanstveno sodelovanje diplomantov UL FGG z učitelji ter sodelavci fakultete, skrb za ugled poklicev, za katere izobražuje UL FGG, in njihovo promocijo, uveljavljanje strokovnega področja v lokalnem in širšem okolju, skrb za trajnostni razvoj strokovnega področja v sodelovanju z univerzo in gospodarstvom, spodbujanje menjave znanja in kadrov na strokovnem področju, skrb za strokovni razvoj, podpora kariernemu razvoju študentov UL FGG, prispevanje k podpori dejavnosti UL FGG in njenih študentov.

Vsako leto so v klubu poleg rednega občnega zbora organizirani tudi strokovni in znanstveni posveti, predavanja, okrogle mize in podobne prireditve. Prav tako so v sodelovanju z UL FGG organizirana družabna srečanja, športne dejavnosti in drugi podobni dogodki za člane.

V študijskih letih 2015/2016 in 2016/2017 so bila izvedena predavanja predavateljev: doc. dr. Primoža Banovca »Poplave – izziv modeliranja in iskanje rešitev za zmanjšanje poplavne ogroženosti« (23. 3. 2016) in Ivana Krstiča in Anžeta Andrejka (Masivna Pasivna): Zidana montažna gradnja (Vzrok za inovativni pristop k gradnji; V čem smo drugačni; Digitalna podpora gradnji) (29. 3. 2017).

Aktivnosti kluba smo v mednarodnem letu kart (2015–2016) popestrili z ekskluzivnim predvajanjem filma »Franc Anton Steinberg; Človek baročne popolnosti« v organizaciji doc. dr. Dušana Petroviča (18. 4. 2016).

Klub diplomantov UL FGG je v teh letih igral aktivno vlogo pri obveščanju svojih članov o morebitnih zaposlitvenih možnostih, na katere nas opozorijo člani in prijatelji kluba.

Poleg predavanj in razprav so člani kluba tradicionalno vabljeni tudi na športne dejavnosti, ki so organizirane v okviru UL FGG pod vodstvom dr. Aleša Golje. Tako imajo člani možnost druženja s študenti UL FGG na sedaj že tradicionalnih izletih na Komno ali Slavnik in drugih izletih.

Univerza v Ljubljani je v tem obdobju ustanovila klub diplomantov znotraj univerze, zato je društvo Klub diplomantov UL FGG na občnem zboru 29. 3. 2017 sprejelo sklep o svoji ukinitvi (predvidoma konec leta 2018) in o prenosu finančnih sredstev na UL Fakulteto za gradbeništvo in geodezijo.

Občni zbor kluba diplomantov 2017
Alumni Club General Assembly 2017

Zidana montažna gradnja, predavanje Ivana Krstiča in Anžeta Andrejke
Masonry prefabricated construction, lecture by Ivan Krstič and Anže Andrejka

VSEBINA / CONTENT

KADER / PERSONNEL

- pred. dr. Aleš Golja, prof. šp. vzg.

Študentski pohod na slap Brinta 2016/17
Hiking tour for students to Brinta Waterfall 2016/17

Udeležba študentov in zaposlenih UL FGG na štafetnem teku UL 2016/17
UL FGG students and staff at UL relay run in 2016/17

POSEBNA PEDAGOŠKA ENOTA ZA ŠPORTNO VZGOJO UL FGG

V študijskih letih 2015/16 in 2016/2017 je pedagoška enota za šport na UL FGG ponudila študentom štiri športne programe in zaposlenim v okviru promocije zdravja dva programa:

- Športno-rekreativna vadba za vse študente in zaposlene UL FGG,
- Izbirni predmet Športna vzgoja (4 KT) na I. stopnji bolonjskega študija,
- Izbirni predmet Športna vzgoja (3 KT) na II. stopnji bolonjskega študija,
- Športna tekmovanja na UL (študenti in zaposleni).

Namen ponujenih športnorekreativnih dejavnosti je vzdrževanje in izboljšanje psihofizične kondicije, pridobivanje dodatnih znanj in izkušenj, krepitev psihomotoričnih in funkcionalnih sposobnosti ter medsebojno druženje (širitev socialne mreže).

Študenti, ki so izbrali izbirni predmet Športna vzgoja, so v okviru teoretičnega dela pridobili osnovne informacije o delovanju človekovega telesa, njegovega gibalnega, srčno-žilnega in dihalnega sistema, metodah preverjanja in ugotavljanja stanja psihomotoričnih in funkcionalnih sposobnosti, športnogibalni aktivnosti kot preventivni in kurativni dejavnosti za ohranjanje in utrjevanje zdravja, prehranjevanju in regulaciji telesne teže ter drugih medicinskih vidikih športa.

Študenti so opravili svoje obveznosti pri urah športne vzgoje z obiskovanjem športnih dejavnosti v univerzitetnih športnih dvoranah, pri športnih igrah, aerobiki, družabnem plesu in pri individualnih športih oziroma na bazenih pri plavanju ter naravnem okolju. Programe športnih dejavnosti v naravi lahko izberejo tudi v dogovoru s posameznimi fakultetami UL (FS, EF, BF, FFA, FF – izmenjava študentov), ki so potekale organizirano preko UL FGG skozi celo leto.

V študijskem letu 2015/16 je bilo v športnorekreativne programe vpisanih 69 študentov in v izbirni program predmeta Športna vzgoja 124 redno vpisanih študentov I. in II. stopnje bolonjskega programa.

Športnorekreativne dejavnosti 2015/16

Planinski pohod na Stol, Nanos, Krvavec, dvakrat na Slavnik in dvakrat na Slivnico; predbožični družabni ples v avli fakultete; alpsko smučanje vsak petek na Krvavcu; vsako soboto pohodi na Šmarno goro (preko celega leta); enotedenski tečaj alpskega smučanja v Kranjski Gori; štiridnevni začetni tečaj jadranja; kajakaški izlet po reki Krki; petdnevni športno-rekreativni tabor Tolmin (Volarje).

Študentje in študentke UL FGG so v študijskem letu 2015/16 dosegli na prvenstvih Univerze v Ljubljani odlične športne dosežke na ekipnih državnih univerzitetnih prvenstvih in ligaških tekmovanjih: 1. mesto študentov in zaposlenih v orientacijskem teku; 1. mesto v pikadu; 1. mesto v biljardu; 6. mesto v badmintonu; 8., 11., 12., mesto v curlingu;

SPECIAL UNIT FOR SPORTS EDUCATION UL FGG

In the academic years 2015/16 and 2016/2017 the unit for sports at UL FGG offered students four sports programs and to the staff two health promotion programs:

- Sports and recreation for all students and staff at UL FGG,
- Elective course Sports Education (4 ECTS) at the first Bologna cycle,
- Elective course Sports Education (3 ECTS) at the second Bologna cycle,
- Sports competitions at UL (students and staff).

The purpose of the offered sports and recreation activities is to maintain and improve psycho-physical fitness, acquire additional knowledge and experience, strengthen psycho-motor and functional abilities as well as socializing (expansion of social network).

Students who select the course Sports Education acquire within the theoretical part basic information on the functioning of human body, its motive, cardiac and respiratory system, methods for the assessment and establishment of psycho-motor condition and functional abilities, sports motor activities as preventive or curative activities for preserving and strengthening health, nutrition and regulation of body weight, as well as other medical aspects of sports.

Students perform their obligations also by attending sports activities in university sports halls, in sports games, aerobics, ball dance and individual sports as well as in swimming pools and outdoors. Programs of sports activities outdoors are available in agreement with other faculties of UL (Mechanical Engineering, Electrical Engineering, Biotechnical Engineering, Pharmacy, Economics – student exchange) and are organised by UL FGG throughout the year.

In the academic year 2015/16, 69 students selected sports and recreation programs. 124 regular students of the first and second Bologna cycles attended the course Sports Education.

Sports and recreation activities 2015/16

Hiking tours to Stol, Nanos, Krvavec, twice to Slavnik and Slivnica; pre-Christmas ball dance in the UL FGG hall; skiing each Friday at Krvavec; hiking tours on Saturdays to Šmarna Gora (throughout the year); one week course of skiing in Kranjska Gora; four day beginner's course of sailing; kayaking on the river Krka; five-day sports and recreation camp Tolmin (Volarje).

In the academic year 2015/16 students of UL FGG were excellent at championships of the University of Ljubljana in team sports and at league competitions: 1st place of students and staff in orienteering; 1st place in darts; 1st place in billiards; 6th place in badminton; 8th, 11th, 12th places in curling; 8th place in basketball 3 × 3; 7th place of women students in volleyball league; 5th-8th place of male students in basketball league; 9th place of men students in volleyball league; 9th–18th place of men students in indoor football.

In the academic year 2016/17, 64 students selected sports and recreation programs. 105 regular students of the first and second Bologna cycles attended the course Sports Education.

Sports and recreation activities 2016/2017

Hiking tours to Snežnik, Nanos, Slavnik, Krim, twice to Slivnica, Krvavec, Stol; three-day skiing course Civetta; pre-Christmas student ball dance in the UL FGG hall; skiing at Krvavec, hiking tours to Šmarna Gora (throughout the year); one week skiing course in Kranjska Gora; three-day skiing in Marmolada; four-day beginner's course of sailing; kayaking on the river Krka; five-day sports and recreation camp Tolmin (Volarje).

In the academic year 2016/17 students of UL FGG were excellent at championships of the University of Ljubljana in team sports and at league competitions. Results of UL FGG at team national university championships: 2nd place of students and staff in orienteering; 1st place in darts; 1st place in billiard; 3rd place in curling. Results in league competitions of UL: 9th place of women students in volleyball league; 6th place of male students in basketball league; 7th place of male students in volleyball league; 17th place of male students in indoor football.

Within the promotion of health for the UL FGG staff, the following activities were implemented in 2015/16 and 2016/17 as measures to improve wellbeing at the workplace: once a week 1 hour swimming in Tivoli swimming pool; once a week 1 hour badminton in Sports Centre Dolgi most; once a week 2 hours of gym in Sports Centre Dolgi Most; winter sports day; hiking tour to Rožnik; kayaking on the river Krka; summer sports day; sports and procreative holidays in Volarje.

Special unit for sports education at UL FGG will continue to aspire (with the support of the Faculty's management) to enable students, future intellectuals, appropriate working conditions to achieve and maintain health and an active life style.

8. mesto v košarki 3 × 3; 7. mesto študentk v odbojkarski ligi; 5.–8. mesto študentov v košarkarski ligi; 9. mesto študentov v odbojkarski ligi; 9.–18. mesto študentov v dvoranskem nogometu.

V študijskem letu 2016/17 je bilo v športnorekreativne programe vpisanih 64 študentov in v izbirni program predmeta Športna vzgoja 105 redno vpisanih študentov I. in II. stopnje bolonjskega programa.

Športnorekreativne dejavnosti 2016/2017

Planinski pohod na Snežnik, Nanos, Slavnik, Krim, dvakrat na Slivnico, Krvavec, Stol; tridnevni tečaj smučanja – Civetta; predbožični študentski družabni ples v avli fakultete; alpsko smučanje na Krvavcu, pohodi na Šmarno goro (preko celega leta); enotedenski tečaj alpskega smučanja v Kranjski Gori; tridnevni tečaj smučanja – Marmolada; štiridnevni začetni tečaj jadranja; kajakaški izlet po reki Krki; petdnevni športnorekreativni tabor Tolmin (Volarje).

Študentje in študentke UL FGG so v študijskem letu 2016/17 dosegli na prvenstvih Univerze v Ljubljani odlične športne dosežke. Rezultati UL FGG na ekipnih državnih univerzitetnih prvenstvih: 2. mesto študentov in zaposlenih v orientacijskem teku; 1. mesto v pikadu; 1. mesto v biljardu; 3. mesto v curlingu. Rezultati ligaških tekmovanj UL: 9. mesto študentk v odbojkarski ligi; 6. mesto študentov v košarkarski ligi; 7. mesto študentov v odbojkarski ligi; 17. mesto študentov v dvoranskem nogometu.

V okviru promocije zdravja pri delu z zaposlenimi na UL FGG smo v študijskem letu 2015/16 in 2016/17 izvedli naslednje aktivnosti in ukrepe za izboljšanje počutja na delovnem mestu: 1-krat tedensko po 1 uro plavanja v bazenu Tivoli; 1-krat tedensko po 1 uro igranja badmintona v Športnem centru Dolgi most; 1-krat tedensko po 2 uri fitnesa v Športnem centru Dolgi most; zimski športni dan; pohod na Rožnik; kajakaški izlet po reki Krki; poletni športni dan; športnorekreativne počitnice v Volarjih.

Posebna pedagoška enota za športno vzgojo na UL FGG si bo tudi v bodoče (ob podpori vodstva fakultete) prizadevala, da študentom, bodočim intelektualcem, omogoči primerne pogoje dela za doseganje in vzdrževanje zdravega in aktivnega načina življenja.

Ekipno 1. mesto študentov UL FGG na prvenstvu UL v družabnih igrah 2015/16
1st place of UL FGG students at UL social games in 2015/16

Začetni tečaj jadranja študentov UL FGG 2015/2016
Beginner's course of sailing for UL FGG students 2015/16

Ekipno 1. mesto UL FGG (študenti in zaposleni) na državnem univerzitetnem prvenstvu v orientacijskem teku 2015/16
1st place of UL FGG (students and staff) at the national university championships in orienteering 2015/16

VSEBINA / CONTENT

- Vodja referata
  Head of Office
  Mojca Lorber

- Strokovne sodelavke
  Professional associates
  Suzana Erjavec
  Teja Japelj
  Monika Lipnik Brus

REFERAT ZA ŠTUDIJSKE ZADEVE

Referat za študijske zadeve je obraz fakultete, s katerim se najpogosteje srečujejo študenti, neredko tudi v trenutkih negotovosti in stisk. Je služba, ki odgovarja na vsa njihova vprašanja in vprašanja pedagogov, ki so vezana na izobraževalno področje.

Referat za študijske zadeve na dodiplomskih in podiplomskih ter na vseh treh stopnjah bolonjskih študijskih programov skladno z Zakonom o visokem šolstvu, Statutom UL in Pravilnikom o študiju na prvi in drugi stopnji na UL FGG:

- skrbi za izvedbo vpisa študentov,
- opravlja administrativno delo, povezano z organiziranjem in izvajanjem študija,
- vodi evidence o študentih, izpitnih prijavah, opravljenih izpitih in drugih obveznostih študentov,
- izdaja dokumente in potrdila,
- vodi vse postopke v zvezi s pripravo zaključnih del in zaključkov študija,
- skrbi za organizacijo podelitev diplom, izvajanje administrativnih postopkov v zvezi z zagovorom zaključnih del, pisanje prilog k diplomam,
- izdaja račune za študijsko področje,
- pomaga pri pripravi gradiv za Študijske odbore in Senat UL FGG,
- skrbi za izvedbo študentskih anket,
- spremlja študijski uspeh študentov,
- pripravlja analize in poročila ter vodi statistike za potrebe UL FGG, UL in zunanje institucije za celotno študijsko področje,
- sodeluje s strokovnimi službami Univerze v Ljubljani,
- aktivno sodeluje s pedagogi na področju študijske dejavnosti in
- opravlja druga dela, ki vsebinsko sodijo v širše strokovno področje študijske dejavnosti, po nalogu vodstva fakultete.

Referat za študijske zadeve se je v tej obliki oblikoval leta 2012, ko sta se skupini priključili zdajšnja vodja Mojca Lorber in Teja Japelj, ki je pred tem na UL FGG administrativno pokrivala področje gospodarskih zadev. Suzana Erjavec se je v Referatu za študijske zadeve zaposlila eno leto prej, torej 2011, Monika Lipnik Brus pa je v Referatu zaposlena od leta 2017. Referat deluje na dveh enotah. Vse zadeve, vezane na bolonjski prvo- in drugostopenjski študij, se vodijo na Jamovi 2, na sedežu fakultete. Zadeve, vezane na doktorski študij, za katerega je zadolžena Monika Lipnik Brus, pa se od leta 2013, ko je bila pisarna preseljena na ločeno enoto, vodijo na Hajdrihovi 28.

STUDENT OFFICE

The Office of Study Affairs is the face of our faculty, the first and most frequent contact point of our students, often asking our assistance also in moments of insecurity and distress. Our office strives to respond to all their issues as well as to the questions of our teachers related to education.

At the undergraduate and graduate as well as all three cycles of the Bologna study programmes, the Office of Study Affairs performs the following tasks according to the Higher Education Act, the University Statute and the UL FGG Rules at first and second cycle studies:

- enrolment of students,
- administrative tasks related to the organization and implementation of study programs,
- keeping of records related to students, exam applications, exams passed and other student obligations,
- issuing of documents and certificates,
  conducting procedures related to the preparation of final theses and completion of studies,
- care of the organisation for the award of diplomas, implementation of administrative procedures related to the defence of final theses, preparation of diploma supplements,
- issuing invoices for the study area,
- assistance in the preparation of materials for the UL FGG Study Boards and Senate,
- care of the implementation of student surveys,
- monitoring of students' study success,
- preparation of analyses and reports and keeping statistics for the needs of UL FGG, the University and external institutions for all study related areas,
- cooperation with professional services of the University of Ljubljana,
- active cooperation with teachers related to study activities,
- other work that belongs to the wider professional area of study affairs, by order of the faculty management.

In the present form, the Office of Study Affairs was established in 2012, when the team was joined by the present head of the office, Mojca Lorber, and the administrative officer Teja Japelj, previously in charge of the administrative matters of economic affairs. Suzana Erjavec came to work for the Office of Study Affairs a year before, in 2011, whereas Monika Lipnik Brus has been its member since 2017. The office operates at two locations. All matters related to the Bologna first and second cycle studies are handled at Jamova 2, at the faculty's head office. The matters related to doctoral studies, conducted by Monika Lipnik Brus, have been stationed since 2013 at the dislocated unit at Hajdrihova 28.

KNJIŽNICA UL FGG

Knjižnična dejavnost

Knjižnična dejavnost knjižnice UL FGG se odvija na dveh lokacijah, na Jamovi cesti 2 (Gradbeništvo, Geodezija, Grajeno okolje) in na Hajdrihovi ulici 28 (Vodarstvo in okoljsko inženirstvo). Knjižnično gradivo v obeh knjižničnih prostorih je postavljeno po sistemu prostega pristopa. V vsaki stavbi obstaja tudi knjižnični arhiv.

V knjižnici UL FGG na Jamovi cesti 2 ohranjamo ustaljen urnik, za izposojo je knjižnica odprta 38 ur na teden, čitalnica pa je odprta vsak dan, razen petka, do 20. ure, skupno 55 ur tedensko. Ob koncu tedna je knjižnica zaprta. V njej je 50 čitalniških mest, ki so polno zasedena predvsem v času priprav na kolokvije in v izpitnih obdobjih.

V knjižnici na lokaciji Oddelka za vodarstvo in okoljsko gradbeništvo na Hajdrihovi ulici 28 je za potrebe uporabnikov knjižnice skrbelo administrativno osebje oddelka. Posredovanje gradiva med obema lokacijama knjižnice je bilo zagotovljeno s kurirsko dostavo po dogovoru.

Izredno povečan obisk knjižnice, izposoja gradiv in prirast visokošolskih del so vidni predvsem v letu 2016 (kot posledica zaključka predbolonjskih študijev), ko beležimo dvojni prirast visokošolskih del v primerjavi s prejšnjimi leti, to je 600 naslovov in 1.200 enot, in ko je bilo v enem letu izposojenih okrog 20.000 enot gradiv. V porastu je elektronski dostop do člankov tujih revij (preglednica 2), kar je skladno s poslanstvom hibridne knjižnice v digitalni dobi (preglednica 2).

Fondi

V knjižnici uporabljamo vse ustaljene poti za posodabljanje in bogatitev fonda strokovnih gradiv (preglednica 1). Za sprotno obveščenost uporabnikov o novostih v matičnih strokovnih dejavnostih je v knjižnici 4-krat letno izvedena prodajna razstava strokovnih knjig. Z rednim in sprotnim nakupom strokovnih standardov smo do konca 2017 izdatno obogatili njihovo zbirko, skupno jih je 1.028. V porastu je nakup standardov v digitalni različici.

	2015	2016	2017
Knjige, brošure	44.297	44.862	45.551
Disertacije, magistrska dela, diplome	9.823	10.930	11.132
Revije	13.657	13.930	14.176
Neknjižno gradivo	2.993	3.623	3.663
Kartografsko gradivo in standardi	138	159	383
	70.908	**73.500**	**76.922**

Preglednica: Skupni knjižnični fond v letih 2015 do 2017

V porastu je elektronski dostop do člankov tujih revij (preglednica 2), kar je skladno s poslanstvom hibridne knjižnice v digitalni dobi.

UL FGG LIBRARY

Library activity

The library activity of the UL FGG Library runs at two locations, at Jamova cesta 2 (Civil Engineering, Geodesy, Built Environment) and at Hajdrihova ulica 28 (Water Science and Environmental Engineering). The library materials at both library locations are organised according to the free access system. In both buildings there are also library archives.

In the UL FGG Library at Jamova cesta 2 we offer permanent opening hours. Books in the library are available for borrowing 38 hours per week, and the reading room is open every day except Fridays until 8 p.m., thus a total of 55 hours per week. At weekends, the library is closed. The library offers 50 reading seats, which are normally fully occupied during the preparations for midterm and final exams.

In the library of the Department of Water Science and Environmental Engineering at Hajdrihova ulica 28, the department staff was in charge of the needs of library users. The exchange of materials between both locations was organised by courier service according to agreement.

Extreme increase in library visits, borrowing of materials and larger numbers of higher education works was recorded especially in 2016 (as a consequence of final year for pre-Bologna studies), when we recorded double growth of higher education works compared to previous years, i.e. 600 titles and 1,200 units, and 20,000 borrowed units in one year. The electronic access to articles in international journals is also visible (Table 2), which is in agreement with the mission of a hybrid library in the digital era (Table 2).

Funds

The UL FGG Library uses regular procedures to modernise and enrich the fund of professional materials (Table 1). Users are informed about new publications in their main professional areas in the form of sales exhibitions organised in the library four times per year. With regular and timely purchase of expert standards, the selection of these was considerably enriched by the end of 2017. Thus, there are currently 1,028 standards available. The number of standards in digital version is also growing.

The number of electronic accesses to articles in international journals is growing (Table 2), which is in agreement with the mission of a hybrid library in the digital age.

KADER / PERSONNEL

- Vodja knjižnice
  Head of library
  doc. dr. Cvetka Teja Koler Povh
- Knjižničarke
  Librarians
  Elizabeta Adamlje
  Jelka Rovanšek
  Barbara Šivec

Čitalnica v knjižnici UL FGG
Reading room in the UL FGG library

Leto	Število uporabe
2015	11.919
2016	14.812
2017	17.673

Uporaba oddaljenega dostopa do člankov tujih revij

Odprti dostop do znanja v letih 2015-2017

V letu 2016 smo fakultetni repozitorij DRUGG povezali z univerzitetnim RUL in poenotili zbirki obeh sistemov. V letu 2017 smo zaradi tehničnih zahtev vzdrževanja sistema prenehali z arhiviranjem gradiv v repozitoriju DRUGG. Kot pomemben vir informacij za strokovno javnost je 3.500 arhiviranih gradiv v letu 2017, ki so bila deležna 222.000 ogledov in prenosov. V decembru 2017 je bil DRUGG zaradi varnostnih razlogov ukinjen, dela UL FGG so sestavni del repozitorija RUL. Tudi v RUL so bila dela UL FGG v letu 2017 ogledana preko 200.000-krat.

Hkrati smo v letu 2017 v knjižnici začeli s preverjanjem podobnosti vsebin visokošolskih del v sistemu TurnItIn in s tem ob od 2005 uveljavljenim preverjanjem oblikovne ustreznosti visokošolskih del in navajanja virov dodatno prispevali h kakovosti visokošolskih del. Ob uvedbi samoarhiviranja elektronske različice visokošolskih del v sistemu e-VIS in RUL redakcijo sistema RUL kot pooblaščena skrbnica izvaja vodja knjižnice.

Promocijo repozitorija smo izvedli s predstavitvijo na Kongresu IFLA v Ameriki v avgustu 2016 in s predstavitvijo na Posvetovanju sekcij Zveze bibliotekarskih društev Slovenije v Mariboru septembra 2016, na promocijskih prireditvah fakultete, v okviru študija na UL FGG pa s predstavitvami v okviru doktorskega seminarja, za doktorande, za študente 1. letnika gradbeništva, za alumni klub gradbenikov in v individualnih razgovorih. V letu 2015 je bilo opravljenih 239.000 prenosov iz repozitorija DRUGG, kar je v povprečju 650 prenosov dnevno. To je največ od ustanovitve repozitorija DRUGG v letu 2011.

	2015	2016
visokošolska dela skupaj	**2418**	**3022**
doktorske disertacije	104	131
magistrska dela	129	280
diplomske naloge	2185	2611
monografije skupaj	**63**	**68**
strokovne knjige	17	22
zborniki konferenc	45	45
video konferenca	1	1
članki in sestavki skupaj	**321**	**345**
članki	280	298
prispevki v zbornikih	41	43
drugo	4	4
	2806	**3435**

Preglednica: Prirast gradiv v repozitoriju DRUGG in uporaba 2015-2016

Open access to knowledge in 2015-2017

In 2016, the UL FGG repository DRUGG was connected to the university repository RUL and adjusted the collections of both systems. In 2017, we stopped filing materials in the DRUGG repository due to technical requirements for the system maintenance. 3,500 reposited materials in 2017, which attracted 222,000 views or downloads, represent an important source of information for the professional public. In December 2017, DRUGG was terminated for safety reasons and the UL FGG repository became part of the RUL repository. Also in RUL, the UL FGG works were in 2017 viewed over 200,000 times.

At the same time, the library started to check the resemblance of contents of higher education works using the application TurnItIn. This has considerably contributed to the quality of higher education works, the foundations of which were laid in 2005 with the instructions for the formatting of higher education works and referencing sources. With the introduction of self-filing of the electronic version of higher education works in the systems e-VIS and RUL; the editing of RUL is performed by the head of library as the authorised trustee.

Promotion of the repository was implemented by a presentation at the IFLA Congress in the USA in August 2016 and with the presentation at the Congress of sections of Librarian Societies of Slovenia in Maribor in September 2016, at promotional events of UL FGG, and within studies at UL FGG in the form of presentations at the doctoral seminar for PhD students of the 1st year of Civil Engineering, for Alumni Club of civil engineering and at individual discussions. In 2015, there were 239,000 downloads from the DRUGG repository, which is on average 650 downloads per day. This is the largest number since the establishment of DRUGG in 2011.

Čitalnica v knjižnici UL FGG
Reading room in the UL FGG library

Bibliographic activity

Throughout the years of its activity, the bibliographic centre of our library has been recording bibliographies of UL FGG teachers and researchers as well as of external partners. Each year, we record around 2,500 bibliographic records in the COBISS system. In addition, students express their wishes to record their bibliographic units, mainly for the candidates applying for scholarships and for students studying abroad. The bibliographic units of the UL FGG staff are mainly still scientific publications, among them original scientific articles.

Publishing activity of UL FGG

In 2015 to 2017, UL FGG published new textbooks Strength I and Strength II, and re-printed the completed textbook Statics I as well as the updated Instructions for Formatting Higher Education Works at UL FGG with quoting rules. Each year, the library sells on average 250 units of textbooks, which is in agreement with the number of newly enrolled students.

Bibliografska dejavnost knjižnice

Vsa leta smo v bibliografskem centru knjižnice vestno gradili bibliografije učiteljev in raziskovalcev UL FGG ter za zunanje naročnike, v sistem COBISS smo vsako leto prispevali okrog 2.500 bibliografskih zapisov. Pojavljajo se potrebe vpisovanja bibliografskih enot za študente, predvsem za kandidate za štipendije in študirajoče v tujini. Med bibliografskimi enotami zaposlenih na UL FGG še vedno prevladujejo znanstvene objave, med njimi izvirni znanstveni članki.

Založniška dejavnost UL FGG

V letih 2015 do 2017 smo na UL FGG izdali nov učbenik Trdnost I in Trdnost II ter ponatisnili dopolnjen učbenik Statika I in predelana Navodila za oblikovanje visokošolskih del na UL FGG in citiranje. Letno smo v prostorih knjižnice prodali v povprečju 250 enot učbenikov, kar je skladno z številom vpisanih študentov.

Čitalnica v knjižnici UL FGG
Reading room in the UL FGG library

Naslovnica revije Acta hydrotechnica iz leta 2017 (revija izhaja dvakrat letno)
Cover page of Acta hydrotechnica from 2017 (the journal is published twice a year)

Naslovnica revije Igra ustvarjalnosti (izhaja le v spletni obliki enkrat letno)
Cover page of the journal Igra ustvarjalnosti (published yearly in electronic version only)

REVIJE UL FGG

Na UL FGG z izdajanjem revij skrbimo tudi za širjenje znanja in novosti na vseh področjih našega delovanja.

Acta hydrotechnica

Samostojno izdajamo revijo Acta hydrotechnica, ki je odprtodostopna mednarodna znanstvena revija s področij hidrologije, hidravlike, mehanike tekočin, inženirske hidrotehnike, urejanja voda, vodnega gospodarstva, ekološkega inženirstva, hidrotehničnih objektov, izrabe vodnih moči, pregradnega inženirstva, zdravstvene hidrotehnike, zaščite voda, upravljanja voda ter tudi vodnega prava, inženirske geomorfologije, ekologije voda ter varstva pred naravnimi nesrečami. Revija je v Sloveniji matična za področja hidrotehnike, vodarstva in okoljskega inženirstva. Utrjuje tudi svoje pedagoško poslanstvo, s katerim skrbi za prenos znanj in tehnologije v prakso. (http://ksh.fgg.uni-lj.si/ksh/acta/index.htm)

Igra ustvarjalnosti

V sozaložništvu z UL FA izdajamo revijo Igra ustvarjalnosti, ki je namenjena objavi teoretičnih spoznanj in praktičnih izkušenj s področij arhitekture in gradbeništva, urbanizma, prostorskega planiranja, krajinske arhitekture, sociologije ter tem raziskovalnim področjem bližnjih družboslovnih in tehničnih disciplin. Revija predstavlja rezultate strokovnega, pedagoškega in znanstvenoraziskovalnega dela, ki z ustvarjalnostjo in abstraktnim načinom razmišljanja oblikujejo neprekinjen tok izkustvenega učenja o vrednotah prostora in o procesih, ki potekajo v njem. (https://www.iu-cg.org/)

UL FGG JOURNALS

By publishing journals, UL FGG streamlines the dissemination of knowledge and novelties we create with all our activities.

Acta hydrotechnica

UL FGG is the sole publisher of Acta hydrotechnica, an international open-access scientific journal from the areas of hydrology, hydraulics, fluid mechanics, engineering hydraulics, river engineering, water science, ecological engineering, hydraulic structures, water power exploitation, dam engineering, sanitary engineering, water protection, water management as well as water legislation, engineering geomorphology, water ecology and protection against natural disasters. It is a basic journal in Slovenia for the areas of hydraulic engineering, water science and environmental engineering. With the transfer of knowledge and technology into practice, the journal also keeps strengthening its educational mission. (http://ksh.fgg.uni-lj.si/ksh/acta/index.htm)

Igra ustvarjalnosti (Creativity Game)

With the Faculty of Architecture (University of Ljubljana) as co-publisher, we publish the journal Igra ustvarjalnosti (Creativity Game), intended for publication of theoretic findings and practical experiences from the areas of architecture and civil engineering, urbanism, spatial planning, landscape architecture, sociology and from other related social and technical disciplines. The journal presents the results of professional, educational, scientific and research activities, which contribute with creativity and abstract thinking to continuous flow of experiential learning about the values of space and the processes going on inside it. (https://www.iu-cg.org/)

Geodetski vestnik (Geodetic Journal)

With contents and partial financial support, we also contribute to the regular publication of Geodetski vestnik (Geodetic Journal). For many years, the main editors and the whole technical support have been from the UL FGG Department of Geodetic Engineering. In this time, the journal has become an important international open-access journal classified also in the Social Sciences Citation Index (SSCI). The main purpose of the journal is to collect scientific and professional articles and to offer them to the professional public. Its articles deal with the latest achievements in the areas of geodesy, geoinformatics, spatial planning and their related areas. (https://www.zveza-geodetov.si/geodetski-vestnik/)

Acta geotechnica Slovenica

Completely different character and contents are dealt with in the journal Acta geotechnica Slovenica, with UL FGG acting as co-founder. It publishes quality articles focusing on important areas of geomechanics and geotechnics, such as soil and rock mechanics, engineering geology, environmental geotechnics, geosynthetics, geotechnical structures, numerical and analytical methods, computer modelling, field and laboratory investigations. The journal is published twice a year. (http://www.fg.uni-mb.si/journal-ags/)

Gradbeni vestnik (Civil Engineering Journal)

With active contribution of contents and partial financial support, we are also involved in the journal Gradbeni vestnik (Civil Engineering Journal) (http://www.zveza-dgits.si/gradbeni-vestnik). The journal is the official gazette of the Slovenian Association of Societies of Civil Engineers and its basic section of civil engineers within the Slovenian Chamber of Engineers. The journal is published monthly.

Geodetski vestnik

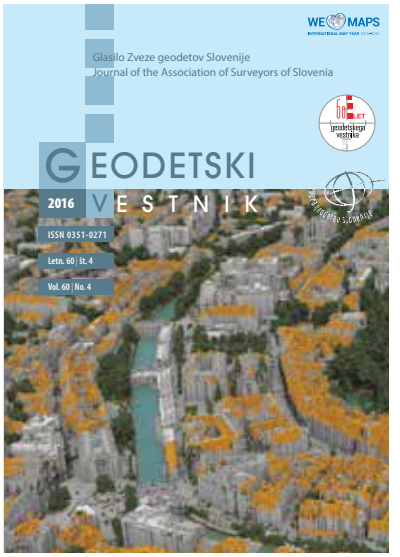
Poleg tega vsebinsko in deloma tudi finančno podpiramo redno izhajanje revije Geodetski vestnik. Glavni uredniki in celotna tehnična podpora že vrsto let prihajajo iz vrst Oddelka za geodezijo UL FGG. V tem času je revija postala odprtodostopna mednarodno pomemba revija in se uvrstila v Social Sciences Citation Index (SSCI). Glavni namen revije je zbirati znanstvene in strokovne članke in jih ponuditi strokovni javnosti. V člankih so predstavljena najnovejša dognanja s področij geodezije, geoinformatike, prostorskega planiranja ter sorodnih področij. (https://www.zveza-geodetov.si/geodetski-vestnik/)

Acta geotechnica Slovenica

Povsem drug značaj in vsebino pa ima revija Acta geotechnica Slovenica, katere soustanoviteljica je tudi UL FGG. V njej so objavljeni kakovostni članki s pomembnih področij geomehanike in geotehnike, kot so mehanika zemljin in kamnin, inženirska geologija, okoljska geotehnika, geosintetika, geotehnične konstrukcije, numerične in analitične metode, računalniško modeliranje, terenske in laboratorijske preiskave. Revija izhaja dvakrat letno. (http://www.fg.uni-mb.si/journal-ags/)

Gradbeni vestnik

Vsebinsko tvorno in z delno finančno podporo sodelujemo tudi pri reviji Gradbeni vestnik (http://www.zveza-dgits.si/gradbeni-vestnik). Revija je glasilo Zveze društev gradbenih inženirjev in tehnikov Slovenije in Matične sekcije gradbenih inženirjev Inženirske zbornice Slovenije. Izhaja vsak mesec.



Naslovnica revije Geodetski vestnik iz leta 2017 (revija izhaja štirikrat letno)
Cover page of Geodetski vestnik from 2017 (the journal is published quarterly)

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

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