Semester 1		
Polytechnic graduate professional study programme specialization in Civil Engineering obligatory courses		
P:dr.sc. Dalibor Gelo mag.ing.aedif. A:dr.sc. Dalibor Gelo mag.ing.aedif. K:dr.sc. Dalibor Gelo mag.ing.aedif.	Structural Engineering	ECTS:4.0
P:dr.sc. Mandi Orlić Bachler v.pred P: Ivana Božić Dragun dipl.prof.mat. P:mr. sc. Reni Banov dipl. ing. mat. A:dr.sc. Mandi Orlić Bachler v.pred A:mr. sc. Reni Banov dipl. ing. mat.	Mathematics	ECTS:6.0
P:mr.sc. Donka Wurth v. predavač P:dr.sc. Sonja Zlatović , profesor visoke škole K:dr.sc. Sonja Zlatović , profesor visoke škole S:dr.sc. Sonja Zlatović , profesor visoke škole K:mr.sc. Donka Wurth v. predavač S:mr.sc. Donka Wurth v. predavač	Quality Management	ECTS:4.0
P:dr.sc. Mandi Orlić Bachler v.pred P:mr. sc. Reni Banov dipl. ing. mat. P: Ivana Božić Dragun dipl.prof.mat. A:dr.sc. Mandi Orlić Bachler v.pred L:dr.sc. Mandi Orlić Bachler v.pred A:mr. sc. Reni Banov dipl. ing. mat.	Probability and Statistics	ECTS:4.0
P:mr.sc. Petar Adamović prof.v.škole P:mr.sc. Časlav Dunović , viši predavač P:dr.sc. Mariela Sjekavica Klepo A:mr.sc. Petar Adamović prof.v.škole S:mr.sc. Petar Adamović prof.v.škole A:mr.sc. Časlav Dunović , viši predavač S:mr.sc. Časlav Dunović , viši predavač A:dr.sc. Mariela Sjekavica Klepo S:dr.sc. Mariela Sjekavica Klepo	Project Management	ECTS:4.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:doc.dr.sc. Dalija Kuvačić profesor visoke škole A:doc.dr.sc. Dalija Kuvačić profesor visoke škole	Economics and Management	ECTS:4.0
P:mr.sc. Sanja Bračun dipl.oec. A:mr.sc. Sanja Bračun dipl.oec.	Asset Management	ECTS:4.0
P:mr.sc. Lucija Bačić v.pred. A:mr.sc. Lucija Bačić v.pred. S:mr.sc. Lucija Bačić v.pred.	Communication Skills	ECTS:4.0
P: Ljiljana Matuško Antonić S: Ljiljana Matuško Antonić	Bussiness Ethics and Law	ECTS:4.0

Semester 2		
Polytechnic graduate professional study programme specialization in Civil Engineering obligatory courses		
P:prof.vis.šk. Boris Baljkas P:dr.sc. Krunoslav Pavković dipl.ing.građ. P:doc. dr. sc. Dean Čizmar dipl. ing. građ. A:dr.sc. Krunoslav Pavković dipl.ing.građ. K:dr.sc. Krunoslav Pavković dipl.ing.građ. A: Šime Serdarević mag. ing. aedif. K: Šime Serdarević mag. ing. aedif. A:doc. dr. sc. Dean Čizmar dipl. ing. građ. K:doc. dr. sc. Dean Čizmar dipl. ing. građ.	Engineering Buildings	ECTS:6.0
P: Želimir Ortolan P:dr.sc. Sonja Zlatović , profesor visoke škole K:dr.sc. Sonja Zlatović , profesor visoke škole L:dr.sc. Sonja Zlatović , profesor visoke škole K: Ratko Savi struč.spec.ing.aedif. L: Ratko Savi struč.spec.ing.aedif.	Modern Methods in Geotechnical Engineering	ECTS:6.0
P:mr.sc. Petar Adamović prof.v.škole P:mr.sc. Časlav Dunović , viši predavač A:mr.sc. Petar Adamović prof.v.škole K:mr.sc. Petar Adamović prof.v.škole A:mr.sc. Časlav Dunović , viši predavač K:mr.sc. Časlav Dunović , viši predavač A:dr.sc. Mariela Sjekavica Klepo K:dr.sc. Mariela Sjekavica Klepo	Constructon Project Management	ECTS:6.0
P:mr.sc. Gorana Ćosić-Flajsig viši predavač A:mr.sc. Gorana Ćosić-Flajsig viši predavač S:mr.sc. Gorana Ćosić-Flajsig viši predavač A:dr.sc. Ivan Vučković dipl.ing.biologije S:dr.sc. Ivan Vučković dipl.ing.biologije	Environmental Management	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:v.predavač Boris Uremović dipl.ing.građ. P:mr.sc. Donka Wurth v. predavač A:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. A: Domagoj Šojat struč.spec.ing.aedif. K: Domagoj Šojat struč.spec.ing.aedif. A: Nina Šantek struč.spec.ing.aedif., predavač K: Nina Šantek struč.spec.ing.aedif., predavač A: Sanela Vojnović mag.ing.aedif K: Sanela Vojnović mag.ing.aedif	Modern Construction Technologies	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:doc.dr.sc. Miroslav Šimun dipl.ing.građ. A: Sandra Mihalinac mag.ing.aedif. K: Sandra Mihalinac mag.ing.aedif. A:doc.dr.sc. Miroslav Šimun dipl.ing.građ. K:doc.dr.sc. Miroslav Šimun dipl.ing.građ.	Urban Transport Facilities	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:dr.sc. Mladen Petričec dipl.ing.građ. P: Danko Fundurulja	Solid Waste Disposals	ECTS:6.0

A: Filip Kalinić mag. ing. aedif. K: Filip Kalinić mag. ing. aedif.		
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:dr.sc. Igor Gukov , dipl.ing.građ. A:dr.sc. Igor Gukov , dipl.ing.građ. K:dr.sc. Igor Gukov , dipl.ing.građ. A: Ivan Volarić struč.spec.ing.aedif. K: Ivan Volarić struč.spec.ing.aedif.	Concrete Engineering Structures	ECTS:6.0

Semester 3		
Polytechnic graduate professional study programme specialization in Civil Engineering obligatory courses		
P:dr.sc. Igor Gukov , dipl.ing.građ. K:dr.sc. Igor Gukov , dipl.ing.građ. A: Ivan Volarić struč.spec.ing.aedif. K: Ivan Volarić struč.spec.ing.aedif.	Bridges	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:mr.sc. Željko Lebo v. pred.	Geotechnology	ECTS:3.0
P: Željko Kovačević , struč.spec.ing.techn.inf. A: Tamara Ivelja mag. ing. geod. et. geoinf. K: Tamara Ivelja mag. ing. geod. et. geoinf. S: Tamara Ivelja mag. ing. geod. et. geoinf.	GIS and spatial database	ECTS:6.0
P: Stjepan Kordek dipl.ing.građ. A: Stjepan Kordek dipl.ing.građ. K: Stjepan Kordek dipl.ing.građ. L: Stjepan Kordek dipl.ing.građ.	Water Treatement	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Preservation of Cultural-Historic Heritage	ECTS:3.0
P:dr.sc. Ivan Vučković dipl.ing.biologije	Basic hydrobiology	ECTS:3.0
P:mr.sc. Željko Uhlir A:mr.sc. Željko Uhlir K:mr.sc. Željko Uhlir	Basics of real estate valuation	ECTS:6.0
P:dr.sc. Mirela Katić Žlepalo prof.mat. P:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. K:dr.sc. Mirela Katić Žlepalo prof.mat.	Parametric modelling I	ECTS:6.0
P: Sanja Lađarević dipl.ing.arh. K: Goran Babić	Perception and technical presentations of space	ECTS:3.0
P:mr.sc. Gorana Ćosić-Flajsig viši predavač A: Dejan Kovačević dipl.ing.građ. K: Dejan Kovačević dipl.ing.građ. S: Dejan Kovačević dipl.ing.građ. L: Marin Ganjto	Wastewater Treatment	ECTS:6.0
P: Iva Ževrnja predavač P:dr.sc. Dražen Arbutina dipl.ing.arh. K: Iva Ževrnja predavač	Documentation principles in construction design	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic plans as basis for planning and construction	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic computer science	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Geoinformation Systems (GIS)	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. A:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to physical planning and sustainability	ECTS:3.0

P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic surveying techniques	ECTS:3.0
P:dr.sc. Mladen Petričec dipl.ing.građ. P:mr.sc. Gorana Ćosić-Flajsig viši predavač S:dr.sc. Mladen Petričec dipl.ing.građ. A: Ivana Bartolić , pred. K: Ivana Bartolić , pred.	Water Resources Systems	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P: Željko Kovačević , struč.spec.ing.techn.inf. A: Tamara Ivelja mag. ing. geod. et. geoinf. K: Tamara Ivelja mag. ing. geod. et. geoinf. S: Tamara Ivelja mag. ing. geod. et. geoinf.	GIS and spatial database	ECTS:6.0
P:v.predavač Boris Uremović dipl.ing.građ. A:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ.	Construction logistics	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Preservation of Cultural-Historic Heritage	ECTS:3.0
P:mr.sc. Željko Uhlir A:mr.sc. Željko Uhlir K:mr.sc. Željko Uhlir	Basics of real estate valuation	ECTS:6.0
P:dr.sc. Mirela Katić Žlepalo prof.mat. P:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. K:dr.sc. Mirela Katić Žlepalo prof.mat.	Parametric modelling I	ECTS:6.0
P: Sanja Lađarević dipl.ing.arh. K: Goran Babić	Perception and technical presentations of space	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic plans as basis for planning and construction	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic computer science	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Geoinformation Systems (GIS)	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. A:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to physical planning and sustainability	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic surveying techniques	ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:doc. dr. sc. Sanja Morić predavačica K:doc. dr. sc. Sanja Morić predavačica		ECTS:3.0
P:mr.sc. Željko Lebo v. pred. A:mr.sc. Željko Lebo v. pred.	Geotechnology	ECTS:3.0

K:mr.sc. Željko Lebo v. pred.		
P: Željko Kovačević , struč.spec.ing.techn.inf. A: Tamara Ivelja mag. ing. geod. et. geoinf. K: Tamara Ivelja mag. ing. geod. et. geoinf. S: Tamara Ivelja mag. ing. geod. et. geoinf.	GIS and spatial database	ECTS:6.0
P: Željko Pavlin dipl.ing.građ. A: Željko Pavlin dipl.ing.građ. K: Željko Pavlin dipl.ing.građ. S: Željko Pavlin dipl.ing.građ. A: Berislav Rupčić K: Berislav Rupčić S: Berislav Rupčić	Hydraulic structures	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Preservation of Cultural-Historic Heritage	ECTS:3.0
P:mr.sc. Željko Uhlir A:mr.sc. Željko Uhlir K:mr.sc. Željko Uhlir	Basics of real estate valuation	ECTS:6.0
P:dr.sc. Mirela Katić Žlepalo prof.mat. P:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. K:dr.sc. Mirela Katić Žlepalo prof.mat.	Parametric modelling I	ECTS:6.0
P: Sanja Lađarević dipl.ing.arh. K: Goran Babić	Perception and technical presentations of space	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic plans as basis for planning and construction	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic computer science	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Geoinformation Systems (GIS)	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. A:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to physical planning and sustainability	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic surveying techniques	ECTS:3.0
P:doc. dr. sc. Sanja Morić predavačica K:doc. dr. sc. Sanja Morić predavačica		ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P: Željko Kovačević , struč.spec.ing.techn.inf. A: Tamara Ivelja mag. ing. geod. et. geoinf. K: Tamara Ivelja mag. ing. geod. et. geoinf. S: Tamara Ivelja mag. ing. geod. et. geoinf.	GIS and spatial database	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Preservation of Cultural-Historic Heritage	ECTS:3.0

P:mr.sc. Željko Uhlir A:mr.sc. Željko Uhlir K:mr.sc. Željko Uhlir	Basics of real estate valuation	ECTS:6.0
P:dr.sc. Mirela Katić Žlepalo prof.mat. P:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. K:dr.sc. Mirela Katić Žlepalo prof.mat.	Parametric modelling I	ECTS:6.0
P: Sanja Lađarević dipl.ing.arh. K: Goran Babić	Perception and technical presentations of space	ECTS:3.0
P: Goran Puž A: Karlo Kopljar	Earthquake Engineering	ECTS:6.0
P: Iva Ževrnja predavač P:dr.sc. Dražen Arbutina dipl.ing.arh. K: Iva Ževrnja predavač	Documentation principles in construction design	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. P: Iva Ževrnja predavač K:dr.sc. Dražen Arbutina dipl.ing.arh. K: Iva Ževrnja predavač	Introduction to Architectural Drawing	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic plans as basis for planning and construction	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic computer science	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Geoinformation Systems (GIS)	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. A:dr.sc. Dražen Arbutina dipl.ing.arh. S:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to physical planning and sustainability	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to geodetic surveying techniques	ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P: Željko Pavlin dipl.ing.građ. A: Željko Pavlin dipl.ing.građ. K: Željko Pavlin dipl.ing.građ. S: Željko Pavlin dipl.ing.građ. A: Berislav Rupčić K: Berislav Rupčić S: Berislav Rupčić	Hydraulic structures	ECTS:6.0
P:doc.dr.sc. Miroslav Šimun dipl.ing.građ. S: Sandra Mihalinac mag.ing.aedif. S:doc.dr.sc. Miroslav Šimun dipl.ing.građ.	Pavement Structures	ECTS:3.0
P:mr.sc. Ante Goran Bajić viši predavač K:mr.sc. Ante Goran Bajić viši predavač	Train Stations	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:mr.sc. Časlav Dunović , viši predavač P:mr.sc. Željko Uhlir A:mr.sc. Časlav Dunović , viši predavač S:mr.sc. Časlav Dunović , viši predavač	Construction Regulations	ECTS:6.0
P: Josip Čengija P:v.predavač Boris Uremović	Investment Policies	ECTS:6.0

dipl.ing.građ. A: Josip Čengija K: Josip Čengija A: Belinda Brucker		
P:mr.sc. Časlav Dunović , viši predavač A: Domagoj Šojat struč.spec.ing.aedif. K: Nina Šantek struč.spec.ing.aedif., predavač A:dr.sc. Mariela Sjekavica Klepo K:dr.sc. Mariela Sjekavica Klepo	Project Planning and Monitoring	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P: Stjepan Kordek dipl.ing.građ. A: Stjepan Kordek dipl.ing.građ. K: Stjepan Kordek dipl.ing.građ. L: Stjepan Kordek dipl.ing.građ.	Water Treatement	ECTS:6.0
P:dr.sc. Ivan Vučković dipl.ing.biologije	Basic hydrobiology	ECTS:3.0
P:mr.sc. Gorana Ćosić-Flajsig viši predavač A: Dejan Kovačević dipl.ing.građ. K: Dejan Kovačević dipl.ing.građ. S: Dejan Kovačević dipl.ing.građ. L: Marin Ganjto	Wastewater Treatment	ECTS:6.0
P:dr.sc. Mladen Petričec dipl.ing.građ. P:mr.sc. Gorana Ćosić-Flajsig viši predavač S:dr.sc. Mladen Petričec dipl.ing.građ. A: Ivana Bartolić , pred. K: Ivana Bartolić , pred.	Water Resources Systems	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:prof.vis.šk. Boris Baljkas P:doc. dr. sc. Dean Čizmar dipl. ing. građ. A: Ivan Volarić struč.spec.ing.aedif. K: Ivan Volarić struč.spec.ing.aedif. A:doc. dr. sc. Dean Čizmar dipl. ing. građ. K:doc. dr. sc. Dean Čizmar dipl. ing. građ.	Wooden Engineering Structures	ECTS:6.0
P: Jagoda Bodić dipl.ing.arh. P: Iva Ževrnja predavač A: Jagoda Bodić dipl.ing.arh. K: Jagoda Bodić dipl.ing.arh. A: Iva Ževrnja predavač K: Iva Ževrnja predavač	Public and industrial buildings - pre-school education, education and health care	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. P: Iva Ževrnja predavač A:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Public and industrial buildings - work, tourism and sport	ECTS:6.0
P:prof.vis.šk. Boris Baljkas P:dr.sc. Krunoslav Pavković dipl.ing.građ. A:prof.vis.šk. Boris Baljkas A:dr.sc. Krunoslav Pavković dipl.ing.građ. K:dr.sc. Krunoslav Pavković dipl.ing.građ.	Steel Engineering Structures	ECTS:6.0

Semester 4		
Polytechnic graduate professional study programme specialization in Civil Engineering obligatory courses		
A:mr.sc. Ante Goran Bajić viši predavač	Graduation Thesis	ECTS:18.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:dr.sc. Dražen Arbutina dipl.ing.arh. P:mr.sc. Donka Wurth v. predavač	Basics in Materials for the Conservation of the Architectural Heritage	ECTS:3.0
P:mr.sc. Željko Uhlir	Legal Aspects of Construction Projects	ECTS:6.0
P:mr.sc. Jure Galić predavač P:mr.sc. Donka Wurth v. predavač K:mr.sc. Jure Galić predavač K:mr.sc. Donka Wurth v. predavač	Protection and Repair of Structures	ECTS:6.0
P:mr.sc. Željko Lebo v. pred. P:doc.dr.sc. Miroslav Šimun dipl.ing.građ. A: Sandra Mihalinac mag.ing.aedif. K: Sandra Mihalinac mag.ing.aedif. A: Ivan Mustapić K: Ivan Mustapić	Tunnels	ECTS:6.0
P: Josip Čengija A: Josip Čengija K: Josip Čengija A: Belinda Brucker K: Belinda Brucker	Management and Maintenance of Infrastructure Facilities and Buildings	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Sustainable Building Services	ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:dr.sc. Darko Barbalić dipl.ing.građ. A:dr.sc. Darko Barbalić dipl.ing.građ. K:dr.sc. Darko Barbalić dipl.ing.građ. S:dr.sc. Darko Barbalić dipl.ing.građ.	Water Resources Modelling	ECTS:6.0
P:doc. dr. sc. Sanja Morić predavačica K:doc. dr. sc. Sanja Morić predavačica		ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:prof.vis.šk. Boris Baljkas P:dr.sc. Krunoslav Pavković dipl.ing.građ. P:doc. dr. sc. Dean Čizmar dipl. ing. građ. L:dr.sc. Krunoslav Pavković dipl.ing.građ. L:doc. dr. sc. Dean Čizmar dipl. ing. građ.	Structural Modelling and Design	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. P:mr.sc. Donka Wurth v. predavač	Basics in Materials for the Conservation of the Architectural Heritage	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Basics of Reconstruction, Retrofitting and Adaptation of the Architectural Heritage	ECTS:3.0
P:mr.sc. Ljerka Kopričanec Matijevac viši predavač A:mr.sc. Ljerka Kopričanec Matijevac viši predavač S:mr.sc. Ljerka Kopričanec Matijevac viši predavač	Fire Protection	ECTS:3.0
P:mr.sc. Jure Galić predavač P:mr.sc. Donka Wurth v. predavač K:mr.sc. Jure Galić predavač K:mr.sc. Donka Wurth v. predavač	Protection and Repair of Structures	ECTS:6.0

P:mr.sc. Donka Wurth v. predavač K:mr.sc. Donka Wurth v. predavač	Durability and Maintenance of Buildings	ECTS:6.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Management of architectural heritage / cultural institutions	ECTS:3.0
P: Jagoda Bodić dipl.ing.arh. P: Iva Ževrnja predavač	Introduction to ergonomics	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. P:doc. dr. sc. Dean Čizmar dipl. ing. građ. K:dr.sc. Dražen Arbutina dipl.ing.arh. K:doc. dr. sc. Dean Čizmar dipl. ing. građ.	Introduction to Structural Retrofit of the Architectural Heritage	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Sustainable Building Services	ECTS:3.0
Nositelj predmeta nije poznat	Introduction to Sustainable Architecture and Construction	ECTS:3.0
P: Iva Ževrnja predavač P:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Practical Ergonomics	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to the Interior Design	ECTS:3.0
P: Iva Ževrnja predavač P:dr.sc. Dražen Arbutina dipl.ing.arh. K: Iva Ževrnja predavač	Introduction to the elaboration and implementation of the architectural project	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to Urban Planning and Heritage Conservation	ECTS:3.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:doc.dr.sc. Miroslav Šimun dipl.ing.građ. L: Sandra Mihalinac mag.ing.aedif. S: Sandra Mihalinac mag.ing.aedif. L:doc.dr.sc. Miroslav Šimun dipl.ing.građ. S:doc.dr.sc. Miroslav Šimun dipl.ing.građ.	Characteristics of pavement surface	ECTS:6.0
P:dr.sc. Darko Barbalić dipl.ing.građ. A:dr.sc. Darko Barbalić dipl.ing.građ. K:dr.sc. Darko Barbalić dipl.ing.građ. S:dr.sc. Darko Barbalić dipl.ing.građ.	Water Resources Modelling	ECTS:6.0
P:mr.sc. Željko Lebo v. pred. P:doc.dr.sc. Miroslav Šimun dipl.ing.građ. A: Sandra Mihalinac mag.ing.aedif. K: Sandra Mihalinac mag.ing.aedif. A: Ivan Mustapić K: Ivan Mustapić	Tunnels	ECTS:6.0
Polytechnic graduate professional study programme specialization in Civil Engineering elective courses		
P:doc. dr. sc. Sanja Morić predavačica K:doc. dr. sc. Sanja Morić predavačica		ECTS:6.0
P:dr.sc. Mirela Katić Žlepalo prof.mat. P: Sanja Lađarević dipl.ing.arh. P:v.predavač Boris Uremović dipl.ing.građ. K:v.predavač Boris Uremović dipl.ing.građ. K:dr.sc. Mirela Katić Žlepalo prof.mat. K: Goran Babić	Parametric modelling II	ECTS:6.0
P:dr.sc. Sonja Zlatović , profesor visoke škole		ECTS:3.0

K:dr.sc. Sonja Zlatović , profesor visoke škole		
P:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh.	Introduction to recording and Documentation of the Architectural Heritage	ECTS:3.0
P:dr.sc. Dražen Arbutina dipl.ing.arh. P: Iva Ževrnja predavač P:doc. dr. sc. Dean Čizmar dipl. ing. građ. A:dr.sc. Dražen Arbutina dipl.ing.arh. K:dr.sc. Dražen Arbutina dipl.ing.arh. A:doc. dr. sc. Dean Čizmar dipl. ing. građ. K:doc. dr. sc. Dean Čizmar dipl. ing. građ.	Introduction to thermal insulation and energy efficiency in Civil Engineering	ECTS:3.0

Semester 5

Semester 6

Code WEB/ISVU	23891/173491	**ECTS**	3.0	**Academic year**	2018/2019
Name					
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:doc. dr. sc. Sanja Morić predavačica Construction exercises:doc. dr. sc. Sanja Morić predavačica				
Course objectives	getting familiar with technologies of sustainable living in cities				
Learning outcomes:	1.to evaluate eco transition in urban and rural areas. Level:7 2.to analyse the examples of sustainability of urban areas and green infrastructure. Level:6 3.to evaluate critically the influence of NGO and ecologists on eco transition. Level:7 4.to create seminar work according to instructions of a chosen journal . Level:6,7 5.To present a seminar work. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
Course content lectures	1.Introduction, 4h, Learning outcomes:1,5 2.Sustainable city as a system, 6h, Learning outcomes:2 3.Example analysis, sustainable cities and green infrastructure, 10h, Learning outcomes:3,4 4.No classes 5.No classes 6.No classes 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Course content constructures	1.No classes 2.Workshop: writing a seminar work according to chosen journal instructions, 10h, Learning outcomes:4,5 3.No classes 4.No classes 5.No classes 6.No classes 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	Basic literature: Materijali s predavanja				
Students obligations	classes attendance				
Knowledge evaluation during semester	Seminar work				
Knowledge evaluation after semester	Seminar work				
Student activities:	Aktivnost (Activity in class)			ECTS 2	

	(Seminar Work)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	23880/173480	**ECTS**	3.0	**Academic year**	2018/2019
Name					
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+0+15) 60
Teachers	Lectures:dr.sc. Sonja Zlatović , profesor visoke škole Construction exercises:dr.sc. Sonja Zlatović , profesor visoke škole				
Course objectives	Understanding the behavior of soil in earthquakes, and avoiding problems known in earthquake geotechnical engineering.				
Learning outcomes:	1.evaluate possible damages due to earthquake. Level:6,7 2.choose proper method of soil investigation. Level:7 3.judge and use results of soil investigation. Level:7 4.estimate wave amplification for a given location. Level:6,7 5.evaluate liquefaction susceptibility. Level:6,7 6.estimate soil settlement caused by an earthquake. Level:6,7 7.choose method of soil improvement or other method to avoid problems with soil in possible earthquakes. Level:6,7 8.evaluate importance of soil-structure interaction. Level:7 9.propose foundations for a structure. Level:7 10.estimate seismic action on a structure. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Discussion Questions and answers Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Mind mapping Computer simulations Interactive problem solving Workshop				
Course content lectures	1.Nature of earthquakes. Magnitude and intensity., 1h, Learning outcomes:1 2.Landslides in earthquakes., 1h, Learning outcomes:1 3.Liquefaction, 1h, Learning outcomes:2,3,5 4.Liquefaction, 1h, Learning outcomes:2,3,5 5.Wave amplification, 1h, Learning outcomes:1,4 6.Soil behaviour in earthquakes., 1h, Learning outcomes:2,3 7.Laboratory testing., 1h, Learning outcomes:2,3 8.In situ testing., 1h, Learning outcomes:2,3 9.Liquefaction susceptibility., 1h, Learning outcomes:2,3,5 10.Soil settlement due to liquefaction., 1h, Learning outcomes:2,3,5 11.Soil improvement., 1h, Learning outcomes:7 12.Soil-structure interaction., 1h, Learning outcomes:8 13.Seismic action and ground effects., 1h, Learning outcomes:10 14.Seismic action and ground effects., 1h, Learning outcomes:10 15.Foundations. Isolation., 1h, Learning outcomes:9				
Course content constructures	1.Nature of earthquakes. Magnitude and intensity., 1h, Learning outcomes:1 2.Landslides in earthquakes., 1h, Learning outcomes:1 3.Liquefaction, 1h, Learning outcomes:5 4.Liquefaction, 1h, Learning outcomes:5 5.Wave amplification, 1h, Learning outcomes:4 6.Soil behaviour in earthquakes., 1h, Learning outcomes:2,3 7.Laboratory testing., 1h, Learning outcomes:2,3,5 8.In situ testing., 1h, Learning outcomes:2,3,5 9.Liquefaction susceptibility., 1h, Learning outcomes:2,3,5 10.Soil settlement due to liquefaction., 1h, Learning outcomes:2,3,5,6 11.Soil improvement., 1h, Learning outcomes:5,7 12.Soil-structure interaction., 1h, Learning outcomes:8 13.Seismic action and ground effects., 1h, Learning outcomes:10 14.Seismic action and ground effects., 1h, Learning outcomes:10 15.Temeljenje u potresnim podruma., 1h, Learning outcomes:9				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				

	Maquette	
Exam literature	TOWHATA, Ikuo, 2008, Geotechnical Earthquake Engineering, Springer ISHIHARA, Kenji, 1996, Soil Behaviour in Earthquake Geotechnics, Oxford University Press KRAMER, Steven L., 1996, Earthquake Geotechnical Engineering, Pearson KOKUSHO, Takaji, 2017, Innovative Earthquake Soil Dynamics	
Students obligations	Activities during lectures - assignments, tests, minitests.	
Knowledge evaluation during semester	2 tests	
Knowledge evaluation after semester	written exam	
Student activities:	Aktivnost	ECTS
	(Activity in class)	1
	(Written exam)	1
	(Research)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	Sonja ZLATOVIĆ, PhD	

Code WEB/ISVU	23874/173474	**ECTS**	3.0	**Academic year**	2018/2019
Name					
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:doc. dr. sc. Sanja Morić predavačica Construction exercises:doc. dr. sc. Sanja Morić predavačica				
Course objectives	basics on elements of inclusive, universal design oriented toward individual smart house users needs				
Learning outcomes:	1.to review smart house and its elements. Level:7 2.to estimate urban and rural trends of smart houses. Level:6,7 3.to review the silver economy potential. Level:7 4.to analyse the individual needs of smart house users. Level:6 5.to estimate the examples of smart houses projects. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
Course content lectures	1.Introduction, 2h, Learning outcomes:2 2.Analysis of smart living trends, 2h, Learning outcomes:1 3.Basic elements of smart houses, 6h, Learning outcomes:2 4.Smart houses examples according to users needs, 10h, Learning outcomes:3,4,5 5.No classes 6.No classes 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Course content constructures	1.No classes 2.No classes 3.No classes 4.No classes 5.Terrain tour of conducted infrastructure projects, 10h, Learning outcomes:5 6.No classes 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	Basic literature: materijali s predavanja				
Students obligations	Class attendance				
Knowledge evaluation during semester	-				
Knowledge evaluation after semester	Written exam				
Student activities:	Aktivnost (Classes attendance)			ECTS 1	

	(Activity in class) (Research)	1 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	23875/173475	**ECTS**	3.0	**Academic year**	2018/2019
Name					
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:doc. dr. sc. Sanja Morić predavačica Construction exercises:doc. dr. sc. Sanja Morić predavačica				
Course objectives	getting familiar with urban horticulture innovations for quality of life in urban areas				
Learning outcomes:	1.to connect the quality of life in cities with urban horticulture innovations . Level:6,7 2.to evaluate critically the examples of green infrastructure. Level:7 3.to choose key innovations of urban horticulture for the improvement of quality of life in urban areas . Level:7 4.to present the examples of green infrastructure good practice. Level:6,7 5.to write a seminar work. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Workshop				
Course content lectures	1.Introduction, basic terms, 2h, Learning outcomes:1 2.The quality of life, 4h, Learning outcomes:1,3 3.Urban horticulture and innovations, 4h, Learning outcomes:1,2 4.No classes 5.No classes 6.No classes 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Course content constructures	1.No classes 2.No classes 3.No classes 4.Tour visit of green infrastructure objects, 10h, Learning outcomes:2,3 5.Workshop - preparation of seminar assignment, 6h, Learning outcomes:1,2,3 6.Presentation of seminar assignment, 4h, Learning outcomes:1,4,5 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	Basic literature: Materijali s predavanja				
Students obligations	class attendance				
Knowledge evaluation during semester	Seminar assignment				
Knowledge evaluation after semester	Seminar assignment				

Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Activity in class)	1
	(Seminar Work)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	23879/173479	**ECTS**	6.0	**Academic year**	2018/2019
Name					
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+0+0+30) 120
Teachers	Lectures:doc. dr. sc. Sanja Morić predavačica Construction exercises:doc. dr. sc. Sanja Morić predavačica				
Course objectives	Getting acquainted with the basic elements of project cycle management on green project examples				
Learning outcomes:	1.to create a project summary. Level:6,7 2.to generate the basic elements of the project cycle. Level:6,7 3.to judge the chosen examples of the green projects. Level:7 4.to manage the assignments in the project team. Level:6,7 5.to present the results of a project assignment. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Workshop Other Terrain tour of implemented infrastructure projects				
Course content lectures	1.introduction, Terminology, 4h, Learning outcomes:1 2.The basic elements of a project cycle, 6h, Learning outcomes:1 3.Analysis of conducted green projects, 5h, Learning outcomes:2 4.Project budget planning, 5h, Learning outcomes:3,4 5.From idea to project application, 5h, Learning outcomes:1,3,4 6.Logical Framework Matrix, 5h, Learning outcomes:3,4,5 7.No classes 8.No classes 9.No classes 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Course content constructures	1.No classes 2.No classes 3.No classes 4.No classes 5.No classes 6.No classes 7.Implemented infrastructure projects - terrain tour, 10h, Learning outcomes:2 8.From idea to project application, 10h, Learning outcomes:1,3,4 9.Logical Framework Matrix, 10h, Learning outcomes:3,4,5 10.No classes 11.No classes 12.No classes 13.No classes 14.No classes 15.No classes				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment Terrain tour of implemented infrastructure projects				
Exam literature	Basic literature: materijali s predavanja				
Students obligations	Classes attendance				
Knowledge evaluation during semester	Project assignment				
Knowledge evaluation after	Written exam				

semester		
Student activities:	Aktivnost	ECTS
	(Research)	2
	(Activity in class)	1
	(Classes attendance)	2
	(Seminar Work)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	24020/186268	**ECTS**	4.0	**Academic year**	2018/2019
Name	Asset Management				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (15+0+0+0) 75
Teachers	Lectures:mr.sc. Sanja Bračun dipl.oec. Auditory exercises:mr.sc. Sanja Bračun dipl.oec.				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				
ISVU equivalents:	146689;163453;				

Code WEB/ISVU	23873/173473	**ECTS**	3.0	**Academic year**	2018/2019
Name	Basic hydrobiology				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+0 (0+0+0+0) 60
Teachers	Lectures:dr.sc. Ivan Vučković dipl.ing.biologije				
Course objectives	Student will be sensitizes on the importance of preserving biodiversity in the surface water				
Learning outcomes:	1.critically analyse decisions on the use of water and water ecosystems, includingthe use of water as the place for final discharge of wastewater. Level:7 2.correlate basic environmenta lprinciples and circulationof matter and energy with sustainable use of water. Level:6,7 3.recommend environmental engineering measures to the water management plans. Level:6,7 4.anticipate effects of human activities on the condition of water and water ecosystems. Level:6,7 5.plan interventions in natural environment in accordance with principles of sustainable development. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Discussion Questions and answers Seminar, students presentation and discussion Auditory				
Course content lectures	1.The plan of course content and exam, 2h, Learning outcomes:5 2.Concept, content and importanceof the water ecology/biology , 1h, Learning outcomes:1 Connection of the hydrology and ecology/biology , 1h, Learning outcomes:1 3.Circulation of matter and energy flow, 1h, Learning outcomes:1 Biogeochemical processes and organic production, 1h, Learning outcomes:1,2 4.Water status and importance of water conservation, 1h, Learning outcomes:1,2 The terms that describe the ware status, 1h, Learning outcomes:1,2 5.Evaluation of the water status by biological and physicho-chemichal parameters, 2h, Learning outcomes:2 6.The impact of pollution on the water status, 2h, Learning outcomes:3 Aquatic ecosystem, 1h, Learning outcomes:2 7.Metods and indices which describing the water ecological status, 1h, Learning outcomes:4 River basin management and definiton od surface water bodies, 1h, Learning outcomes:4,5 8.Areas of practical application of hydrobiology , 2h, Learning outcomes:4,5 9.Protected areas and NATURA 2000 sites as areas of special water protection, 2h, Learning outcomes:4,5 10.Using natural retention in water management, 2h, Learning outcomes:4,5 11.Sustainable water use, 2h, Learning outcomes:4,5 12.Natural processes of wastwater treatment, 2h, Learning outcomes:4,5 13.Pressures and impact on biodiversity in surface water, 2h, Learning outcomes:5 14.Colloqium, 1h, Learning outcomes:1,2,3,4,5 Seminar paper - submission and expanation, 1h, Learning outcomes:1,2,3,4,5 15.Repeated colloquium, 1h, Learning outcomes:1,2,3,4,5 Oral part of the exam, 1h, Learning outcomes:1,2,3,4,5				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment Auditory				
Exam literature	1, Matoničkі, I. Pavletić, Z: Život naših rijeka, Školska knjiga 1972 2.Bonacci O.: Ekohidrologija vodnih resursa i otvorenih vodotoka, Građevinski-arhitektonski fakultet Sveučilišta u Splitu, Split, 2001. 3. GlavačV.:Uvod u globalnu ekologiju, Državna uprava za zaštiu prirode i okoliša, Zagreb, 1999. 4. Primc Habdija B., Kerovec M. i sur.: Biološka valorizacija voda - Metode i indikaorski sustav HR, HRIS Biološki odsjek PMF-a, Zagreb 2003				
Students obligations	Regularity attendance, max 30 points Lectures start: 30 points, Condition: 20 points. Worked and defended seminar work The preparation, the dedication, the presentation content of the seminar work is evaluated				
Knowledge evaluation during semester	The theoretical part of all learning outcomes, max 70 points Passage: More than 36 points. (50%) There is a repair colloquium. Oral exam: max 30 points. Total, max 100 points. 91- 100 = 5 81 - 90 = 4 71 - 80 = 3 61 - 70 = 2				

	60 = 1	
Knowledge evaluation after semester	Written part of the exam max. 70 points Oral exam, max. 30 points Passage: More than 42 points (60%) Total, max 100 points. 91- 100 = 5 81 - 90 = 4 71 - 80 = 3 61 - 70 = 2 60 = 1	
Student activities:	Aktivnost (Constantly tested knowledge) (Practical work)	ECTS 2 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	Ivan Vučković, PhD, lecturer 28.04.2018.	

Code WEB/ISVU	23887/173487	**ECTS**	3.0	**Academic year**	2018/2019
Name	Basics in Materials for the Conservation of the Architectural Heritage				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. mr.sc. Donka Wurth v. predavač Lectures:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Basic training for the assessment and preparation of designs for adequate materials application for the protection of the architectural heritage in accordance with the conservation requirements				
Learning outcomes:	1.Critically evaluate specific values of the architectural heritage. Level:7 2.Choose option for the level and intensity of intervention and appropriate materials for restoration of the architectural heritage. Level:7 3.Select appropriate materials and their alternatives in accordance with conservation requirements for restoration of architectural heritage. Level:7 4.Preparing a project for the application of materials for restoration of architectural heritage in accordance with conservation requirements. Level:6,7 5.a.Defend stand on selected materials, techniques and technologies, their use in rehabilitation of architectural heritage in accordance with the conservation requirements. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Seminar, students presentation and discussion				
How construction exercises are held	Laboratory exercises on laboratory equipment Group problem solving Workshop Other design preparation for adequate materials application for use on architectural heritage in accordance with conservation conditions				
Course content lectures	1.An overview of basic historical materials on architectural heritage, 2h, Learning outcomes:1,2,3,4,5 2.Principles for application of historical and contemporary materials in purpose of protecting and preserving the architectural heritage, 2h, Learning outcomes:1,2,3,4,5 3.Contemporary materials for restoration, maintenance and conservation of architectural heritage and limitations of their application, 2h, Learning outcomes:1,2,3,4 4.Methods of field sampling of materials on architectural heritage, 2h, Learning outcomes:3,4 5.Laboratory testing methods of heritage building material, 2h, Learning outcomes:3,4 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Surveying and documentation of construction and materials on architectural heritage, 2h, Learning outcomes:1,2,3,4,5 2.Sampling of materials on architectural heritage, 2h, Learning outcomes:3,4 3.Laboratory analysis of the architectural heritage sampled materials, 4h, Learning outcomes:3,4 4.Preparation of adequate materials design for restoration of architectural heritage , 4h, Learning outcomes:1,2,3,4,5 5.Preparation of adequate materials design for restoration of architectural heritage , 4h, Learning outcomes:1,2,3,4,5 6.Preparation of adequate materials design for restoration of architectural heritage , 4h, Learning outcomes:1,2,3,4,5 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Special purpose laboratory General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment				

Exam literature	1. ICCROM, Conservation of Architectural Heritage: Historic Structures and Materials : Arc Laboratory Handbook. Rom, 1999. 2. Arbutina D.; Dunović Č.; Alfirević Arbutina H. (2013.), Modern Materials in the Protection of Building Heritage, Proceedings of 11th International Conference Organization, Technology and Management in Construction, Dubrovnik-Zagreb 3. Teutonico, Jeanne M. A Laboratory Manual for Architectural Conservators. Rome: International Centre for the Study of the Preservation and the Restoration of Cultural Property = ICCROM, 1988. 4. Mortars, Cements and Grouts Used in the Conservation of Historic Buildings: Symposium, 3/6-11-1981, Rome. Rome: s.n., 1982. 5. Massari, Giovanni. Humidity in Monuments. Rome: International Centre for the Study of Preservation and the Restauration of Cultural Property, 1977. 6.Malinar, Hrvoje. Vlaga U Povijesnim Gradevinama: : Sistematika, Dijagnostika, Sanacija. Zagreb: Ministarstvo kulture, Uprava za zaštitu kulturne baštine, 2003. Dopunska Literatura 1. Selwitz, Charles. Epoxy Resins in Stone Conservation. Marina del Rey, Calif., USA: Getty Conservation Institute, 1992. 2. Bic#807;er-S#807;ims#807;ir, Beril, and Leslie Rainer. Evaluation of Lime-Based Hydraulic Injection Grouts for the Conservation of Architectural Surfaces: A Manual of Laboratory and Field Test Methods. , 2011. 3. Normandin, Kyle C, and Susan Macdonald. A Colloquium to Advance the Practice of Conserving Modern Heritage: March 6-7, 2013 : Meeting Report. , 2013. 4. Standeven, Harriet A. L. House Paints, 1900-1960: History and Use. Los Angeles: Getty Conservation Institute, 2011. 5. Jester, Thomas C. Twentieth-century Building Materials: History and Conservation. Los Angeles: Getty Publications, 2014. 6. Caneva, Giulia, M P. Nugari, and O Salvadori. Plant Biology for Cultural Heritage: Biodeterioration and Conservation. Los Angeles: Getty Conservation Institute, 2008.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (a reduced example of a design for restoration of architectural heritage with emphasis on the application of materials in accordance with conservation conditions and requirements) - Oral examination for all students - Synthesis of the thematic area related to the architectural heritage and the application of adequate materials for its restoration, protection and preservation.
Student activities:	Aktivnost — ECTS (Activity in class) — 1 (Practical work) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	24036/188107	**ECTS**	6.0	**Academic year**	2018/2019
Name	Basics of real estate valuation				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (20+0+0+10) 120
Teachers	Lectures:mr.sc. Željko Uhlir Auditory exercises:mr.sc. Željko Uhlir Construction exercises:mr.sc. Željko Uhlir				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23897/173498	**ECTS**	3.0	**Academic year**	2018/2019
Name	Basics of Reconstruction, Retrofitting and Adaptation of the Architectural Heritage				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Basic training for architectural heritage design, assessment and preparation of reconstruction, rehabilitation and adaptation in accordance with conservation requirements				
Learning outcomes:	1.Critically evaluate the value of architectural heritage in the light of the necessary and possible interventions. Level:7 2.To formulate basic conservation restrictions and principles for intervention on architectural heritage. Level:6,7 3.To create an appropriate design assignment (design brief) for eventual architectural heritage reconstruction, renovation or adaptation. Level:6,7 4.To design an appropriate way and level of intervention on architectural heritage to protect and preserve its values. Level:6,7 5.To defend the stand consistent with the conservation requirements of planned, projected and implemented reconstruction, remediation and adaptation interventions on architectural heritage. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers				
How construction exercises are held	Group problem solving Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.Evaluation of heritage and conservation principles of interventions on architectural heritage, 2h, Learning outcomes:1,2,3 2.Terminology of architectural heritage protection and its practical implications for conservation and construction procedures , 2h, Learning outcomes:1,2,3 3.Reconstruction of architectural heritage (theoretical principles with practical implications and procedures), 2h, Learning outcomes:1,2,3 4.Remediation of architectural heritage (theoretical principles with practical implications and procedures), 2h, Learning outcomes:1,2,3 5.Adaptation of architectural heritage (theoretical principles with practical implications and procedures), 2h, Learning outcomes:1,2,3 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.An analytical study of the architectural heritage value on a example, 4h, Learning outcomes:1,2,3 2.Definition of options and limitations for interventions on a example, 4h, Learning outcomes:1,2,3 3.Preparation of design brief for reconstruction, rehabilitation and adaptation of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3 4.Preparation of design brief for reconstruction, rehabilitation and adaptation of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3 5.Preparation of design brief for reconstruction, rehabilitation and adaptation of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector				

Exam literature	1. Arbutina D. (2009.), Faksimilna rekonstrukcija, stručna problematika, Stručni materijal uz seminar, Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva VII. Seminar, Tehničko veleučilište u Zagrebu, Zagreb 2. Arbutina D. (2012.), Zahvati, rekonstrukcije i adaptacije graditeljske baštine, Stručni materijal uz seminar, Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva XII. Seminar, Tehničko veleučilište u Zagrebu, Zagreb 3. Marasovic#769;, Jerko: Metodologija Obrade Graditeljskog Naslijeđa =: La Me#769;thodologie D'e#769;laboration Du Patrimoine Ba#770;ti. Split: Knjiz#780;evni krug, 2007. 4. Jokilehto, Jukka: A History of Architectural Conservation. Oxford: Butterworth-Heinemann, 2008. 5. Arbutina Dražen: Kulturno povijesna baština, Tehničko veleučilište u Zagrebu Zagreb, 2011 6. Gazzola, Pietro. The Past in the Future. Rome: Internat. Centre for the Study of the Preservation and the Restoration of Cultural Property, 1975. 7. Angelis, d'Ossat G.: Guide to the Methodical Study of Monuments and Causes of Their Deterioration. Rome: Faculty of Architecture University of Rome, 1982. 8. T. Marasović: "Aktivni pristup graditeljskom naslijeđu", Split, 1985. 9. T. Marasović: "Zaštita graditeljskog naslijeđa", Split-Zagreb. 1983. .
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (a design brief for reconstruction, rehabilitation and adaptation of the architectural heritage on a example with the initial and basic design elaboration of variants in accordance with conservation conditions and requirements) - Oral examination for all students - Synthesis of the thematic area related to the architectural heritage and the application of adequate materials for its restoration, protection and preservation.
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Practical work) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	24011/186259	**ECTS**	6.0	**Academic year**	2018/2019
Name	Bridges				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:dr.sc. Igor Gukov , dipl.ing.građ. Auditory exercises: Ivan Volarić struč.spec.ing.aedif. Construction exercises:dr.sc. Igor Gukov , dipl.ing.građ. Construction exercises: Ivan Volarić struč.spec.ing.aedif.				
Course objectives	Students will gain knowledge on historic development of bridges, requirements to be met by bridges, bridge construction methods, and major tasks related to the maintenance and use of bridges.				
Learning outcomes:	1.make load analysis for pedestrian, road and railway bridges. Level:6,7 2.prepare several bridge design solutions. Level:6,7 3.select an optimum bridge solution. Level:7 4.propose cross-sectional dimensions of a bridge. Level:6,7 5.create a preliminary design for a bridge. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Simulations Modelling Questions and answers An emphasis is placed on the visual dimension of bridge construction. Therefore, various sketches, drawings and large-format details are during lectures. Modern teaching aids are used for presentation of course material. Oral explanations focus on significant elements of sketches, on functions of individual parts of bridges, an on their interaction with other elements. Principal stability criteria to be met by bridges during construction as well as during subsequent use are presented. Guidelines of structural analyses and dimensioning are presented. Students are encouraged to actively participate in the lectures so as to enhance comprehension of course material.				
Methods of carrying out auditory exercises	Group problem solving Computer simulations The assignment solving procedure is presented on an example of a similar already completed assignment. Drawings and solutions are presented on anappropriate scale.				
How construction exercises are held	Group problem solving Computer simulations Assignments are elaborated - with the assistant				
Course content lectures	1.Introduction. History. General information. Types of bridges. The basic requirements for the bridges., 2h, Learning outcomes:3 2.Actions on bridges., 2h, Learning outcomes:1 3.The types of structures in bridges., 2h, Learning outcomes:2,3 4.Substructure. Equipment bridges., 2h, Learning outcomes:2,3,4 5.Plate-concrete bridges., 2h, Learning outcomes:2,3,4 6.Ribbed concrete bridges., 2h, Learning outcomes:2,3,4 7.Box-concrete bridges., 2h, Learning outcomes:2,3,4 8.Arch bridges., 2h, Learning outcomes:2,3,4 9.Beam and frame bridges. Rigid frame bridge. Integral bridges., 2h, Learning outcomes:2,3,4 10.Suspension bridges., 2h, Learning outcomes:2,3,4 11.Cable-stayed bridges., 2h, Learning outcomes:2,3,4 12.Composite bridges. Truss bridges., 2h, Learning outcomes:2,3,4 13.Bridges with steel girders. Steel orthotropic plate., 2h, Learning outcomes:2,3,4 14.Building bridges. Maintaining bridges. Bridges in extraordinary circumstances., 2h, Learning outcomes:2,3,4 15.Examples of modern bridge design. The second colloquium., 2h, Learning outcomes:1,2,3,4				
Course content auditory	1.Assign the task. Longitudinal section and plan view and cross sections of the bridge., 1h, Learning outcomes:2,5 2.Substructure., 1h, Learning outcomes:2,5 3.Bridge equipment and details., 1h, Learning outcomes:2,5 4.Drawing and review dispositions., 1h, Learning outcomes:2,5 5.Submission of completed preliminary drawing., 1h, Learning outcomes:5 6.Actions on bridges. Transverse distributions., 1h, Learning outcomes:1,2,5 7.Analysis of the load., 1h, Learning outcomes:1,5 8.Creating a model., 1h, Learning outcomes:2,5 9.Structural analysis., 1h, Learning outcomes:2,5 10.Nema nastave 11.Dimensioning., 1h, Learning outcomes:2,5 12.Nema nastave, Learning outcomes:5 13.Nema nastave 14.Nema nastave 15.Nema nastave				
Course content constructures	1.Assign the task. Longitudinal section, plan view and cross sections of the bridge., 1h, Learning outcomes:2,5 2.Substructure., 1h, Learning outcomes:2,5 3.Bridge equipment and details., 1h, Learning outcomes:2,5 4.Drawing and review dispositions., 1h, Learning outcomes:2,5 5.Submission of completed preliminary drawing., 1h, Learning outcomes:5 6.Actions on bridges. Transverse distributions., 1h, Learning outcomes:1,5				

	7.Analysis of the load., 1h, Learning outcomes:1,2,5 8.Creating a model., 1h, Learning outcomes:2,5 9.Structural analysis., 1h, Learning outcomes:2,5 10.The first colloquium., 2h, Learning outcomes:5 11.Dimensioning., 1h, Learning outcomes:2,5 12.Making a reinforcement drawing., 2h, Learning outcomes:2,5 13.Technical description, equipment program., 2h, Learning outcomes:2,5 14.Bills of quantities., 2h, Learning outcomes:2,5 15.View and delivery of the overall program, 2h, Learning outcomes:1,3,4,5
Required materials	Basic: classroom, blackboard, chalk... Overhead projector
Exam literature	Osnovna: 1. Radić, J.: Masivni mostovi, Hrvatska sveučilišna naklada, Andris, Zagreb, 2007. 2. Marić, Z.: Mostovi, : Sveučilište J. J. Strossmayera u Osijeku, Osijek, 2016. 3. Radić, J.; Mandić, A.; Puž, G.: Konstruiranje mostova, Hrvatska sveučilišna naklada, Jadring, Zagreb, 2005. 4. Radić, J.: Mostovi, Dom i svijet, Zagreb, 2002. 5. Horvatić, D.; Šavor, Z.: Metalni mostovi, Udžbenici Sveučilišta u Zagrebu, HDGK, Zagreb, 1998. 6. Radić, J.: Uvod u mostarstvo, Hrvatska sveučilišna naklada, Jadring, Zagreb, 2009. Additional literature: 7. Šram, S.: Gradnja mostova, Golden marketing, Zagreb, 2002. 8. Tonković, K.: Oblikovanje mostova, Tehnička knjiga, Zagreb, 1985. 9. Tonković, K.: Mostovi u izvanrednim okolnostima, Školska knjiga, Zagreb, 1989. 10. Ryall, M. J.; Parke, G. A. R.; Harding, J. E.: Manual of bridge engineering, Thomas Telford, London, 2000.
Students obligations	Maximum of 3 absences from exercises.
Knowledge evaluation during semester	Redovitost pohaa. Kolokvij, teorijska pitanja. Seminarski rad.
Knowledge evaluation after semester	The written part of the examination consists of five to seven questions, all relating to individual segments of the course. The oral part of the examination may be taken by students who obtained at least 60% op points.
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Oral exam) — 2 (Constantly tested knowledge) — 1 (Seminar Work) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	173458;

Code WEB/ISVU	24019/186267	**ECTS**	4.0	**Academic year**	2018/2019
Name	Bussiness Ethics and Law				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (0+0+15+0) 75
Teachers	Lectures: Ljiljana Matuško Antonić Seminar exercises: Ljiljana Matuško Antonić				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				
ISVU equivalents:	146692;163452;				

Code WEB/ISVU	24017/186265	**ECTS**	6.0	**Academic year**	2018/2019
Name	Characteristics of pavement surface				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+8+22+0) 120
Teachers	Lectures:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Laboratory exercises: Sandra Mihalinac mag.ing.aedif. Laboratory exercises:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Seminar exercises: Sandra Mihalinac mag.ing.aedif. Seminar exercises:doc.dr.sc. Miroslav Šimun dipl.ing.građ.				
Course objectives	Developing knowledge about important properties of asphalt, and ways of measuring and determining the criteria for the particular characteristics of the pavement surface				
Learning outcomes:	1.select the asphalt components and classify the construction products. Level:7 2.distinguish types of bituminous mixtures and finishing layers of the pavement. Level:6 3.compare and link the methods of determining the quality of the material and finishing works of the pavement. Level:6,7 4.formulate/shape the quality requirements of the constituent materials and the constructed finishing layer. Level:6,7 5.categorize the rolling surface properties, essential for safe and comfortable driving. Level:6 6.recommend the metering method and measure the parameters of driving surface. Level:7 7.standardize and analyze the criteria of a certain characteristic of the end layer of the pavement. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion				
Methods of carrying out laboratory exercises	Laboratory exercises on laboratory equipment Discussion, brainstorming Visit to the construction site				
Methods of carrying out seminars	Essay writing Discussion, brainstorming Workshop				
Course content lectures	1.General and introduction to the subject, 2h, Learning outcomes:1,2,5 2.Types of finishing layers of pavement, 2h, Learning outcomes:1,2 3.Ingredients of asphalt Construction Products, 2h, Learning outcomes:3,4 4.Methods for testing the properties of the material, bituminous mix and the asphalt layer, 2h, Learning outcomes:2,3,4 5.Quality condition of the material and finishing layer works of pavement, 2h, Learning outcomes:2,3,4 6.Production, transport and substrate, 2h, Learning outcomes:1,2,3 7.Construction of the finishing layer of pavement, 2h, Learning outcomes:1,2,3,4 8.Stiffness of the asphalt layer, 2h, Learning outcomes:1,3,4 9.Properties of driving surfaces, 2h, Learning outcomes:1,5 10.Methods and devices of measuring the properties of the driving surfaces, 2h, Learning outcomes:5,6 11.Roughness of the driving surfaces, 2h, Learning outcomes:5,6 12.Criteria for the roughness of the pavement, 2h, Learning outcomes:6,7 13.Determination of resistance to rutting, 2h, Learning outcomes:2,3,4,5 14.Determination connection of asphalt layers, 1h, Learning outcomes:2,4,5 15.The system of waterproofing and asphalt layers of road structure, 3h, Learning outcomes:2,5,6,7				
Course content laboratory	1.No classes, 2h 2.No classes, 2h 3.No classes, 2h 4.No classes, 2h 5.No classes, 2h 6.No classes, 2h 7.No classes, 2h 8.Testing of aggregates in road construction laboratories, 2h, Learning outcomes:1,2,3 9.Testing of bitumen in road construction laboratories, 2h, Learning outcomes:1,2,3,4 10.Testing of hot mix asphalt in road construction laboratories, 2h, Learning outcomes:1,2,3,4 11.Testing of bituminous specimens in road construction laboratories, 2h, Learning outcomes:1,2,3,4 12.No classes, 2h 13.No classes, 2h 14.No classes, 1h 15.No classes, 3h				
Course content seminars	1.EN 1097-2: Methods for the determination of resistance aggregates to fragmentation, 2h, Learning outcomes:1,2,3 2.EN 1097-6: Determination of particle density aggregates and water absorption, 2h, Learning outcomes:1,2,3 3.EN 1097-8: Determination of the polished stone value, 2h, Learning outcomes:1,2,3 4.EN 1426: Determination of bitumen penetration by needle, 1h, Learning outcomes:1,2,3,4 EN 1427: Determination of bitumen softening point, 1h, Learning outcomes:1,2,3,4 5.EN 12697-6: Determination of bulk density of bituminous specimens, 1h, Learning outcomes:2,3,4 EN 13398: Determination of the elastic recovery of modified bitumen, 1h, Learning outcomes:1,2,3,4 6.EN 12697-2: Determination of particle size distribution of hot mix asphalt, 1h, Learning outcomes:2,3,4 EN 13036-1: Measurement of pavement surface macrotexture depth using a volumetric patch technique, 1h, Learning outcomes:2,3,4,5 7.EN 13036-4: Method of measurement of slip/skid resistance of a surface; The pendlum test, 2h, Learning				

	outcomes:2,3,4,5 8.No classes, 2h 9.No classes, 2h 10.No classes, 2h 11.No classes, 2h, Learning outcomes:2 12.Measuring the texture of the pavement surface on the construction site, 2h, Learning outcomes:5,6,7 13.Measuring the slip/skid resistance of the pavement surface on the construction site, 2h, Learning outcomes:5,6,7 14.Measuring the ruts of the pavement surface on the construction site, 1h, Learning outcomes:4,5,6 15.Measuring the roughness of the pavement surface on the construction site, 3h, Learning outcomes:4,5,6
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment Visit to the road construction laboratories
Exam literature	OBAVEZNA: 1. Babić, B., Horvat, Z., Građenje i održavanje kolničkih konstrukcija, Fakultet građevinskih znanosti Sveučilišta u Zagrebu, 1987. 2. Roberts,F., i dr. Vruće asfaltne mješavine 1996. (prijevod na hrvatski jezik) 3. Henigman, S., i dr. Asfalt, Združenje asfalterjev Slovenije, Ljubljana, 2006. DOPUNSKA: 1. Opći tehnički uvjeti za radove na cestama, Zagreb, IGH 2001. 2. Tehnički uvjeti za asfaltne kolnike, Hrvatske ceste, Zagreb, 2015.
Students obligations	Regular attendance and a positive evaluated seminar, maximum of 30% absences
Knowledge evaluation during semester	The regularity of attendance#10#0#50$Seminar task#1#0#100$
Knowledge evaluation after semester	Written part of the examination consists of 7-8 questions relating to the topics presented during lectures and exercises; Oral part of the examination consists of 5-7 questions relating to the topics presented during lectures and exercises.
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Oral exam) — 2 (Seminar Work) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	Miroslav Šimun, PhD.Asst.Prof.C.E. 12.6.2017

Code WEB/ISVU	24021/186269	**ECTS**	4.0	**Academic year**	2018/2019
Name	Communication Skills				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (10+0+5+0) 75
Teachers	Lectures:mr.sc. Lucija Bačić v.pred. Auditory exercises:mr.sc. Lucija Bačić v.pred. Seminar exercises:mr.sc. Lucija Bačić v.pred.				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				
ISVU equivalents:	146690;				

Code WEB/ISVU	23908/181172	**ECTS**	6.0	**Academic year**	2018/2019
Name	Concrete Engineering Structures				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:dr.sc. Igor Gukov , dipl.ing.građ. Auditory exercises:dr.sc. Igor Gukov , dipl.ing.građ. Auditory exercises: Ivan Volarić struč.spec.ing.aedif. Construction exercises:dr.sc. Igor Gukov , dipl.ing.građ. Construction exercises: Ivan Volarić struč.spec.ing.aedif.				
Course objectives	Students will acquire knowledge and skills that are needed for the design, analysis and realization of concrete structures.				
Learning outcomes:	1.make a load analysis for a concrete structure. Level:6,7 2.develop analysis models for a structure. Level:6,7 3.propose cross-sectional dimensions of a load-bearing structure. Level:6,7 4.create planar and spatial analysis models for a structure. Level:6,7 5.check load-bearing capacity of all structural elements of a building/structure according to limit state methods. Level:7 6.using a computer software, prepare bending schedules of all elements of concrete structures with the definition of quantities. Level:6,7 7.prepare analysis of mechanical resistance and stability of a concrete structure. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Modelling Questions and answers				
Methods of carrying out auditory exercises	Laboratory exercises, computer simulations Group problem solving Traditional literature analysis Computer simulations Workshop				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Computer simulations Workshop				
Course content lectures	1.Prefabricated concrete structures., 2h, Learning outcomes:2,4,5 2.Calculation, reinforcement and construction of frame structures., 2h, Learning outcomes:2,3,5,6 3.Calculation, reinforcement and construction of short elements. , 2h, Learning outcomes:2,3,5,6 4.Calculation, reinforcement and construction of arch structures., 2h, Learning outcomes:2,3,5,6 5.Calculation, reinforcement and design of truss structure., 2h, Learning outcomes:2,3,5,6 6.Engineering buildings. Tanks, water towers, bunkers, silos., 2h, Learning outcomes:1,2,3,6 7.Thin-walled roof structure, barrel shells, conical roofs, shell dual curvature, tents, compound., 2h, Learning outcomes:2,3 8.Basic principles of structural concrete construction solutions., 2h, Learning outcomes:2,3 9.Rheology of concrete. Expansion joints., 2h, Learning outcomes:1 10.Design models. Linear theory calculation. Calculation the theory of plasticity., 2h, Learning outcomes:2,4 11.Basic recommendations for the design of buildings in earthquake areas., 2h, Learning outcomes:1,3 12.Reinforcement of concrete structures., 2h, Learning outcomes:3 13.Bridge structures., 2h, Learning outcomes:1,2,4 14.Masonry., 2h, Learning outcomes:1,5 15.Second Colloquium., 2h, Learning outcomes:7				
Course content auditory	1.Creating a static spatial models more storey residential building., 1h, Learning outcomes:1,2,4 2.Calculation and reinforcing the inspection chamber., 1h, Learning outcomes:1,2,4 3.Calculation and reinforcing retaining wall., 1h, Learning outcomes:1,2,4 4.Calculation and reinforcing core slabs on piles., 1h, Learning outcomes:2,4,5 5.Creating a static model of the plate pedestrian bridge., 1h, Learning outcomes:4 6.Creating a static model of a beam bridge ribbed cross section., 1h, Learning outcomes:2,4 7.Creating a static model of prefabricated prestressed girders., 1h, Learning outcomes:2,4 8.Calculation loss of prestressing force., 1h, Learning outcomes:5 9.Structural analysis and sizing. Checks to limit states., 1h, Learning outcomes:5 10.The first colloquium., 1h, Learning outcomes:1,2 11.Defining bearing structure of the building set., 1h, Learning outcomes:1,2 12.Analysis of the load., 1h, Learning outcomes:1,7 13.Defining and fabrication of planar and spatial design models., 1h, Learning outcomes:2,3,4,7 14.Calculation and dimensioning plane model., 1h, Learning outcomes:2,3,4,7 15.Calculation and dimensioning spatial models., 1h, Learning outcomes:2,4,7				
Course content constructures	1.Creating a static spatial models more storey residential building., 1h, Learning outcomes:1,2,4 2.Calculation and reinforcing the inspection chamber., 1h, Learning outcomes:1,2,4 3.Calculation and reinforcing retaining wall., 1h, Learning outcomes:1,2,4				

	4.Calculation and reinforcing core slabs on piles., 1h, Learning outcomes:2,4,5 5.Creating a static model of the plate pedestrian bridge., 1h, Learning outcomes:4 6.Creating a static model of a beam bridge ribbed cross section., 1h, Learning outcomes:2,4 7.Creating a static model of prefabricated prestressed girders., 1h, Learning outcomes:2,4 8.Stati prora i dimenzioniranje. Provjere prema granim stanju uporabljivosti., 1h, Learning outcomes:5 9.Structural analysis and sizing. Checks to limit states., 1h, Learning outcomes:5 10.The first colloquium., 1h, Learning outcomes:1,2 11.Defining bearing structure of the building set., 1h, Learning outcomes:1,2 12.Analysis of the load., 1h, Learning outcomes:1,7 13.Defining and fabrication of planar and spatial design models., 1h, Learning outcomes:2,3,4,7 14.Calculation and dimensioning plane model., 1h, Learning outcomes:2,3,4,7 15.Calculation and dimensioning spatial models. , 1h, Learning outcomes:2,4,7
Required materials	Basic: classroom, blackboard, chalk... Overhead projector
Exam literature	Osnovna: 1. Gukov, I.: Betonske konstrukcije I. Skripta Tehničkog veleučilišta u Zagrebu. Zagreb. 2010. 2. Sorić, Z., Kišiček, T.: Betonske konstrukcije 1. Sveučilišta u Zagrebu. Građevinski fakultet. Zagreb. 2014. 3. Radić, J. i suradnici: Betonske Konstrukcije Priručnik, Hrvatska sveučilišna naklada, Sveučilište u Zagrebu, Građevinski fakultet, SECON HNDK, Andris, Zagreb, 2006. 4. Radić, J. i suradnici: Betonske Konstrukcije Riješeni primjeri, Hrvatska sveučilišna naklada, Sveučilište u Zagrebu, Građevinski fakultet, Andris, Zagreb, 2006. 5. Behaim, B.: Armirani beton, Ars nova, Zagreb, 2010. 6. Sorić, Z.: Zidane konstrukcije I, Hrvatski savez građevinskih inženjera, Zagreb, 1999. Dodatna: 7. HRN EN 1990:2011. Eurokod. Osnove projektiranja konstrukcija + nacionalni dodatak. 8. HRN EN 1991:2012. Eurokod 1. Djelovanja na konstrukcije + nacionalni dodatak. 9. HRN EN 1992:2013. Eurokod 2. Projektiranje betonskih konstrukcija + nacionalni dodatak. 10. HRN EN 1998:2011. Eurokod 8. Projektiranje potresne otpornosti konstrukcija + nacionalni dodatak. 11. HRN EN 1996:2012. Eurokod 6. Projektiranje zidanih konstrukcija + nacionalni dodatak. 12. Tehnički propis za betonske konstrukcije, 2009.
Students obligations	Maximum of 3 absences from exercises.
Knowledge evaluation during semester	Redovitost pohaa. Kolokvij, teorijska pitanja. Seminarski rad. Programski zadatak.
Knowledge evaluation after semester	Pismeni ispit. Usmeni ispit.
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Oral exam) — 2 (Constantly tested knowledge) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146738;

Code WEB/ISVU	23870/173470	**ECTS**	6.0	**Academic year**	2018/2019
Name	Construction logistics				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:v.predavač Boris Uremović dipl.ing.građ. Auditory exercises:v.predavač Boris Uremović dipl.ing.građ. Construction exercises:v.predavač Boris Uremović dipl.ing.građ.				
Course objectives	To acquire knowledge regarding logistics in civil engineering				
Learning outcomes:	1.suggest parts of a logistical system of medium complexity. Level:6,7 2.create a logistical system of medium complexity. Level:6,7 3.manage a logistical system of medium complexity. Level:6,7 4.evaluate versions of logisitcal systems of medium complexity. Level:7 5.anticipate the needs and possibilities of logistical systems. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Questions and answers Seminar, students presentation and discussion				
Methods of carrying out auditory exercises	Data mining and knowledge discovery on the Web Discussion, brainstorming				
How construction exercises are held	Group problem solving Discussion, brainstorming Workshop				
Course content lectures	1.Introduction to construction logistics, 2h, Learning outcomes:1,2,3,4,5 2.Planning of a construction logistics system, 2h, Learning outcomes:1,2,3,4,5 3.Planning of a construction logistics system, 2h, Learning outcomes:1,2,3,4,5 4.Procurement and ordering, 2h, Learning outcomes:1,2,3,4,5 5.Procurement and ordering, 2h, Learning outcomes:1,2,3,4,5 6.Logistics in the project life cycle, 2h, Learning outcomes:1,2,3,4,5 7.The client role in the logistics process, 2h, Learning outcomes:1,2,3,4,5 8.The contractor role in the logistics process, 2h, Learning outcomes:1,2,3,4,5 9.The project manager role in the logistics process, 2h, Learning outcomes:1,2,3,4,5 10.Economic evaluation of logistical system variants, 2h, Learning outcomes:1,2,3,4,5 11.Environmental impact, 2h, Learning outcomes:1,2,3,4,5 12.The implementation of IT, 2h, Learning outcomes:1,2,3,4,5 13.BIM and construction logistics, 2h, Learning outcomes:1,2,3,4,5 14.BIM and construction logistics, 2h, Learning outcomes:1,2,3,4,5 15.Benchmarking, 2h, Learning outcomes:1,2,3,4,5				
Course content auditory	1.Definition of input data, 2h, Learning outcomes:1,2,3,4,5 2.Definiton of necessary resources, 2h, Learning outcomes:1,2,3,4,5 3.Definiton of necessary resources, 2h, Learning outcomes:1,2,3,4,5 4.Planning of a logistical system, 2h, Learning outcomes:1,2,3,4,5 5.Planning of a logistical system, 2h, Learning outcomes:1,2,3,4,5 6.no classes, 2h 7.no classes, 2h 8.no classes, 2h 9.no classes, 2h 10.no classes, 2h 11.no classes, 2h 12.no classes, 2h 13.no classes, 2h 14.no classes, 2h 15.no classes, 2h				
Course content constructures	1.no classes, 2h 2.no classes, 2h 3.no classes, 2h 4.no classes, 2h 5.no classes, 2h 6.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 7.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 8.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 9.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 10.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 11.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 12.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 13.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 14.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5 15.Students work on their own project of a medium complexity logistics system, 2h, Learning outcomes:1,2,3,4,5				

Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector
Exam literature	[1] Scott, C., Lundgren, H., Thompson, P. (2011). Guide to Supply Chain Management. Springer-Verlag Berlin. ISBN 978-3-642-17675-3 [2] Waters, D. et al. (2010). Global Logistics New directions in supply chain management 6th ed. KooganPage Press. ISBN 978-0-7494-5703-7 [3] Ferišak, V.; Medvešček, I.; Renko, F.; Sremac, D.; Šnajder, B. (1983). Poslovna logistika. Zagreb Informator
Students obligations	Seminar paper
Knowledge evaluation during semester	Writen exams and seminar paper presentation
Knowledge evaluation after semester	Writen exam
Student activities:	Aktivnost ECTS (Seminar Work) 4 (Written exam) 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	24027/186276	**ECTS**	6.0	**Academic year**	2018/2019
Name	Construction Regulations				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+20+0) 120
Teachers	Lectures:1. mr.sc. Časlav Dunović , viši predavač Lectures:2. mr.sc. Željko Uhlir Auditory exercises:mr.sc. Časlav Dunović , viši predavač Seminar exercises:mr.sc. Časlav Dunović , viši predavač				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	24009/186257	**ECTS**	6.0	**Academic year**	2018/2019
Name	Constructon Project Management				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (6+0+0+24) 120
Teachers	Lectures:mr.sc. Petar Adamović prof.v.škole Lectures:mr.sc. Časlav Dunović , viši predavač Auditory exercises:mr.sc. Petar Adamović prof.v.škole Auditory exercises:mr.sc. Časlav Dunović , viši predavač Auditory exercises:dr.sc. Mariela Sjekavica Klepo Construction exercises:mr.sc. Petar Adamović prof.v.škole Construction exercises:mr.sc. Časlav Dunović , viši predavač Construction exercises:dr.sc. Mariela Sjekavica Klepo				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				
ISVU equivalents:	146693;				

Code WEB/ISVU	23865/173464	**ECTS**	3.0	**Academic year**	2018/2019
Name	Documentation principles in construction design				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. Iva Ževrnja predavač Lectures:2. dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises: Iva Ževrnja predavač				
Course objectives	-				
Learning outcomes:	1.-. Level:6 2.-. Level:6 3.-. Level:6 4.-. Level:6,7 5.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Other -				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Discussion, brainstorming Other -				
Course content lectures	1.-, 2h, Learning outcomes:1 2.-, 2h, Learning outcomes:2,3 3.-, 2h, Learning outcomes:2,3 4.-, 2h, Learning outcomes:2,3 5.-, 2h, Learning outcomes:2,3 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.-, 2h, Learning outcomes:1,2,3,4,5 2.-, 2h, Learning outcomes:1,2,3,4,5 3.-, 2h, Learning outcomes:1,2,3,4,5 4.-, 2h, Learning outcomes:1,2,3,4,5 5.-, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h, Learning outcomes:1,2,3,4,5 7.-, 2h, Learning outcomes:1,2,3,4,5 8.-, 2h, Learning outcomes:1,2,3,4,5 9.-, 2h, Learning outcomes:1,2,3,4,5 10.-, 2h, Learning outcomes:1,2,3,4,5 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment				
Exam literature	1. Bodić, Ževrnja: Zgradarstvo I, Priručnik za izvođenje konstrukcijskih vježbi; izbor studentskih radova iz programa samostojećih obiteljskih zgrada 2.E.Neufert: Elementi arhitektonskog projektiranja, Golden marketing, Zagreb 2002 3.A.Štulhofer, Z.Veršić: Crtanje arhitektonskih nacrta, Pribor i osnove, UPI-2m,Zagreb1998 4.Zakon o gradnji, 153/13; Zakon o prostornom uređenju 153/13; www.migpu.hr 5. Pravilnik o osiguranju pristupačnosti građevina osobama s invaliditetom i smanjene pokretljivosti, NN78/2013				
Students obligations	-				

Knowledge evaluation during semester	-	
Knowledge evaluation after semester	-	
Student activities:	Aktivnost (Classes attendance) (Practical work)	ECTS 1 2
Remark	This course can not be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	-	

Code WEB/ISVU	23892/173493	**ECTS**	6.0	**Academic year**	2018/2019
Name	Durability and Maintenance of Buildings				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+0+0+30) 120
Teachers	Lectures:mr.sc. Donka Wurth v. predavač Construction exercises:mr.sc. Donka Wurth v. predavač				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23295/146742	**ECTS**	6.0	**Academic year**	2018/2019
Name	Earthquake Engineering				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures: Goran Puž Auditory exercises: Karlo Kopljar				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	24022/186270	**ECTS**	4.0	**Academic year**	2018/2019
Name	Economics and Management				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (15+0+0+0) 75
Teachers	Lectures:doc.dr.sc. Dalija Kuvačić profesor visoke škole Auditory exercises:doc.dr.sc. Dalija Kuvačić profesor visoke škole				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	24010/186258	**ECTS**	6.0	**Academic year**	2018/2019
Name	Engineering Buildings				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (14+0+0+16) 120
Teachers	Lectures:1. prof.vis.šk. Boris Baljkas Lectures:2. dr.sc. Krunoslav Pavković dipl.ing.građ. Lectures:3. doc. dr. sc. Dean Čizmar dipl. ing. građ. Auditory exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Auditory exercises:dr.sc. Krunoslav Pavković dipl.ing.građ. Auditory exercises: Šime Serdarević mag. ing. aedif. Construction exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Construction exercises:dr.sc. Krunoslav Pavković dipl.ing.građ. Construction exercises: Šime Serdarević mag. ing. aedif.				
Course objectives	Students will acquire an in-depth knowledge relating to the design, calculation and realization of engineering structures made of concrete, steel and wood.				
Learning outcomes:	1.prepare load analysis for concrete, steel and wooden structures. Level:6,7 2.define simpler structural analysis models and static solutions for structures of medium complexity. Level:6,7 3.propose cross-sectional dimensions of a load-bearing structure. Level:6,7 4.create a planar analysis model using a computer software. Level:6,7 5.determine load bearing capacity of model elements based on the ultimate bearing capacity and serviceability methods. Level:7 6.prepare bending schedules for slabs, beams, columns and walls using a computer software. Level:6,7 7.present complex static systems of steel structures. Level:6,7 8.predict steel structure failure modes. Level:6,7 9.produce documentation for the preparation of workshop drawings for steel and timber structures. Level:6,7 10.justify cost-effectiveness of material used in engineering structures. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Modelling Real-life structures are presented in all phases of design, fabrication and assembly, using drawings, photographs and video projections as appropriate.				
Methods of carrying out auditory exercises	Group problem solving Traditional literature analysis Other Structures and related calculations are presented on drawings, and explanations are given when necessary.				
How construction exercises are held	Group problem solving Computer simulations Other Presentation of the detailed design and working design of a structure.				
Course content lectures	1.Introduction: overview of existing concrete, prestressed concrete, steel and wood engineering structures typical for civil infrastructure and building engineering, 2h, Learning outcomes:2 2.Introduction: overview of existing concrete, prestressed concrete, steel and wood engineering structures typical for civil infrastructure and building engineering, 2h, Learning outcomes:2 3.Structural systems, selection of materials, and spatial stability., 2h, Learning outcomes:2 4.Structural systems, selection of materials, and spatial stability., 2h, Learning outcomes:2 5.Calculation principles (Eurocode 0, 1) and forces acting on structures, 2h, Learning outcomes:1 6.Calculation methods and selection of calculation model, 3h, Learning outcomes:1,2,4 7. Engineering software for the calculation and drawing of structures, 2h, Learning outcomes:1,2,4 8.Design of structural elements and typical details according to Eurocode 2, 3, 5, 2h, Learning outcomes:5,7,8 9.Design of structural elements and typical details according to Eurocode 2, 3, 5, 2h, Learning outcomes:5,7,8 10.Safety and stability, 2h, Learning outcomes:5,7 11. Fire protection, 1h 12.Corrosion protection, 2h 13.Protection against moisture, 1h 14.Durability and maintenance of structures, 2h 15.Examples of existing concrete, steel and wooden structures, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9				
Course content auditory	1.Structural system selection, 2h, Learning outcomes:1,2 2.Design model selection and use of computer software in the design process, 2h, Learning outcomes:3,4 3.Individual segments of the design of structural elements , 3h, Learning outcomes:5 4.Presentation of working drawings with details, 3h, Learning outcomes:8,9 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				

Course content constructures	1.Preparation of structural drawings detailed design, 3h, Learning outcomes:3,7,9 2.Structural analysis, 4h, Learning outcomes:1,3,4,5,7,8 3.Preparation of working drawings for a structure, with typical details, 8h, Learning outcomes:6,8,9 4.- 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Portable overhead projector Video equipment
Exam literature	1. I. Tomičić: BETONSKE KONSTRUKCIJE, Školska knjiga, 1988, i 1996 2. B. Androić, D. Džeba, I. Dujmović: METALNE KONSTRUKCIJE I, Građ. Fak..Zagreb, 1994. 3. S. Takač: Novi koncept sigurnosti drvenih konstrukcija, Građ. Fak. Osijek Dopunska literatura: 1. H. C. Schulitz, W. Sobek, K. J. Habermann: STEEL CONSTRUCTION MANUAL, Birkhauser Verlag Basel, 1999. 2. F. K..Brkauskas, B. Kauhsen, S. Polonyi, J. Brandt: CONCRETE CONSTRUCTION MANUAL, Birkhauser, 2002. 3. J. Natterer, W. Winter, T. H. Roland, S. and M. Volz: TIMBER CONSTRUCTION MANUAL, Birkhauser, 2003. 4. Handbook 1 - Timber structures, TEMTIS, 2008. 5. Handbook 2 - Design of timber structures according to EC5, TEMTIS, 2008 6. G. Pfeifer, R. Ramcke, J. Achtiger, K. Zilch: MASONRY CONSTRUCTION MANUAL, Birkhauser, 2001. Literatura: 1 4, jezik: engleski ili njemački, www: detail.de 7. B. Androić, D. Džeba, I. Dujmović: METALNE KONSTRUKCIJE 3, Građ. Fak. Zag., 1998. 8. B. Androić, D. Džeba, I. Dujmović: METALNE KONSTRUKCIJE 4, Građ. Fak. Zag., 2003. 9. R. Park, T. Paulay: REINFORCED CONCRETE STRUCTURES, John Wiley, New York 1977. 10. Stahl im Hochbau, priručnik
Students obligations	Maximum of 3 absences from exercises Completed project assigment
Knowledge evaluation during semester	Class attendence Passed colloquium.
Knowledge evaluation after semester	Preparation of assignment (Structural Design). Oral justification of the assignment (Structural Design).
Student activities:	Aktivnost — ECTS (Project) — 1 (Written exam) — 2 (Oral exam) — 3
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146694;
Proposal made by	dr.sc. Krunoslav Pavković dipl.ing.građ., 20.06.2018

Code WEB/ISVU	24006/186253	**ECTS**	6.0	**Academic year**	2018/2019
Name	Environmental Management				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (6+0+24+0) 120
Teachers	Lectures:1. mr.sc. Gorana Ćosić-Flajsig viši predavač Auditory exercises:mr.sc. Gorana Ćosić-Flajsig viši predavač Auditory exercises:dr.sc. Ivan Vučković dipl.ing.biologije Seminar exercises:mr.sc. Gorana Ćosić-Flajsig viši predavač Seminar exercises:dr.sc. Ivan Vučković dipl.ing.biologije				
Course objectives	To train students to apply basic environmental instruments by adopting methodologies / methods of environmental management, project-oriented teaching and team work				
Learning outcomes:	1.evaluate / critically evaluate the concept of sustainable development and ecosystem service and well-being. Level:7 2.assess / critically evaluate the application of systematic analysis methods to solve complex environmental impact effects of an individual intervention in space. Level:7 3.identify environmental constituents and existing environmental status as a result of anthropogenic environmental impacts and legislative measures. Level:7 4.assessing the intensity of impact of an individual intervention on environmental constituents using the existing models and methods. Level:6,7 5.formulate the cause-benefit relationship, using the DPSIR approach, the estimated impact on the environment, of the measures taken and the establishment of monitoring programs. Level:6,7 6.evaluating the ToR environmental assessment study using the selected model and method). Level:7 7.Present the results of the environmental impact study ToR with the involvement of stakeholders. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Modelling Discussion Questions and answers Seminar, students presentation and discussion				
Methods of carrying out auditory exercises	Laboratory exercises, computer simulations Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming				
Methods of carrying out seminars	Laboratory exercises, computer simulations Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming				
Course content lectures	1.Organization of teaching and the way of exams, 2h Introduction lecture - general about environmental management, 2h, Learning outcomes:1 2.Sustainable development, 2h, Learning outcomes:1 DPSIR approach, 2h, Learning outcomes:1,2 3.Legislation related to the EU Environmental Impact Assessment, 2h, Learning outcomes:1,2,3 Legislation on environmental impact assessment legislation in Croatia, 2h, Learning outcomes:1,2,3 4.Methods of environmental impact assessment - problem-oriented approach, 1h, Learning outcomes:2,3 Multi-criteria analysis, 1h, Learning outcomes:2,3 AHP method, 1h, Learning outcomes:2,3 Leopold matrix, Using Arc GIS as the part of environmental impact assessment, 1h, Learning outcomes:2,3 5.Impact and mitigation measures on environmental impact and monitoring, 2h, Learning outcomes:4,5 Measures like gray and green infrastructure, 2h, Learning outcomes:4,5 6.Nature protection as the key component of environmental protection, 1h, Learning outcomes:4,5,6,7 Arc GIS use as the part of environmental impact assessment, 2h, Learning outcomes:4,5,6,7 7.No lectures 8.The first colloquium, 2h, Learning outcomes:1,2,3,4,5 9.No lectures 10.No lectures 11.No lectures 12.Practical application of environmental impacts and measures to mitigate environmental impact, monitoring implementation, 4h, Learning outcomes:6,7 13.No lectures 14.Ecosystem service and well-being, 2h, Learning outcomes:6,7 15.The second colloquium, 1h, Learning outcomes:4,5,6,7				
Course content auditory	1.No lectures 2.No lectures 3.No lectures 4.No lectures 5.No lectures 6.Components and preparation of the environmental impact assessment study, 2h, Learning outcomes:4,5,6,7				

	7.Examples of the environmental impact assessment study, 2h, Learning outcomes:4,5,6,7 Grouping and explanation of topics, 2h, Learning outcomes:4,5,6,7 8.No lectures 9.No lectures 10.No lectures 11.No lectures 12.No lectures 13.No lectures 14.No lectures 15.No lectures
Course content seminars	1.No lectures 2.No lectures 3.No lectures 4.No lectures 5.No lectures 6.No lectures 7.No lectures 8.No lectures 9.Presenting of the environmental impact study ToR for each group , 1h, Learning outcomes:1,2,3,4 Preparation of the seminar paper, 3h, Learning outcomes:4,5,6,7 10.Preparation of the seminar paper, 4h, Learning outcomes:4,5,6,7 11.Preparation of the seminar paper, 4h, Learning outcomes:4,5,6,7 12.No lectures 13.Preparation of the seminar paper, 4h, Learning outcomes:4,5,6,7 14.Preparation of the seminar paper, 2h, Learning outcomes:4,5,6,7 15.Presentation and final defense of the seminar paper ToR , 3h, Learning outcomes:1,2,3,4,5,6,7
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Special purpose computer laboratory Whiteboard with markers Overhead projector Operating supplies
Exam literature	Materijali sa predavanja i vježbi predmetnog nastavnika Uredba o procjeni utjecaja na okoliš 2017
Students obligations	The condition for signing is the defense of the seminar work in the planned terms with the achievement of the required minimum number of points, passing the colloquium with the achievement of the required minimum number of points, and regular attendance of exercises and lectures (maximum 35% absences from the whole classroom). To get a signature, it is necessary to achieve at least 10 points per colloquium (20 points total) and a minimum of 10 points for defending the seminar work - a total of 30 points. Students who do not collect the required points in repair colloquium and do not reach the minimum of 30 points can not get a signature.
Knowledge evaluation during semester	During the semester, 2 colloquies are planned (a combination of theoretical and practical knowledge in the way presented during lectures and exercises) through which students gain points. Total can be collected 1 x 20 + 1 x 20 = 40 points. For the passage to the colloquium it is necessary to collect 12 points per colloquium (60%). The signatures should be collected from the 10th point of the seminar and 10 points from the second round, which is 20 points in total. Students who do not have enough credits to sign must write a correctional colloquium. According to defined topics of the course of the Environmental Management, students in groups of 5 students prepare the seminar paper. During the semester students are trained, and in defense of the seminar paper work through the PP presentation, students can achieve a maximum of 20 points. The evaluation of the seminar paper consists of the defense of the seminar work through the PP presentation and answers to the questions asked. The presentation and the contribution of each student, ithe chapter of the seminar project, must be clearly defined.
Knowledge evaluation after semester	Students who have obtained the right to sign the exam are on a regular exam, with the points earned during the semester with 60% of the marks. The final grade of the course is the sum of the points awarded during the semester and the exam as a percentage of the accepted knowledge, skills and competencies as follows: - for the sum of points from 90 to 100% - excellent rating (5) - for a score of 80 - 89.9% - very good (4) - for a score of 65 to 79.9% - a good score (3) - for sum of points from 50 to 64.9% - rating sufficient (2)
Student activities:	Aktivnost ECTS (Seminar Work) 2 (Written exam) 2 (Oral exam) 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146695;
Proposal made by	Gorana Ćosić Flajisg, MSc, Senior lecturer

Code WEB/ISVU	23911/181175	**ECTS**	3.0	**Academic year**	2018/2019
Name	Fire Protection				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (9+0+6+0) 60
Teachers	Lectures:mr.sc. Ljerka Kopričanec-Matijevac viši predavač Auditory exercises:mr.sc. Ljerka Kopričanec-Matijevac viši predavač Seminar exercises:mr.sc. Ljerka Kopričanec-Matijevac viši predavač				
Course objectives	To enable a student to produce fireproof structures.				
Learning outcomes:	1.recommend the performance of the required fire protection for individual structures and spaces. Level: 7. Level:6,7 2.formulate / form a project for fire protection. Level: 6.7. Level:6,7 3.to choose the regulations, norms and other legal regulations necessary for the development of fire protection. Level: 7. Level:6,7 4.write basic building data, access to firefighting techniques, construction constructions and uses space. Level: 6.7. Level:6,7 5.to devise a fire brigade reconstruction. Level: 6.7. Level:6,7 6.compare the projected building with data from regulations and norms. Level: 6.7. Level:6,7 7.to propose ways to get out of the building. Level: 6.7. Level:6,7 8.to determine the fire load in the building. Level: 7. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Questions and answers Seminar, students presentation and discussion Other he oral presentation will be followed by comic presentations. The fire photo will be selected with the analysis the cause of the design release with reference to (non) fire protection. The lecture will be accompanied separating teachers with illustrations to enable understanding of the subject matter				
Methods of carrying out auditory exercises	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Workshop				
Methods of carrying out seminars	Essay writing Discussion, brainstorming Workshop				
Course content lectures	1.Course Design Plan and Exam Content,, 1h, Learning outcomes:1,2 legislation,, 1h, Learning outcomes:1,2 2. planning measures, 1h, Learning outcomes:1,2 Firefighting approaches, 1h, Learning outcomes:1,2,3 3.Behavior of building materials in fire burning test, fire load, 1h, Learning outcomes:2,7 4.Fire resistance of building components and constructions of a standard fire curve, testing, 1h, Learning outcomes:1,2,3,5,7 5.No lectures 6.Protection of construction structures, 1h, Learning outcomes:1,2,5 7.No lectures 8.Development of fire inside the enclosed space and its expansion as well as protection of the fire sector, fire wall, 1h, Learning outcomes:1,2,3,4,8 9.Transfer of fire from building to building, 1h, Learning outcomes:1,2,3,5,8 10.First Colloquium, 1h, Learning outcomes:1,2,3,4,5 11.Development and spreading of smoke within the building and protection of the smoke sector, quenching,, 1h, Learning outcomes:1,2,3,4,8 12.Protection of persons in buildings evacuation routes, 1h, Learning outcomes:1,2,3,6,7 13.Fire behavior on specific buildings, 1h, Learning outcomes:1,2,3,4,5,6,7,8 Estimation of fire and fire protection plan, 1h, Learning outcomes:1,2,3,4,5,6,7,8 14.No lectures 15.The second colloquium,, 1h, Learning outcomes:6,7,8				
Course content auditory	1.no classes 2.no classes 3.no classes 4.no classes 5.Fuel testing, 1h, Learning outcomes:2,3 Ispitivanje vatrootpornosti, 1h, Learning outcomes:2,3,8 6.protection of structures, 1h, Learning outcomes:2,3,4,5,6 7.protection of structures, 2h, Learning outcomes:2,3,4,5,6 8.Dimensional fire sectors, 1h, Learning outcomes:1,2,3,4,5,7 9.Dimension of the smoke sector, 1h, Learning outcomes:1,2,3,4,5,7,8 10.no classes 11.no classes 12.no classes 13.Dimensioning the way for evacuation, 1h, Learning outcomes:1,2,3,4,6,7,8 14.Estimation of Fire Hazard and Fire Protection Plan, 1h, Learning outcomes:1,2,3,4,5,6,7,8 15.no classes				

Course content seminars	1.Instructions for developing seminar work and presenting the existing ones, 1h 2.no classes 3.no classes 4.no classes 5.no classes 6.no classes 7.no classes 8.no classes 9.no classes 10.no classes 11.Presentation of seminar papers, 1h, Learning outcomes:1,2,3,4,5,6,7,8 12.Presentation of seminar papers, 1h, Learning outcomes:1,2,3,4,5,6,7,8 13.no classes 14.Presentation of seminar papers, 1h, Learning outcomes:1,2,3,4,5,6,7,8 15.Presentation of seminar papers, 2h, Learning outcomes:1,2,3,4,5,6,7,8
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector
Exam literature	[1] Stj. Fišter, Lj. Kopričanec Matijevac, Zaštita od požara u graditeljstvu, MUP, Policijska akademija, Zagreb, 2001. [2] Stj. Fišter, Tehničke smjernice za preventivnu zaštitu od požara TRVB 100, TRVB 125, i TRVB 126 s obrazloženjem, Hrvatska vatrogasna zajednica, Zagreb, 1997. [3] M. David Egan: Concepts in Building Firesfety, John Wiley and sons, New York, 1986., [4] David Egan, Građevinske konstrukcije i požar, Građevinska knjiga, Beograd, 1999. [5] Carević, M., Jukić, P., Sertić, Z., Šimara, B., Tehnički priručnik za zaštitu od požara, Zagrebinspekt, Zagreb, 2002. [6] Vidaković, M., Požar i arhitektonski inženjering, Fahrenheit, Beograd, 1995. [7] Zaštita od požara, Temeljni dokument, Bitni zahtjevi broj 2, Smjernica Vijeća 89/106/EEZ od 21. prosinca 1988, Građevni godišnjak '99, Hrvatski savez građevinskih inženjera, Zagreb 1999. [8] Bobinec-Naprta, D., Zaštita od požara i eksplozija, Zbirka propisa, Nading, Zagreb, [9] Malhorta, H.L., Design of Fire-Resisting Structures, Surrey University Press, 1982. [10] Brandschuzt Atlas, Baulicher Brandschutz Band 1, Josef Mayr (gl. urednik), Wehner GmbH Verlag von Brandschutzpublikation, 2000. [11] Brandschuzt Atlas, Baulicher Brandschutz Band 2, Josef Mayr (gl. urednik), Wehner GmbH Verlag von Brandschutzpublikation, 2000. [12] HRN DIN 4102 dio 1 do 18. [13] HRN EN norme [14] PROMAT priručnik građevinske i tehničke protupožarne zaštite, Zagreb, 2005. [15] Zakoni, pravilnici,
Students obligations	Collect at least 40 points, but no lesson than 10 points or seminar work 5 points regularity in lectures
Knowledge evaluation during semester	1 seminar work of 20 points For evaluation through the colloquium: each colloquium and seminar work must be scored with at least 50% points, the rating may be: 60 to 69 points - sufficient (2) 70 to 79 points - good (3) 80 to 89 points - very good (4) 90 to 100 points - excellent (5)
Knowledge evaluation after semester	Written exam passed 60% points + oral exam
Student activities:	Aktivnost — ECTS (Constantly tested knowledge) — 2 (Seminar Work) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	mr.sc. Ljerka Kopričanec-Matijevac viši predavač, 10.4.2018

Code WEB/ISVU	24018/186266	**ECTS**	3.0	**Academic year**	2018/2019
Name	Geotechnology				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+15+0) 60
Teachers	Lectures:1. mr.sc. Željko Lebo v. pred.				
Course objectives	Students will gain an in-depth knowledge for the realization of specialist works in the field of geotechnics.				
Learning outcomes:	1.analyse basic problems related to organization of geotechnical works. Level:7 2.critically analyse and recognise possibility for realizing individual geotechnical solutions based on available equipment and technology. Level:7 3.define work technology for jet grouting, plank driving, anchoring, RC diaphragm installation, and concreting under foundations. Level:6,7 4.select an applicable technology for the protection of foundation pits, excavations and cuttings, or for existing soil strengthening. Level:7 5.gather together technical documents that must be kept on the site during realization of geotechnical works. Level:6,7 6.determine minimum technical correctness of design documentation for the conduct of geotechnical activities. Level:7 7.propose additions to design documents to take into account the proposed foundation pit excavation or protection technology. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other Specialist geotechnical works are presented and illustrated with simple models and animations.				
Methods of carrying out seminars	Essay writing Workshop				
Course content lectures	1.Introductory lecture, 1h, Learning outcomes:1,2,3 2.campground under concrete foundation, 1h, Learning outcomes:1,2,5,6 3.Micro piles, rebild silos, 1h, Learning outcomes:1,2,3,6 4.Geosynthetics, 1h, Learning outcomes:1,2,3,5,6 5.Remediation of the landfill, 1h, Learning outcomes:1,3 6.Geotechnical piles, 1h, Learning outcomes:1,3 7.Geotechnical piles, 1h, Learning outcomes:1,3,5,6 8.Geotechnisal anchors, 1h, Learning outcomes:1,3,5,6 9.Protection of building pit with reinforced concrete diaphragm wall, 1h, Learning outcomes:1,2,3,4,5,6,7 10.Protection of building pit with reinforced concrete diaphragm wall, 1h, Learning outcomes:1,2,3,4,5,6,7 11.Jet grouting, 1h, Learning outcomes:1,2,3,4,5,6 12.Jet grouting, 1h, Learning outcomes:3,4 13.Geotechnical steel sheet piling, 1h, Learning outcomes:2,3,4,5,6,7 14.Gabions, 1h, Learning outcomes:3,4,5,6,7 15.Soil freezing technology, 1h, Learning outcomes:2,3,4,5,6,7				
Course content seminars	1.seminar work, 1h, Learning outcomes:1,2,6 2.seminar work, 1h, Learning outcomes:1,2,6 3.seminar work, 1h, Learning outcomes:1,2,6 4.seminar work, 1h, Learning outcomes:1,2,6 5.seminar work, 1h, Learning outcomes:1,2,6 6.seminar work, 1h, Learning outcomes:1,2,6 7.seminar work, 1h, Learning outcomes:1,2,6 8.seminar work, 1h, Learning outcomes:1,2,6 9.seminar work, 1h, Learning outcomes:1,2,6 10.seminar work, 1h, Learning outcomes:1,2,6 11.seminar work, 1h, Learning outcomes:1,2,6 12.seminar work, 1h, Learning outcomes:1,2,6 13.seminar work, 1h, Learning outcomes:1,2,6 14.seminar work, 1h, Learning outcomes:1,2,6 15.seminar work, 1h, Learning outcomes:1,2,6				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				
Exam literature	Ž. Lebo, Separati predavanja na web-u Grupa autora: Mehanika stijena; Temeljenje; Podzemni radovi, Zagreb, 1983 D. Čorko i ostali: Mlazno injektiranje, Zagreb 1998. L. Fingerhut: Konsolidacija tla injektiranjem, varaždin 1977 T. Roje-Bonacci: Potporne građevine i građevne jame, Split 2005.				
Students obligations	Regular attendance and positive evaluation and submitted seminar work				

Knowledge evaluation during semester	no	
Knowledge evaluation after semester	written and oral exam	
Student activities:	Aktivnost (Classes attendance) (Written exam) (Oral exam)	ECTS 1 1 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
ISVU equivalents:	146711;181174;	
Proposal made by	mr.sc. Željko Lebo, senior lecture	

Code WEB/ISVU	24035/181174	**ECTS**	3.0	**Academic year**	2018/2019
Name	Geotechnology				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (4+0+0+11) 60
Teachers	Lectures:mr.sc. Željko Lebo v. pred. Auditory exercises:mr.sc. Željko Lebo v. pred. Construction exercises:mr.sc. Željko Lebo v. pred.				
Course objectives	Students will gain an in-depth knowledge for the realization of specialist works in the field of geotechnics.				
Learning outcomes:	1.analyse basic problems related to organization of geotechnical works. Level:7 2.critically analyse and recognise possibility for realizing individual geotechnical solutions based on available equipment and technology. Level:7 3.define work technology for jet grouting, plank driving, anchoring, RC diaphragm installation, and concreting under foundations. Level:6,7 4.select an applicable technology for the protection of foundation pits, excavations and cuttings, or for existing soil strengthening. Level:7 5.gather together technical documents that must be kept on the site during realization of geotechnical works. Level:6,7 6.determine minimum technical correctness of design documentation for the conduct of geotechnical activities. Level:7 7.propose additions to design documents to take into account the proposed foundation pit excavation or protection technology. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other Specialist geotechnical works are presented and illustrated with simple models and animations.				
Methods of carrying out auditory exercises	Group problem solving Discussion, brainstorming				
How construction exercises are held	Group problem solving Discussion, brainstorming Computer simulations Other Independent work on the assignment.				
Course content lectures	1.Introductory lecture, 1h, Learning outcomes:1,2,3 2.campground under concrete foundation, 1h, Learning outcomes:1,2,5,6 3.Micro piles, rebild silos, 1h, Learning outcomes:1,2,3,6 4.Geosynthetics, 1h, Learning outcomes:1,2,3,5,6 5.Remediation of the landfill, 1h, Learning outcomes:1,3 6.Geotechnical piles, 1h, Learning outcomes:1,3 7.Geotechnical piles, 1h, Learning outcomes:1,3,5,6 8.Geotechnisal anchors, 1h, Learning outcomes:1,3,5,6 9.Protection of building pit with reinforced concrete diaphragm wall, 1h, Learning outcomes:1,2,3,4,5,6,7 10.Protection of building pit with reinforced concrete diaphragm wall, 1h, Learning outcomes:1,2,3,4,5,6,7 11.Jet grouting, 1h, Learning outcomes:1,2,3,4,5,6 12.Jet grouting, 1h, Learning outcomes:3,4 13.Geotechnical steel sheet piling, 1h, Learning outcomes:2,3,4,5,6,7 14.Gabions, 1h, Learning outcomes:3,4,5,6,7 15.Soil freezing technology, 1h, Learning outcomes:2,3,4,5,6,7				
Course content auditory	1.Analysis of practical examples relating to grouting, anchoring and shotcreting, 1h, Learning outcomes:1,3 2.Analysis of practical examples relating to grouting, anchoring and shotcreting, 1h, Learning outcomes:1,3 3.Analysis of practical examples relating to drainage and the use of geosynthetics and micropiles, 1h, Learning outcomes:1,4 4.Analysis of practical examples relating to drainage and the use of geosynthetics and micropiles, 1h, Learning outcomes:1,4 5.no classes, 1h 6.no classes, 1h 7.no classes, 1h 8.no classes, 1h 9.no classes, 1h 10.no classes, 1h 11.no classes, 1h 12.no classes, 1h 13.no classes, 1h 14.no classes, 1h 15.no classes, 1h				
Course content constructures	1.no classes, 1h 2.no classes, 1h 3.no classes, 1h 4.no classes, 1h 5.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning				

	outcomes:1,2,3,4,5,6,7 6.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 7.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 8.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 9.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 10.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 11.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 12.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 13.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 14.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7 15.Consultations with students regarding preparation of individual assignments relating to slope protection in cutting or on embankment, based on a drainage system and/or anchoring procedure with shotcreting., 1h, Learning outcomes:1,2,3,4,5,6,7
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector
Exam literature	Ž. Lebo, Separati predavanja na web-u Grupa autora: Mehanika stijena; Temeljenje; Podzemni radovi, Zagreb, 1983 D. Čorko i ostali: Mlazno injektiranje, Zagreb 1998. L. Fingerhut: Konsolidacija tla injektiranjem, varaždin 1977 T. Roje-Bonacci: Potporne građevine i građevne jame, Split 2005.
Students obligations	Regular attendance and positive evaluation and submitted seminar work
Knowledge evaluation during semester	no
Knowledge evaluation after semester	written and oral exam
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Written exam) — 1 (Oral exam) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146711;186266;
Proposal made by	mr.sc. Željko Lebo, senior lecture

Code WEB/ISVU	23862/173461	**ECTS**	6.0	**Academic year**	2018/2019
Name	GIS and spatial database				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+45 (9+0+6+30) 120
Teachers	Lectures:1. Željko Kovačević , struč.spec.ing.techn.inf. Auditory exercises: Tamara Ivelja mag. ing. geod. et. geoinf. Seminar exercises: Tamara Ivelja mag. ing. geod. et. geoinf. Construction exercises: Tamara Ivelja mag. ing. geod. et. geoinf.				
Course objectives	To obtain the level of autonomy in spatial data analysis using GIS and spatial databases				
Learning outcomes:	1.Compare a different GIS structures and functions. Level:6,7 2.Spatial data preparation for GIS application. Level:6,7 3.Integrale use of database management systems within GIS. Level:6,7 4.Spatial analysis within GIS. Level:6 5.Create a solution to a specific civil engineer problem using GIS. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Demonstration Discussion Questions and answers				
Methods of carrying out auditory exercises	Laboratory exercises, computer simulations				
Methods of carrying out seminars	Laboratory exercises, computer simulations Group problem solving				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving				
Course content lectures	1.The basics of GIS, 1h, Learning outcomes:1 Spatial modeling, 1h, Learning outcomes:2 Types, Structure and Data Formats, 1h, Learning outcomes:2 2.Coordinate systems, dates and projections, 2h, Learning outcomes:2 Data sources and quality of spatial data, 2h, Learning outcomes:2 3.DBMS in GIS, 2h, Learning outcomes:3 4.No lectures 5.No lectures 6.No lectures 7.No lectures 8.No lectures 9.No lectures 10.Vector data analysis, 2h, Learning outcomes:4 Raster data analysis, 2h, Learning outcomes:4 11.No lectures 12.No lectures 13.No lectures 14.No lectures 15.GIS application in civil engineering, 2h, Learning outcomes:5				
Course content auditory	1.No lab work 2.No lab work 3.Getting familiar with modules and functionalities of GIS tool, 1h, Learning outcomes:1 4.Managing spatial data within GIS, 1h, Learning outcomes:2 5.Defining projection, reprojecting and data transformation, 1h, Learning outcomes:2 6.Vector and raster data classification, 1h, Learning outcomes:4 7.Data sources (creation, geocoding, collecting, WMS, WFS) and data quality, 1h, Learning outcomes:2 8.No lab work 9.Basic data operations within the DBMS, 1h, Learning outcomes:3 10.No lab work 11.Vector data analysis, 1h, Learning outcomes:4 12.No lab work 13.Raster data analysis, 1h, Learning outcomes:4 14.No lab work 15.No lab work				

Course content seminars	1.No lab work 2.No lab work 3.No lab work 4.Defining project assignment, 1h, Learning outcomes:5 5.No lab work 6.No lab work 7.No lab work 8.No lab work 9.No lab work 10.No lab work 11.No lab work 12.No lab work 13.No lab work 14.No lab work 15.Work on a project assignment, 4h, Learning outcomes:5
Course content constructures	1.No lab work 2.No lab work 3.Getting familiar with modules and functionalities of GIS tool, 2h, Learning outcomes:1 4.Managing spatial data within GIS, 2h, Learning outcomes:2 5.Defining projection, reprojecting and data transformation, 3h, Learning outcomes:2 6.Vector and raster data classification, 3h, Learning outcomes:4 7.Data sources (creation, geocoding, collecting, WMS, WFS) and data quality, 2h, Learning outcomes:2 8.Data sources (creation, geocoding, collecting, WMS, WFS) and data quality, 3h, Learning outcomes:2 9.Basic data operations within the DBMS, 3h, Learning outcomes:3 10.No lab work 11.Vector data analysis, 3h, Learning outcomes:4 12.Vector data analysis, 4h, Learning outcomes:4 13.Raster data analysis, 3h, Learning outcomes:4 14.Raster data analysis, 4h, Learning outcomes:4 15.No lab work
Required materials	Special purpose computer laboratory Whiteboard with markers Overhead projector
Exam literature	Osnovna: Nastavni materijali - prezentacije na moj.tvz.hr Dodatna: Bolstad, P. (2005). GIS Fundamentals: A First Text on Geographic Information Systems. Eider Press.
Students obligations	Attendance at lectures 66% Attendance at Labs 80%
Knowledge evaluation during semester	1 written exam
Knowledge evaluation after semester	Evaluation of the technical report of the project task 80% Oral presentation of project task 20%
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Activity in class) — 1 (Written exam) — 1 (Report) — 2 (Oral exam) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23902/173503	**ECTS**	18.0	**Academic year**	2018/2019
Name	Graduation Thesis				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				1+11 (11+0+0+0) 528
Teachers	Auditory exercises:mr.sc. Ante Goran Bajić viši predavač				
Course objectives	Use of acquired knowledge for independent realization of practical engineering tasks				
Learning outcomes:	1.Define limits and generalization possibilities for the final paper. Level:6,7 2.Integrate existing scientific knowledge to find solution to the problem that has been identified. Level:6,7 3.Identify proposal or solution to a problematic situation. Level:6 4.Divide problematic situation into individual components. Level:6 5.Analyze a problematic situation. Level:6 6.Indentify a problematic situation. Level:7				
Methods of carrying out lectures	Case studies				
Methods of carrying out auditory exercises	Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing				
Course content lectures	1.No lessons, 2h 2.No lessons, 2h 3.No lessons, 2h 4.No lessons, 2h 5.No lessons, 2h 6.No lessons, 2h 7.No lessons, 2h 8.No lessons, 2h 9.No lessons, 2h 10.No lessons, 2h 11.No lessons, 2h 12.No lessons, 2h 13.No lessons, 2h 14.No lessons, 2h 15.No lessons, 2h				
Course content auditory	1.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 2.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 3.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 4.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 5.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 6.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 7.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 8.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 9.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 10.Independent work, consultations with tutor (mentor), 2h, Learning outcomes:1,2,3,4,5,6 11.Independent work, consultations with tutor (mentor), 3h, Learning outcomes:1,2,3,4,5,6 12.Independent work, consultations with tutor (mentor), 3h, Learning outcomes:1,2,3,4,5,6 13.Independent work, consultations with tutor (mentor), 3h, Learning outcomes:1,2,3,4,5,6 14.Independent work, consultations with tutor (mentor), 3h, Learning outcomes:1,2,3,4,5,6 15.Independent work, consultations with tutor (mentor), 3h, Learning outcomes:1,2,3,4,5,6				
Required materials	Special purpose laboratory General purpose computer laboratory Video equipment Special equipment				
Exam literature	Prema dogovoru s mentorom				
Students obligations	Maximum of 3 absences from exercises				
Knowledge evaluation during semester	No lessons				
Knowledge evaluation after semester	No lessons				
Student activities:	Aktivnost (Practical work)			ECTS 18	
Remark	This course can be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23872/173472	**ECTS**	6.0	**Academic year**	2018/2019
Name	Hydraulic structures				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (6+0+8+16) 120
Teachers	Lectures: Željko Pavlin dipl.ing.građ. Auditory exercises: Željko Pavlin dipl.ing.građ. Auditory exercises: Berislav Rupčić Seminar exercises: Željko Pavlin dipl.ing.građ. Seminar exercises: Berislav Rupčić Construction exercises: Željko Pavlin dipl.ing.građ. Construction exercises: Berislav Rupčić				
Course objectives	Students will gain basic theoretical knowledge and practical skills for design of hydraulic structures				
Learning outcomes:	1.foresee methodology for defining a hydraulic structure solution . Level:6,7 2.form (shape) hydraulic structure. Level:6,7 3.choose the best variant of the hydraulic structure solution. Level:7 4.make preliminary design of hydraulic structure. Level:6,7 5.valorise value of hydraulic structure realization. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies				
Methods of carrying out auditory exercises	Group problem solving Traditional literature analysis				
Methods of carrying out seminars	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web				
How construction exercises are held	Other Individual preparation of conceptual design of hydraulic structures				
Course content lectures	1.Definitions, classification and access to solutions, 1h, Learning outcomes:1 Outlines for hydraulic structure calculations, 1h, Learning outcomes:1 Economical approach to dimensioning and decision making, 2h, Learning outcomes:1 2.Economic analysis, 4h, Learning outcomes:3,5 3.Methods of defining optimal size, 4h, Learning outcomes:3,5 4.Flow control, 4h, Learning outcomes:2 5.Spilways, 2h, Learning outcomes:2,3,4 Bottom outlets, 1h, Learning outcomes:2,3,4 6.Stilling basins, 1h, Learning outcomes:2,3,4 Diversion during construction, 1h, Learning outcomes:2,3,4 7.Channels, 2h, Learning outcomes:2,3,4 Tunnels and pipelines, 1h, Learning outcomes:2,3,4 8.Tunnels and pipelines, 2h, Learning outcomes:2,3,4 9.Transient analysis, 4h, Learning outcomes:3 10.no lectures 11.no lectures 12.no lectures 13.no lectures 14.no lectures 15.no lectures				
Course content auditory	1.no classes 2.no classes 3.no classes 4.no classes 5.no classes 6.Determination of embankment and dam crests, 2h, Learning outcomes:2 7.no classes 8.no classes 9.no classes 10.Reservoir volume curve determination, 1h, Learning outcomes:2 11.Outlet structure calculation , 3h, Learning outcomes:4 12.no classes 13.no classes 14.no classes 15.no classes				
Course content seminars	1.no classes 2.no classes 3.no classes				

	4.no classes 5.Colloquium, 1h, Learning outcomes:1,3,5 6.no classes 7.Flood wave transformation calculation, 1h, Learning outcomes:3 8.Graphical and analytical procedure for determining accumulation work, 2h, Learning outcomes:3 9.no classes 10.Diversion tunnels and cofferdams economic analysis , 2h, Learning outcomes:3,4 Colloquium, 1h, Learning outcomes:2,4 11.no classes 12.no classes 13.no classes 14.no classes 15.Colloquium - corrections, 1h, Learning outcomes:1,2,3,4,5
Course content constructures	1.no exercises 2.no exercises 3.no exercises 4.no exercises 5.no exercises 6.no exercises 7.no exercises 8.no exercises 9.no exercises 10.no exercises 11.Development of conceptual design hydraulic structures, 1h, Learning outcomes:2,3,4 12.Development of conceptual design hydraulic structures, 4h, Learning outcomes:2,3,4 13.Development of conceptual design hydraulic structures, 4h, Learning outcomes:2,3,4 14.Development of conceptual design hydraulic structures, 4h, Learning outcomes:2,3,4 15.Development of conceptual design hydraulic structures, 3h, Learning outcomes:2,3,4
Required materials	General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment Individual preparation of conceptual design of hydraulic structures
Exam literature	#61630;P. Stojić: Hidrotehničke građevine I i II, FGZ Split, 1997., 1998. #61630;Lj. Savić: Uvod u hidrotehničke građevine #61630;Agroskin: Hidraulika #61630;Separati koje priprema nastavnik za studente #61630;Burreau of Reclamation: Design of Small Dams #61630;Ž. Vuković: Osnove hidrotehnike I/1 i 2, Akvamarine, Zagreb, 1994., 1995. #61630;E.Nonveiller: Nasute brane
Students obligations	Regular attendance - max 25% of absence min 20 points from two colloquiums each min 10 points min 10 points from practical work
Knowledge evaluation during semester	Two colloquiums each of 20 points Practical work preparation of conceptual design of hydraulic structures - max 20 points Total max. 60 points
Knowledge evaluation after semester	A student who has fulfilled the conditions for signing will apply for an exam in the exam period and access a written exam. Maximum of written exam is 40 points. The passage for passing the exam is a minimum of 20 points. Examination score is based on the total points earned from colloquiums, practical work and exam and amounts to: 50 to 64.9 points - rating 2 65 to 79.9 points - rating 3 80 to 89.9 points - rating 4 90 to 100 points - rating 5
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Written exam) — 1 (Constantly tested knowledge) — 2 (Practical work) — 2

Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	Željko Pavlin dipl.ing. građ.

Code WEB/ISVU	23878/173478	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Architectural Drawing				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Lectures: Iva Ževrnja predavač Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises: Iva Ževrnja predavač				
Course objectives	Prepare students for the application of adequate techniques for graphic presentation of designs and documentation of the current situation using the drawing technique				
Learning outcomes:	1.Create an attractive graphic representation with free-drawing. Level:6,7 2.To construct a perspective view of free-drawing. Level:6,7 3.To construct and free-draw graphically attractive isometric and orthogonal view of space or model. Level:6,7 4.To draw a simple, quick-sketch of space or model. Level:6 5.To sketch - free-drawing - technical details, space elements and constructions. Level:6				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Demonstration				
How construction exercises are held	Workshop Other drawing with corrections on exercises				
Course content lectures	1.Historical overview of architectural drawings and drawing techniques in construction, 2h, Learning outcomes:1,2,3,4,5 2.Principles of free-drawing technique, 2h, Learning outcomes:1,2,3,4,5 3.Graphic presentation and drawing of technical designs, 2h, Learning outcomes:1,3,4,5 4.Graphic presentation and drawing as a construction or reconstruction of space, 2h, Learning outcomes:1,2,3,4,5 5.Drawing as an objective document or a subjective space experience, 2h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Technique of free-drawing and graphic interpretation of technical design, 4h, Learning outcomes:1,2,3,4,5 2.Isometric and perspective views as a construction of the model and space by the technique of a free-drawing, 4h, Learning outcomes:1,3,4 3.Isometric and perspective views as a construction or reconsruction of the model and space by the technique of a free-drawing, 4h, Learning outcomes:1,3,4 4.Documenting the space and models with perspective free-drawing , 4h, Learning outcomes:1,2,3,4,5 5.Drawing - sketch drawing - croquis - technique of free-drawing and specific applications in construction, 4h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	1. Magjer, Nedjeljko. Umijec#769;e Crtanja: Gledati - Vidjeti - Crtati. Zagreb: August Cesarec, 1985. 2. Arbutina Dražen, Arhitektonski crtež - separati predavanja, 2017				
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.				
Knowledge evaluation during semester	During the semester are not planned regular examinations of knowledge - colloquium are not planned, but only the evaluation of practical work (drawings on planned exercises or as an independent student individual work after exercise).				
Knowledge evaluation after semester	The final grade as the average of the grades achieved of drawings/practical work during the course with the possibility of grade correction during the examination by drawing skills check.				

Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Practical work)	2
Remark	This course can not be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	23894/173495	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to ergonomics				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures: Jagoda Bodić dipl.ing.arh. Lectures: Iva Ževrnja predavač				
Course objectives	-				
Learning outcomes:	1.-. Level:6 2.-. Level:6,7 3.-. Level:6,7 4.-. Level:6,7 5.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Discussion Questions and answers				
How construction exercises are held	Other -				
Course content lectures	1.-, 2h, Learning outcomes:1 2.-, 2h, Learning outcomes:1,2,3 3.-, 2h, Learning outcomes:1,2,3,4 4.-, 2h, Learning outcomes:3,4,5 5.-, 2h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.-, 2h, Learning outcomes:1 2.-, 2h, Learning outcomes:1 3.-, 2h, Learning outcomes:1,2,3,4,5 4.-, 2h, Learning outcomes:1,2,3,4,5 5.-, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h, Learning outcomes:1,2,3,4,5 7.-, 2h, Learning outcomes:1,2,3,4,5 8.-, 2h, Learning outcomes:1,2,3,4,5 9.-, 2h, Learning outcomes:1,2,3,4,5 10.-, 2h, Learning outcomes:1,2,3,4,5 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	1. K.H.E.Kroemer., E. Grandjean Prilagođavanje rada čovjeku- ergonomski priručnik , 1999, naknada Slap 2. Julius Panero, Martin Zelnik:Human dimension and interior space (Antropološke mjere i interijeri) 3. E.Neufert: Elementi arhitektonskog projektiranja, Golden marketing, Zagreb 2002 4. Pravilnik o osiguranju pristupačnosti građevina osobama s invaliditetom i smanjene pokretljivosti, NN78/2013 5. Smjernice o uređivanju radnih mjesta na kojima se dugotrajno sjedi Hrvatski zavod za zaštitu zdravlja i sigurnosti na radu, Hrvatski zavod za zdravstveno osiguranje, listopad 2011 6..Pristupačnost za osobe s invaliditetom Priručnik za oblikovanje okoliša bez barijera /cjelokupni priručnik nalazi se na web stranici: http:.//www.hupt.hr/access/ad-000.html / Dopunska literatura: 1. HRN (hrvatska norme) U.A9. 201 - U.A9. 216 2. Pravilnik o zaštiti na radu za radna mjesta (NN 29/2013) 3. Tehnički propis o racionalnoj uporabi energije i toplinskoj zaštiti u zgradama (NN 128/15), 4. Zakon o zaštiti od buke (NN30/09, 55/13, 153/13, 41/16)				

	5. Pravilnik o najvišim dopuštenim razinama buke u sredini u kojoj ljudi rade i borave (N.N. 145/04)
Students obligations	-
Knowledge evaluation during semester	-
Knowledge evaluation after semester	-
Student activities:	Aktivnost ECTS (Written exam) 1 (Project) 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	-

Code WEB/ISVU	23860/173459	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to geodetic computer science				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+0+15) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	-				
Learning outcomes:	1.-. Level:7 2.-. Level:7 3.-. Level:6,7 4.-. Level:7 5.-. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Simulations Modelling Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1.-, 1h, Learning outcomes:4,5 2.-, 1h, Learning outcomes:3,4 3.-, 1h, Learning outcomes:3,4 4.-, 1h, Learning outcomes:3,4 5.-, 1h, Learning outcomes:4,5 6.-, 1h, Learning outcomes:4,5 7.-, 1h, Learning outcomes:4,5 8.-, 1h, Learning outcomes:2,4,5 9.-, 1h, Learning outcomes:2,4,5 10.-, 1h, Learning outcomes:2,3,4,5 11.-, 1h, Learning outcomes:2,3,4,5 12.-, 1h, Learning outcomes:2,3,4,5 13.-, 1h, Learning outcomes:1,2,4,5 14.-, 1h, Learning outcomes:1,4,5 15.-, 1h, Learning outcomes:1,2,4,5				
Course content constructures	1.-, 3h, Learning outcomes:3,4,5 2.-, 3h, Learning outcomes:3,4,5 3.-, 3h, Learning outcomes:2,3,5 4.-, 3h, Learning outcomes:3,4,5 5.-, 3h, Learning outcomes:1,2,3,4,5 6.-, 2h 7.-, 2h 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers Overhead projector				

Exam literature	D. Benčić: Geodetski instrumenti, Zagreb, 1990 Z. Kapović: Geodezija u niskogradnji, Zagreb, 2010 T. Ninkov: Optimizacija projektovanja geodetskih mreža, Beograd 1989 G. Novaković: Geodetske mreže posebnih namjena, skripta, Zagreb, 2006. M. Rezo: Ravninska geodezija, Zagreb, 2013 N. Rožić: Računska obrada geodetskih mjerenja, Zagreb 2007.	
Students obligations	-	
Knowledge evaluation during semester	-	
Knowledge evaluation after semester	-	
Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Written exam)	1
	(Oral exam)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	23863/173462	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to geodetic plans as basis for planning and construction				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+0+15) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	-				
Learning outcomes:	1.-. Level:7 2.-. Level:7 3.-. Level:7 4.-. Level:7 5.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Simulations Modelling Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Data mining and knowledge discovery on the Web Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1.-, 1h, Learning outcomes:1,2,3 2.-, 1h, Learning outcomes:3,4 3.-, 1h, Learning outcomes:2 4.-, 1h, Learning outcomes:3,4 5.-, 1h, Learning outcomes:4 6.-, 1h, Learning outcomes:3 7.--, 1h, Learning outcomes:4 8.-, 1h, Learning outcomes:3,4 9.-, 2h, Learning outcomes:3,4,5 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Course content constructures	1.Collection and presentation of spatial information (official cartographic products, cadastre, CORINE Land Cover, NATURA2000, internet sources, etc.), 7h, Learning outcomes:1,3,4,5 2.Comparison and analysis of spatial information on concrete examples for planning, design and construction and their quality assessment (position and height accuracy, attribute accuracy, data integrity, logical consistency, time consistency, semantic accuracy, etc.), 7h, Learning outcomes:3,4 3.Solving the specific tasks of using spatial data services for planning, design and construction purposes., 3h, Learning outcomes:4,5 4.-, 3h, Learning outcomes:1,2,5 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				

Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers Overhead projector Special equipment -
Exam literature	Obvezna literatura: Jane Silberstein; Chris Maser (2013): Land-use planning for sustainable development. Second edition. CRC Press Dopunska literatura: Mehdi Khosrow-Pour (Ed.)(2013): Geographic Information Systems: Concepts, Methodologies, Tools, and Applications. Information Science Reference. Hershey. Shahab Fazal (2008): GIS basic. New Age International Publishers Mark Stallworthy (2002): Sustainability, lans use and environment. Cavendish Publishing Limited. London, Sydney.
Students obligations	-
Knowledge evaluation during semester	-
Knowledge evaluation after semester	-
Student activities:	Aktivnost ECTS (Classes attendance) 1 (Written exam) 1 (Oral exam) 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23864/173463	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to geodetic surveying techniques				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	-				
Learning outcomes:	1.-. Level:6,7 2.-. Level:7 3.-. Level:7 4.-. Level:6,7 5.-. Level:7 6.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Demonstration Simulations Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Laboratory exercises on laboratory equipment Laboratory exercises, computer simulations Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
Course content lectures	1.Introduction lecture, term and definition of measurement, 1h, Learning outcomes:1,2,6 2.Units for measuring and measuring horizontal and vertical angles, 1h, Learning outcomes:2,3 3.Measurement processing, 1h, Learning outcomes:1,2,3,4,5,6 4.Length and Correction Measurements, 1h, Learning outcomes:3,4 5.Testing and rectification of instrumentation and accessories, measurement error sources and their impact on results, 1h, Learning outcomes:4,5 6.Geometric, trigonometric and height systems, 1h, Learning outcomes:1,5,6 7.Geodetic tracking of displacement and deformation, 1h, Learning outcomes:1,6 8.GNSS measurements and multipurpose DGPS, 1h, Learning outcomes:1,5,6 9.Tahymmetric measurements, 1h, Learning outcomes:5,6 10.Aero-photogrammetric measurements and laser recording, 1h, Learning outcomes:1,6 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Measurement and calculation of definite values of directions and angles, 4h, Learning outcomes:1,2,4,5,6 2.Measurement of length and correction calculation, 4h, Learning outcomes:3,4,5,6 3.Measurement of height differences by geometrical level, 4h, Learning outcomes:4,5,6 4.Measurement of height differences by trigonometric level, 4h, Learning outcomes:3,4,5,6 5.Determining the position of points from GNSS measurement, 4h, Learning outcomes:4,5,6 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers Overhead projector				

Exam literature	M. Džapo: Izmjera zemljišta, Zagreb, 2008 I. Grgić: Tehnike geodetskih mjerenja, predavanja 2017	
Students obligations	-	
Knowledge evaluation during semester	-	
Knowledge evaluation after semester	-	
Student activities:	Aktivnost (Classes attendance) (Written exam) (Oral exam)	ECTS 1 1 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	-	

Code WEB/ISVU	23861/173460	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Geoinformation Systems (GIS)				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Adoption of knowledge and skills in designing, modeling, processing, analyzing, using, and presenting GIS				
Learning outcomes:	1. . Level:6,7 2. . Level:7 3. . Level:7 4. . Level:7 5. . Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Simulations Modelling Discussion Questions and answers Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Data mining and knowledge discovery on the Web Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1. -, 1h, Learning outcomes:1,2 2. -, 1h, Learning outcomes:1,2,3,4 3. -, 1h, Learning outcomes:5 4. -, 2h, Learning outcomes:3,4 5. -, 1h, Learning outcomes:2,4 6. -, 2h, Learning outcomes:3,4 7. -, 1h, Learning outcomes:3,4 8. -, 1h, Learning outcomes:3,4 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Course content constructures	1.-, 8h, Learning outcomes:2,3,4 2.-, 7h, Learning outcomes:1,2,3,4 3.-, 3h, Learning outcomes:1,2,4 4.-, 2h, Learning outcomes:1,2,5 5.-, 2h 6.-, 2h 7.-, 2h 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers				

	Overhead projector Special equipment	
Exam literature	Obvezna literatura: Longley, Goodchild, Maguire, Rhind (2011): Geographic Information Systems and Science, 3rd Edition, Wiley. Dopunska literatura: Neteler, Markus, Mitasova, Helena (2008): Open Source GIS. Springer Worboys, M. (2004): GIS: A Computing Perspective, 2nd Edition. CRC Press, Inc. Boca Raton, FL, USA Popovich, V., Claramunt, C., Schrenk, M., Korolenko, K., Gensel, J. (Eds.) (2015): Information Fusion and Geographic Information Systems. New York. Springer. Molenaar, M. (1998): An Introduction to the Theory of Spatial Object Modelling for GIS, Taylor Francis Ltd, London OGC (2015): http://www.opengeospatial.org	
Students obligations	-	
Knowledge evaluation during semester	-	
Knowledge evaluation after semester	-	
Student activities:	Aktivnost (Classes attendance) (Written exam) (Oral exam)	ECTS 1 1 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	24026/186274	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to physical planning and sustainability				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (10+0+10+0) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Auditory exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Seminar exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Familiarizing with the features of sustainable use and protection of space as one of the basic non-renewable resources. Expanding theoretical knowledge on physical planning, acquiring practical knowledge in the field of planning issues.				
Learning outcomes:	1.To assess the practical problems of spatial planning in the Republic of Croatia. Level:7 2.Critically evaluate basic theoretical settings of physical planning. Level:7 3.Organize the necessary activities during the physical planning. Level:6,7 4.To manage the necessary interdisciplinary work structure in physical planning. Level:6,7 5.To prepare basic guidelines / documents as the basis for initiating the procedure for the development of a specific spatial planning document. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion				
Methods of carrying out auditory exercises	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
Methods of carrying out seminars	Group problem solving Essay writing Discussion, brainstorming Workshop				
Course content lectures	1.Historical development and legislative framework of physical planning, and the structure of physical planning documents in the Republic of Croatia, 1h, Learning outcomes:1,2,3,4,5 2.Sustainable space management, 2h, Learning outcomes:1,2,3,4,5 3.Physical Planning and Infrastructure Systems, 2h, Learning outcomes:1,2,3,4,5 4.Physical planning and tourism, 2h, Learning outcomes:1,2,3,4,5 5.Physical Planning and Economy, 2h, Learning outcomes:1,2,3,4,5 6.Physical planning and environmental protection, 1h, Learning outcomes:1,2,3,4,5 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content auditory	1.Spatial Analysis and conditions for physical planning, 2h, Learning outcomes:1,2,3,4,5 2.Spatial boundaries definition fora physical planning document, 2h, Learning outcomes:1,2,3,4,5 3.Constraint elements analysis and space protection within preparing physical planning documents, 2h, Learning outcomes:1,2,3,4,5 4.Zoning and planning for different purposes, 4h, Learning outcomes:1,2,3,4,5 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				

Course content seminars	1.Spatial Analysis and conditions for physical planning, 2h, Learning outcomes:1,2,3,4,5 2.Spatial boundaries definition fora physical planning document, 2h, Learning outcomes:1,2,3,4,5 3.Constraint elements analysis and space protection within preparing physical planning documents, 2h, Learning outcomes:1,2,3,4,5 4.Zoning and planning for different purposes, 4h, Learning outcomes:1,2,3,4,5 5.-, 2h 6.-, 2h 7.-, 2h 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Overhead projector Video equipment
Exam literature	1.A.Marinović-Uzelac: "Prostorno planiranje",Dom i svijet, Zagreb 2001. 2. A. Mrak-Taritaš: Analiza stanja u prostoru i normativnom uređenju kao podloga za izradu novih propisa o prostornom uređenju i gradnji struktura dokumenata prostornog uređenja, Novi-Informator, Zagreb, 2013. 3.A. Marinović-Uzelac: "Naselja, gradovi, prostori", Tehnička knjiga, Zagreb, 1986. 5.A. Mrak-Taritaš: Dokumenti prostornog uređenja: Principi i metodologija prostornog planiranja, Tehničko veleučilište u Zagrebu, Zagreb, 2006.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (studies) - Oral examination for all students - synthesized interpretation of a thematic field about physical planning.
Student activities:	Aktivnost — ECTS (Written exam) — 1 (Oral exam) — 1 (Project) — 1
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23895/173496	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Practical Ergonomics				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. dr.sc. Dražen Arbutina dipl.ing.arh. Lectures: Iva Ževrnja predavač				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23882/173482	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to recording and Documentation of the Architectural Heritage				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Basic training for architectural heritage documentation preparation in accordance with conservation requirements				
Learning outcomes:	1.To choose the values on the architectural heritage that need to be documented in detail . Level:7 2.To choose the basic conservation principles for documentation of architectural heritage. Level:7 3.To recommend the adequate method, content and level of details for the documentation of the architectural heritage. Level:7 4.To prepare an adequate architectural survey of the building or building block as an example of the architectural heritage. Level:6,7 5.To present an adequate architectural survey of a building or building block as an example of the architectural heritage. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Data mining and knowledge discovery on the Web Workshop				
Course content lectures	1.Basic requirements, conditions and limitations when documenting architectural heritage, 2h, Learning outcomes:1,2,3,4,5 2.Categories of architectural survey (architectural surevy of particular building, assembly and details), 2h, Learning outcomes:1,2,3,4,5 3.Methods and equipment for conducting classical survey and documenting of the architectural heritage, 2h, Learning outcomes:1,2,3,4,5 4.Modern methods of architectural heritage documenting , 2h, Learning outcomes:1,2,3,4,5 5.Preparation and presentation of architectural heritage surveying and documenting results , 2h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Preparing of process for architectural heritage documentation, 2h, Learning outcomes:1,2,3,4,5 2.Preparing elements for surveying and adequate field sketches, 2h, Learning outcomes:1,2,3,4,5 3.Procedure for direct data acquisition (measurement and processing of architectural heritage records), 4h, Learning outcomes:1,2,3,4,5 4.Procedure for direct data acquisition (measurement and processing of architectural heritage records), 4h, Learning outcomes:1,2,3,4,5 5.Procedure for direct data acquisition (measurement and processing of architectural heritage records), 4h, Learning outcomes:1,2,3,4,5 6.Procedure for direct data acquisition (measurement and processing of architectural heritage records), 4h, Learning outcomes:1,2,3,4,5 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector				
Exam literature	1. Arbutina D. Suvremene metode izrade snimaka zatečenog stanja, Stručni materijal uz seminar, Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva XI. Seminar, Tehničko veleučilište u Zagrebu, Zagreb,				

	2011. 2. Arbutina D. Suvremene metode izrade snimaka zatečenog stanja - Primjena specijalnih računalnih alata, Stručni materijal uz seminar, Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva XIII. Seminar, Tehničko veleučilište u Zagrebu, Zagreb, 2012. 3. Arbutina D. Kulturno povijesna baština, Tehničko veleučilište u Zagrebu, Zagreb, 2011. 4. Chabbi, Amel, Rand Eppich, Franc#807;ois LeBlanc, Robin Letellier, and Werner Schmid. Recording, Documentation, and Information Management for the Conservation of Heritage Places. Los Angeles: Getty Conservation Institute, 2011.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (example architectural survey of heritage) - Oral exam for all students - Synthesis of the thematic area related to the application of adequate methods and results of architectural heritage documentation for its renovation, protection and preservation.
Student activities:	Aktivnost ECTS (Classes attendance) 1 (Practical work) 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23898/173499	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Structural Retrofit of the Architectural Heritage				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. doc. dr. sc. Dean Čizmar dipl. ing. građ. Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ.				
Course objectives	Basic training for architectural heritage design, assessment and preparation of structural retrofitting in accordance with conservation requirements				
Learning outcomes:	1.Critically evaluate the value of architectural heritage in the light of the necessary and possible interventions. Level:7 2.To formulate basic conservation restrictions and principles for intervention on architectural heritage. Level:6,7 3.determine method for structural rehabilitation . Level:7 4. evaluate damage of structure. Level:6,7 5.To design an appropriate way and level of structural retrofitting on architectural heritage to protect and preserve its values. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Discussion Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Laboratory exercises on laboratory equipment Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.An overview of basic historical structures on architectural heritage, 2h, Learning outcomes:1,2,3,4,5 2.Principle of valorisation of the architectural heritage and theoretical basis for interventions consistent with conservation conditions for protection and preservation, 2h, Learning outcomes:1,2,3,4,5 3.Contemporary approaches to structural retrofitting of architectural heritage, 1h, Learning outcomes:1,2,3,4,5 Damage analysis, determining and the causing of damages to the structure of the architectural heritage., 1h, Learning outcomes:1,2,3,4,5 4.Restoration and structural retrofitting of wooden and metal structures on architectural heritage, 2h, Learning outcomes:1,2,3,4,5 5.Restoration and structural retrofitting of masonry (brick and stine) structures of architectural heritage, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h 7.-, 2h 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Course content constructures	1.An analytical study of architectural heritage structure on a concrete example (values, levels and causes of damage), 4h, Learning outcomes:1,2,3,4,5 2.Definition of options and limitations for structural retrofitting of architectural heritage on a example, 4h, Learning outcomes:1,2,3,4,5 3.Preparation of design for structural retrofitting of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3,4,5 4.Preparation of design for structural retrofitting of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3,4,5 5.Preparation of design for structural retrofitting of the architectural heritage on a example with the initial and basic design elaboration of variants , 4h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Special purpose laboratory				

	General purpose computer laboratory Whiteboard with markers Overhead projector
Exam literature	1. Arbutina D.: Zahvati, rekonstrukcije i adaptacije graditeljske baštine, Stručni materijal uz seminar, Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva XII. Seminar, Tehničko veleučilište u Zagrebu, Zagreb, 2012. 2. Arbutina D.: Kulturno povijesna baština, Tehničko veleučilište u Zagrebu, Zagreb, 2011. 3. Structural Conservation of Stone Masonry: International Technical Conference, Athens, 31.x. - 3.xi.1989 = Conservation Structurelle De La Maconnerie En Pierre. Rome, 1990. 4. Tolles, E, Edna E. Kimbro, and William S. Ginell. Planning and Engineering Guidelines for the Seismic Retrofitting of Historic Adobe Structures. , 2013. 5. ICOMOS: ICOMOS Charter- principles for the analysis, conservation and structural restoration of architectural heritage, Victoria Falls, Zimbabwe, 2003 6. Costa, Ani#769;bal, Anto#769;nio Are#770;de, and Humberto Varum. Strengthening and Retrofitting of Existing Structures. , 2018. 7. PSYCHARIS, IOANNIS N. Seismic Assessment, Behavior and Retrofit of Heritage Buildings and Monuments. S.l.: SPRINGER INTERNATIONAL PU, 2016. 8. Syngellakis, S. Retrofitting of Heritage Structures against Earthquakes: Design and Evaluation of Strengthening Techniques. , 2013. 9. Bostenaru, Dan M. Materials, Technologies and Practice in Historic Heritage Structures. Place of publication not identified: Springer,Dordrecht, 2014.
Students obligations	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation during semester	Practical work (reduced example of renovation / reinforcement / reconstruction of heritage building structure) - Oral exam for all students - Synthesis of the thematic area related to the properties of mechanical resistance and stability of the architectural heritage.
Knowledge evaluation after semester	Practical work (a design brief for reconstruction, rehabilitation and adaptation of the architectural heritage on a example with the initial and basic design elaboration of variants in accordance with conservation conditions and requirements) - Oral exam for all students - Synthesis of the thematic area related to the properties of mechanical resistance and stability of the architectural heritage.
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Practical work) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23901/173502	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Sustainable Architecture and Construction				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers					
Course objectives	To inform the students about basics in sustainable building design to ensure a more quality attitude towards the matter				
Learning outcomes:	1.develop a positive attitude toward the complex system of sustainable building design. Level:6,7 2.choose the appropriate building materials for construction of a sustainable building according to the local typology and setting. Level:7 3.evaluate the application of different material selection methodologies. Level:7 4.evaluate the principles and methodology of possible technology, system and construction works on the construction of objectives. Level:7 5.esign a sustainable building system proposal using exemplary construction materials and technologies. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Traditional literature analysis Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.Introduction to Sustainable Architecture (basic concepts, terminology, goals), 1h, Learning outcomes:1,2,3,4,5 2.Building Materials of Sustainable Architecture (a set of recommended materials, a local selection of materials, methods for selecting materials), 1h, Learning outcomes:1,2,3,4,5 3.Natural materials (straw, clay, sheep wool, wood), 2h, Learning outcomes:1,2,3,4,5 4.Les - material of the future (application possibilities, modes of installation), 1h, Learning outcomes:1,2,3,4,5 5.Recycling (recycling of wooden construction elements, recycling of steel construction elements, recycling of other materials), 1h, Learning outcomes:1,2,3,4,5 6.Reuse (reuse of objects, static remediation, functional adaptation to new application), 1h, Learning outcomes:1,2,3,4,5 7.Ecological use of resources (in construction / renovation, in the selection of materials, by using energy), 1h, Learning outcomes:1,2,3,4,5 8.Infrastructure facilities (bridges, halls), 1h, Learning outcomes:1,2,3,4,5 9.Vision of sustainable architecture (self-sufficiency), 1h, Learning outcomes:1,2,3,4,5 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Presentation of the starting points for the preparation of the study design of a sustainable design, 2h, Learning outcomes:1,2,3,4,5 2.Designing a sustainable facility project as a proposal for a sustainable building system using exemplary sustainable materials, constructions and technologies, 16h, Learning outcomes:1,2,3,4,5 3.Presentation of a sustainable building project, 2h, Learning outcomes:1,2,3,4,5 4.- 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				
Exam literature	1. R. Gonzalo, R. Vallentin: Passive House Design, DETAIL Business Information GmbH, Mnchen, 2014 2. Hermann Kaufmann, Stefan Krtsch, Stefan Winter: Manual of Multistorey Timber Construction, DETAIL Business Information GmbH, Mnchen, 2018 3. C. Schittich (urednik): best of DETAIL Wood, DETAIL Business Information GmbH, Mnchen, 2014				

	4. S. El Khouli, V. John, M. Zeumer: Sustainable Construction Techniques, DETAIL Business Information GmbH, Mnchen, 2015 5. I. Seljak: Uvod u održivu arhitekturu i konstrukcije [separati predavanja], Zagreb, 2018 Dopunska literatura: 1. K. Voss, E. Musall: Net zero energy buildings, DETAIL Business Information GmbH, Mnchen, 2012 2. D. Anink, C. Boonstra: Handbook of Sustainable Building, Taylor Francis Ltd, London, 1996 3. H. Krapmeier, E. Drossler: Living Comfort without Heating, Springer Verlag GMBH, Wien, 2003 4. Paola Sassi, Strategies for Sustainable Architecture, Taylor Francis, Abingdon, 2006 (http://library.uniteddiversity.coop/Ecological_Building/Strategies_for_Sustainable_Architecture.pdf) 5. J.J. Kim, B. Rigdon: Introduction to Sustainable Design, National Pollution Prevention Center for Higher Education, Ann Arbor, 1998 (http://www.umich.edu/nppcpub/resources/compendia/ARCHpdfs/ARCHdesIntro.pdf) 6. http://www.proholz.at/zuschnitt/ausgabe/2/ http://www.proholz.at/zuschnitt/ausgabe/33/ http://www.proholz.at/zuschnitt/ausgabe/38/ http://www.proholz.at/zuschnitt/ausgabe/40/ http://www.proholz.at/zuschnitt/ausgabe/45/ http://www.proholz.at/zuschnitt/ausgabe/54/ http://www.proholz.at/zuschnitt/ausgabe/65/
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Seminar paper - Oral examination for all students who did not meet seminar paper requirements - synthesized interpretation of a thematic field relating to heritage and environment preservation.
Student activities:	Aktivnost — ECTS (Practical work) — 2 (Activity in class) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23888/173488	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Sustainable Building Services				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Become familiar with terms Building Services and Sustainable development. Acquire general insight into all relevant aspects of Building Services.				
Learning outcomes:	1.To choose building services and installations in buildings for various purposes. Level:7 2.To determine application of electrical energy in buildings according to sources and customers. Level:7 3.Valorize heating systems and their environmental impact. Level:7 4.Critically evaluate the selection and procedure of application of solar energy and heat pumps for building heating and warm water production. Level:7 5.Differentiate HVACR systems in buildings. Level:6 6.Differentiate water supply and sewage systems and their environmental impact. Level:6 7.To choose the option of means of mechanical transport in buildings. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
Course content lectures	1.Introduction to Building Services and Sustainable development and construction. Building Services education, practice and career. Basic information on commissioning process. , 1h, Learning outcomes:1 2.Review of Electrical Engineering. Electricity generation, transmission and distribution. Electricity consumption, types of customers, distribution of electricity in buildings, bus-systems, foto-voltaics and lighting in office buildings, viewing conditions, lighting quality, types of luminaires, 2h, Learning outcomes:2 3.Heating in the buildings, sources of heat, energy consumption and efficiency. Solar heating and heating pumps and natural and mechanical ventilation in buildings, air conditioning and refrigeration, 3h, Learning outcomes:3,4,5 4.Potable and waste water systems, potable water requirements and consumption, sources of waste water and treatment of waste water, sizes and types of treatment plants, waste water disposal and installations for potable and waste water in the buildings, testing and commissioning , 3h, Learning outcomes:6 5.Elevators in buildings,moving walkways, elevator systems and types, requirements, sizes, equipment, 1h, Learning outcomes:7 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Working out example of small commissioning protocol, 1h, Learning outcomes:1 2.Insight into wiring calculation. Working out small calculation of wiring, fuse and voltage drop. , 2h, Learning outcomes:2 3.Calculation of lighting luminaires in buildings, 2h, Learning outcomes:2 4.Calculation of solar panels, reduction of heating costs and carbon dioxide emission., 2h, Learning outcomes:4 5.Heat pump investment plan calculation, 1h, Learning outcomes:4 6.Dimensioning the sewer, quantity of waste water from the building, 2h, Learning outcomes:6 7.Example of small treatment plant, capacity and sizes discussion, 1h, Learning outcomes:6 8.Working out example of sewer testing record and commissioning protocol, 2h, Learning outcomes:6 9.Dimensioning of main pipe for building water supply, 2h, Learning outcomes:6 10.Working out example of water supply installation testing record and commissioning protocol, 1h, Learning outcomes:6 11.Discussion about modern sanitary appliances, calculation of water savings, 1h, Learning outcomes:6 12.Working out selection of fire detectors, firefighting extinguishers, and sprinkler systems; group work, 1h, Learning outcomes:1 13.Calculation of average waiting time and capacity for elevators in buildings, 1h, Learning outcomes:7 14.Calculation of transmission capacity of escalator, 1h, Learning outcomes:7 15.-				

Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector
Exam literature	Osnovna Literatura 1. Lenz, Bernhard, Jrgen Schreiber, and Thomas Stark. Sustainable Building Services: Principles - Systems - Concepts. , 2012. 2. Guide to Building Services for Historic Buildings: Sustainable Services for Traditional Buildings. London: Chartered Institution of Building Services Engineers (CIBSE, 2003. Dopunska literatura: 1. Keeler, Marian, and Bill Burke. Fundamentals of Integrated Design for Sustainable Building. , 2016. 2. Lubeck, Aaron. Green Restorations: Sustainable Building and Historic Homes. Gabriola Island, BC: New Society Publishers, 2010.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (preparation of calculations and smaller technical solutions for sustainable building services) - Oral examination for all students - Synthesis of the thematic area related to sustainable building services.
Student activities:	Aktivnost ECTS (Classes attendance) 1 (Practical work) 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23896/173497	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to the elaboration and implementation of the architectural project				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. Iva Ževrnja predavač Lectures:2. dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises: Iva Ževrnja predavač				
Course objectives	-				
Learning outcomes:	1.-. Level:6 2.-. Level:6 3.-. Level:6 4.-. Level:6,7 5.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Other -				
How construction exercises are held	Laboratory exercises on laboratory equipment Discussion, brainstorming Other -				
Course content lectures	1.-, 2h, Learning outcomes:1 2.-, 2h, Learning outcomes:1,2,3 3.-, 2h, Learning outcomes:1,2,3 4.-, 2h, Learning outcomes:1,2,3 5.-, 2h, Learning outcomes:1,2,3 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.-, 2h, Learning outcomes:1,2,3,4,5 2.-, 2h, Learning outcomes:1,2,3,4,5 3.-, 2h, Learning outcomes:1,2,3,4,5 4.-, 2h, Learning outcomes:1,2,3,4,5 5.-, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h, Learning outcomes:1,2,3,4,5 7.-, 2h, Learning outcomes:1,2,3,4,5 8.-, 2h, Learning outcomes:1,2,3,4,5 9.-, 2h, Learning outcomes:1,2,3,4,5 10.-, 2h, Learning outcomes:1,2,3,4,5 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment				
Exam literature	1. Bodić, Ževrnja: Zgradarstvo I, Priručnik za izvođenje konstrukcijskih vježbi; izbor studentskih radova iz programa samostojećih obiteljskih zgrada 2.E.Neufert: Elementi arhitektonskog projektiranja, Golden marketing, Zagreb 2002 3.A.Štulhofer, Z.Veršić: Crtanje arhitektonskih nacrta, Pribor i osnove, UPI-2m,Zagreb1998 4.Zakon o gradnji, 153/13; Zakon o prostornom uređenju 153/13; www.migpu.hr 5. Pravilnik o osiguranju pristupačnosti građevina osobama s invaliditetom i smanjene pokretljivosti, NN78/2013				
Students obligations	-				
Knowledge evaluation during semester	-				

Knowledge evaluation after semester	-	
Student activities:	Aktivnost (Classes attendance) (Practical work)	ECTS 1 2
Remark	This course can not be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	-	

Code WEB/ISVU	23899/173500	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to the Interior Design				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	-				
Learning outcomes:	1.-. Level:7 2.-. Level:7 3.-. Level:7 4.-. Level:7 5.-. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Modelling Discussion Questions and answers Seminar, students presentation and discussion Homework presentation -				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1.-, 1h, Learning outcomes:1,2,3,4 2.-, 1h, Learning outcomes:1,2,3,4 3.-, 2h, Learning outcomes:1,2,3,4,5 4.-, 2h, Learning outcomes:1,2,3,4,5 5.-, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h, Learning outcomes:1,2,3,4,5 7.-, 2h 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Course content constructures	1.-, 1h, Learning outcomes:1,2,3 2.-, 2h, Learning outcomes:1,2,3 3.-, 2h, Learning outcomes:1,2,3,4 4.-, 2h, Learning outcomes:1,2,3,4 5.-, 2h, Learning outcomes:1,2,3,4,5 6.-, 2h, Learning outcomes:1,2,3,4,5 7.-, 9h, Learning outcomes:1,2,3,5 8.-, 2h 9.-, 2h 10.-, 2h 11.-, 2h 12.-, 2h 13.-, 2h 14.-, 2h 15.-, 2h				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				
Exam literature	Osnovna literatura: Neufert, Ernst (2002.), Elementi arhitektonskog projektiranja : osnove, norme i propisi o projektiranju, građenju, oblikovanju, prostornim potrebama i prostornim odnosima; mjere za zgrade, prostorije, uređaje i pribore s čovjekom kao mjerilom i ciljem Dopunska literatura: Anne Massey, Interior design of the 20th century, Thames and Hudson, London, 1994				
Students obligations	-				

Knowledge evaluation during semester	-	
Knowledge evaluation after semester	-	
Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Seminar Work)	1
	(Practical work)	1
Remark	This course can not be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	24012/186260	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to thermal insulation and energy efficiency in Civil Engineering				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (4+0+0+16) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Lectures:doc. dr. sc. Dean Čizmar dipl. ing. građ. Lectures: Iva Ževrnja predavač Auditory exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Auditory exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ.				
Course objectives	Prepare students for the procedures that are being carried out when designing energy renewal, as well as developing adequate energy efficiency designs or survey of buildings, together with designing and supervising the proper performance of the systems for thermal insulation of building envelopes.				
Learning outcomes:	1.To determine the energy rating (class) of buildings. Level:7 2.Formulate the energy retrofit measures for the buildings. Level:6,7 3.Choose the thermal protection system option for the building envelope. Level:7 4.Assess opportunities for energy retrofit of architectural heritage. Level:7 5.To design the technical details of the thermal protection of the building envelope. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies				
Methods of carrying out auditory exercises	Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Computer simulations Workshop				
Course content lectures	1.Introduction to energy efficiency and thermal protection , 1h, Learning outcomes:1,2,3 2.Sources of heat, heating bodies, hot water preparation systems, regulation and control systems, 2h, Learning outcomes:1,2,3 3.Implementation methodology of energy review , 2h, Learning outcomes:1,2,3 4.Technical principles for energy retrofit of buildings, 2h, Learning outcomes:2,3,4,5 5.Theoretical principles and technical details of energy retrofit of the architectural heritage, 1h, Learning outcomes:2,3,4,5 6.Thermal insulation systems for the buildings outer envelope, 1h, Learning outcomes:2,3,4,5 7.Specific technical detail design of the thermal protection systems of the building envelope, 1h, Learning outcomes:2,3,4,5 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content auditory	1.Application options overview of computer tools for energy rating, calculation of thermal losses and building physics, and production of an energy certificate, 5h, Learning outcomes:1,2,3 2.Overview of specific methods and technologies in design for application of the systems for thermal protection of the building envelope and design of building energy retrofit, 5h, Learning outcomes:2,3,4,5 3.- 4.- 5.- 6.- 7.- 8.- 9.-, 2h 10.-, 2h 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Application of computer tools for energy rating, calculation of thermal losses and building physics, and production of an energy certificate, 5h, Learning outcomes:1,2,3 2.Application of specific methods and technologies in design of the systems for thermal protection of the building				

	envelope and design of building energy retrofit, 5h, Learning outcomes:2,3,4,5 3.- 4.- 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-
Required materials	Basic: classroom, blackboard, chalk... Special purpose laboratory General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment
Exam literature	1. XXX: Priručnik za energetsko certificiranje zgrada I i II, Program Ujedinjenih naroda za razvoj - UNDP, Zagreb, 2010. 2. HUPFAS (grupa autora), Smjernice za izradu ETICS sustava,2016. 3. D. Arbutina: Uvod u toplinsku zaštitu i uštedu energije u graditeljstvu - energetska obnova graditeljske baštine [separati predavanja],Zagreb, 2018. 4. D. Arbutina: Uvod u toplinsku zaštitu i uštedu energije u graditeljstvu - tehnički detalji toplinsko-izolacijskih sustava [separati predavanja],Zagreb, 2018.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (a reduced example of energy valorisation and energy retrofitting design of the building envelope) - Oral examination for all students - synthesized interpretation of a thematic field about energy performace of the buildings.
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Project) — 1 (Practical work) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23900/173501	**ECTS**	3.0	**Academic year**	2018/2019
Name	Introduction to Urban Planning and Heritage Conservation				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Introduction to basic principles of the urban and physical planning measures for protection and conservation of cultural property (architectural heritage)				
Learning outcomes:	1.Critically evaluate specific values of the architectural heritage. Level:7 2.To evaluate and recognize dangers for protecting and preserving of the architectural heritage realted to spatial and urban planning. Level:7 3.To connect the necessary formal elements of the system of spatial planning and planning with the system of protection of the architectural heritage. Level:6,7 4.To formulate urban and spatial planning measures for the protection of architectural heritage. Level:6,7 5.To integrate urban planning and spatial planning measures into a system of conservation measures for the protection and preservation of architectural heritage. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.Systems for physical planning and protection of cultural property, 2h, Learning outcomes:1,2,3,4,5 2.The elements of the physical plan and the relation to the protection of cultural property(architectural heritage), 2h, Learning outcomes:1,2,3,4,5 3.Implementing provisions of spatial planning documents and the relation to the protection and preservation of cultural property(architectural heritage), 2h, Learning outcomes:1,2,3,4,5 4.Conservation study for preparation of spatial planning documents, 2h, Learning outcomes:1,2,3,4,5 5.Conservation guidelines and conditions as part of spatial planning documentation, 2h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Analysis of spatial values related to cultural property (individual cultural heritage and landscape), 4h, Learning outcomes:1,2,3,4,5 2.Preparation of the conservation study for the preparation of the spatial planning document, 4h, Learning outcomes:1,2,3,4,5 3.Preparation of the conservation study for the preparation of the spatial planning document, 4h, Learning outcomes:1,2,3,4,5 4.Preparation of the conservation study for the preparation of the spatial planning document, 4h, Learning outcomes:1,2,3,4,5 5.Preparation of implementing provisions of spatial planning documents related to the protection and preservation of cultural property, 4h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				

Exam literature	Osnovna literatura: 1. Marasovic, T. Methodological Proceedings for the Protection and Revitalization of Historic Sites (experiences of Split). Rome: International Centre for Conservation, etc, 1975. Print. 2. Arbutina D. Kulturno povijesna baština, Tehničko veleučilište u Zagrebu, Zagreb, 2011. 2. Arbutina D., Alfirević Arbutina H., Ževrnja I.; , Spatial Planning as Potential Risk Management Tool in Heritage Protection,Proceedings of 11th International Conference Organization, Technology and Management in Construction, Dubrovnik-Zagreb, 2013. 3. Lipovac N.: Uvod u zakonodavstvo prostornog uređenja, Arhitektonski fakultet Sveučilišta u Zagrebu, Zagreb, 2013. 4. Mitchell, Nora, Mechtild Ro#776;ssler, and Pierre-Marie Tricaud. World Heritage Cultural Landscapes: A Handbook for Conservation and Management. Paris: UNESCO World Heritage Centre, 2009. Dopunska literatura: 1. Arbutina D., Alfirević Arbutina H. , Graditeljska baština te kulturni i kultivirani krajolik u ruralnom prostoru, Stručni skup Urbano-ruralne veze, Sveti Martin na Muri 19. i 20. rujna 2017. godine - Zbornik radova, Hrvatski zavod za prostorni razvoj, Zagreb, 2017. 2. Arbutina D., Alfirević Arbutina H. , Kontroverze pri objektivizaciji valorizacije krajobraznih vrijednosti ruralnog prostora, Stručni skup Urbano-ruralne veze, Sveti Martin na Muri 19. i 20. rujna 2017. godine - Zbornik radova, Hrvatski zavod za prostorni razvoj, Zagreb Hrvatski zavod za prostorni razvoj, Zagreb, 2017 3. Cultural Landscapes: The Challenges of Conservation : World Heritage 2002, Shared Legacy, Common Responsibility, Associated Workshops, 11-12 November 2002, Ferrara, Italy. Rome: UNESCO World Heritage Centre, 2003. 4. Fowler, P J. World Heritage Cultural Landscapes, 1992-2002. Paris: UNESCO World Heritage Centre, 2003.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (preparation of basic analytical elements for study of protected space and landscape, and basics for conservation study) - Oral examination for all students - Synthesis of the thematic area related to the architectural heritage and the application of adequate urban and physical planning measures for its protection and conservation.
Student activities:	Aktivnost ECTS (Classes attendance) 1 (Practical work) 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	24025/186273	**ECTS**	6.0	**Academic year**	2018/2019
Name	Investment Policies				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (14+0+0+16) 120
Teachers	Lectures:1. Josip Čengija Lectures:2. v.predavač Boris Uremović dipl.ing.građ. Auditory exercises: Belinda Brucker Auditory exercises: Josip Čengija Construction exercises: Josip Čengija				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				
ISVU equivalents:	163926;				

Code WEB/ISVU	23884/173484	**ECTS**	6.0	**Academic year**	2018/2019
Name	Legal Aspects of Construction Projects				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (30+0+0+0) 120
Teachers	Lectures:mr.sc. Željko Uhlir				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23909/181173	**ECTS**	6.0	**Academic year**	2018/2019
Name	Management and Maintenance of Infrastructure Facilities and Buildings				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (12+0+0+18) 120
Teachers	Lectures: Josip Čengija Auditory exercises: Belinda Brucker Auditory exercises: Josip Čengija Construction exercises: Belinda Brucker Construction exercises: Josip Čengija				
Course objectives	Students will learn how to independently manage construction companies specializing in the management and maintenance of engineering structures and buildings.				
Learning outcomes:	1.integrate all costs in the model that is used to estimate building/structure maintenance costs. Level:6,7 2.plan building/structure maintenance costs. Level:6,7 3.establish a model for estimating building/structure maintenance costs. Level:6,7 4.measure inputs needed to generate a model. Level:7 5.classify all costs to make them suitable for integration in the model. Level:6,7 6.combine various technological solutions to obtain the most favourable solution from the aspect of total costs of living. Level:6,7 7.develop a model for estimating the building/structure maintenance costs. Level:6,7 8.create various alternatives for estimating the building/structure maintenance costs. Level:6,7 9.manage the building/structure maintenance costs. Level:6,7 10.reexamine each model alternative and its influence on maintenance costs. Level:6,7 11.compare various model alternatives. Level:6,7 12.define the most favourable model alternative. Level:7 13.select an optimum alternative that generates the lowest maintenance costs. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other Appropriate teaching aids (video projector and computer) will be used as appropriate in the presentation of lectures.				
Methods of carrying out auditory exercises	Group problem solving Essay writing Interactive problem solving Other Topics needed for the preparation of the assignment (Building Maintenance and Rehabilitation Scheduling Project) are presented.				
How construction exercises are held	Group problem solving Discussion, brainstorming Workshop Other Students independently solve tasks as necessary for preparation of the assignment (Building Maintenance and Rehabilitation Scheduling Project).				
Course content lectures	1.Introduction and general terms, 2h, Learning outcomes:1,2,3,4,5 2.General principles for the maintenance and rehabilitation of buildings and other facilities, 2h, Learning outcomes:1,2,3,4,5,6 3.Distribution of costs over the entire life of the building/facility, 2h, Learning outcomes:3,4,7,8 4.Identification of building condition and causes of building disrepair, 2h, Learning outcomes:3,7,10,11 5.Service life of individual parts of a building/facility, 2h, Learning outcomes:1,3,6,9 6.Inventory of present condition, periodic controls, reports, 2h, Learning outcomes:2,6,9,11 7.Maintenance, maintenance plan, technology, costs, 2h, Learning outcomes:1,4,6,11,12,13 8.Maintenance, maintenance plan, technology, costs, 2h, Learning outcomes:4,6,10,11,12 9.Maintenance resources (material, machines, personnel, money), 2h, Learning outcomes:1,2,5,8,12 10.Building maintenance and rehabilitation scheduling project, 2h, Learning outcomes:2,3,4,8,10 11.Quality assurance, 2h, Learning outcomes:1,5,7,8,12,13 12.Maintenance of buildings/facilities and maintenance of housing units, 2h, Learning outcomes:5,7,9,10,12,13 13.Organisation of buildng maintenance service, 2h, Learning outcomes:1,8,9,10,11 14.Rehabilitation of buildings and infrastructure facilities, 2h, Learning outcomes:5,6,7,13 15.Building material recycling, 2h, Learning outcomes:1,4,5,6,8				
Course content auditory	1.Parts of the project for the maintenance and rehabilitation of buildings - identification of condition, maintenance or repair method, maintenance or repair costs, quality control, building management, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13 2.Parts of the project for the maintenance and rehabilitation of buildings - identification of condition, maintenance or repair method, maintenance or repair costs, quality control, building management, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13 3.Parts of the project for the maintenance and rehabilitation of buildings - identification of condition, maintenance or repair method, maintenance or repair costs, quality control, building management, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13 4.Remedial work and rehabilitation of old buildings - floor structure, basement, roof structure, facade, with examples from building practice , 2h, Learning outcomes:1,2,3,4,5,6,7,9,10,11,12,13 5.Moisture and causes of moisture occurrence in buildings, remedial measures, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13				

	6.Roof repair technology with an emphasis on flat roof repair, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13 7.no classes, 2h 8.no classes, 2h 9.no classes, 2h 10.no classes, 2h 11.no classes, 2h 12.no classes, 2h 13.no classes, 2h 14.no classes, 2h 15.no classes, 2h
Course content constructures	1.no classes, 2h 2.no classes, 2h 3.no classes, 2h 4.no classes, 2h 5.no classes, 2h 6.no classes, 2h 7.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 8.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 9.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 10.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 11.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 12.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 13.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 14.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13 15.Each student independently prepares the program assignement Management plan for the maintenance and rehabilitation of buildings, which includes providing solution to a specific task., 2h, Learning outcomes:1,2,3,4,5,6,7,8,13
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment
Exam literature	1. Graditelji u obnovi Hrvatske, Zbornik radova, knjiga I i II, Brijunski otoci, 1992. 2. M. Taylor, H.H.Hosker: Quality Assurance for Buliding Design, Longman Scietific and Technical, Essex, 1992.
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Redovitost pohaa#10#0#75$Kolokvij, numeri zadaci#1#35#50$Kolokvij, teorijska pitanja#1#35#50$Programski zadatak#1#30#100$
Knowledge evaluation after semester	Written examination relating to theory (lectures) and exercises (solving tasks in relation with the assignment "Building Maintenance and Rehabilitation Scheduling Project"). Oral examination (to be taken by students who successfully passed the written examination).
Student activities:	Aktivnost — ECTS (Project) — 4 (Written exam) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146706;
Proposal made by	prof.dr.sc. Saša Marenjak, 15.6.2012

Code WEB/ISVU	23893/173494	**ECTS**	3.0	**Academic year**	2018/2019
Name	Management of architectural heritage / cultural institutions				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Getting acquainted with the basics of architectural heritage management as individual elements as well as complex systems				
Learning outcomes:	1.To evaluate specific values for architectural heritage and cultural institutions within. Level:7 2.To assess potential dangers to the heritage and the necessary conditions for functioning of institutions within . Level:7 3.To formulate the necessary measures to ensure the basic conditions for work in institutions located in the architectural heritage. Level:6,7 4.To formulate the basics of the architectural heritage management plan. Level:6,7 5.To re-examine the impact of overall activities during the work of cultural institutions on the architectural heritage and its values. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.Architectural Heritage and Cultural Institutions, 2h, Learning outcomes:1,2,3,4,5 2.Museums, archives and galleries - work activities and conditions for the protection of cultural goods, 2h, Learning outcomes:1,2,3,4,5 3.Management and maintenance of cultural institutions located in a protected architectural heritage, 2h, Learning outcomes:1,2,3,4,5 4.Heritage management plan, 2h, Learning outcomes:1,2,3,4,5 5.Heritage impact assessment, 2h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Heritage Management Plan - conservation conditions and limitations during management and maintenance, 4h, Learning outcomes:1,2,3,4,5 2.Heritage Management Plan - conservation conditions and limitations during management and maintenance, 4h, Learning outcomes:1,2,4,5 3.Heritage Management Plan - conservation conditions and limitations during management and maintenance, 4h, Learning outcomes:1,2,3,4,5 4.Heritage Management Plan - conservation conditions and limitations during management and maintenance, 4h, Learning outcomes:1,2,3,4,5 5.Assessment of the impact on heritage due to use and maintenance, 4h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				

Exam literature	1. Wijesuriya, G, J Thompson, and Chr Young. Managing Cultural World Heritage. Paris: Unesco world heritage centre, 2013. 2. ICOMOS , Guidance on heritage impact assessments for Cultural World Heritage Properties, A publication of the International Council on Monuments and Sites, ICOMOS, Paris, 2011. 3. Bond, Stephen, and Derek Worthing. Managing Built Heritage: The Role of Cultural Values and Significance., 2016. 4. Arbutina D.; Popović S.G.; Lalošević I. Lipovac N.: Procjena uticaja na baštinu za prirodno i kulturno-istorijsko područje Kotora, Arhitektonski Fakultet, Univerzitet Crne Gore, Podgorica, 2017.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Practical work (a reduced example of heritage management plan and heritage impact assessment study) - Oral examination for all students - synthesized interpretation of a thematic field about heritage management and heritage impact assessment.
Student activities:	Aktivnost ECTS (Classes attendance) 1 (Practical work) 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23281/146685	**ECTS**	6.0	**Academic year**	2018/2019
Name	Mathematics				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (30+0+0+0) 120
Teachers	Lectures:1. dr.sc. Mandi Orlić Bachler v.pred Lectures:2. Ivana Božić Dragun dipl.prof.mat. Lectures:3. mr. sc. Reni Banov dipl. ing. mat. Auditory exercises:mr. sc. Reni Banov dipl. ing. mat. Auditory exercises:dr.sc. Mandi Orlić Bachler v.pred				
Course objectives	acquiring basic knowledge in differential and integral calculus of real functions of several real variables				
Learning outcomes:	1.sketch natural domains of functions of two variables. Level:6 2.sketch contour lines of functions of two variables. Level:6 3.find first and second order partial derivatives of functions of two variables. Level:6 4.determine tangent planes on graphs of functions of two variables. Level:6,7 5.estimate errors using partial derivatives. Level:6,7 6.determine local extrema of functions of two variables. Level:6,7 7.solve optimization problems using local extrema. Level:6 8.solve double integrals in Cartesian coordinates. Level:6 9.find volumes and areas using double integrals. Level:6 10.solve triple integrals in Cartesian coordinates. Level:6 11.solve double integrals in polar coordinates. Level:6 12.solve triple integrals in cylindrical and spherical coordinates. Level:6 13.find masses and centres of gravity using multiple integrals. Level:6				
Methods of carrying out lectures	Ex cathedra teaching				
Methods of carrying out auditory exercises	Group problem solving				
Course content lectures	1.Functions of several variables, 2h, Learning outcomes:1 2.Graphical representation of functions of several variables, 2h, Learning outcomes:2 3.Partial derivatives, 2h, Learning outcomes:3 4.Tangent plane, 2h, Learning outcomes:4 5.Application of partial derivatives to error estimation, 2h, Learning outcomes:5 6.Local extrema of functions of several variables, 2h, Learning outcomes:6,7 7.Midterm exam, 2h, Learning outcomes:1,2,3,4,5,6,7 8.Double integral, 2h, Learning outcomes:8 9.Using double integrals to find volumes and areas, 2h, Learning outcomes:9 10.Triple integral, 2h, Learning outcomes:10 11.Double integrals in polar coordinates, 2h, Learning outcomes:11 12.Triple integrals in cylindrical and spherical coordinates, 2h, Learning outcomes:12 13.Applications of multiple integrals in physics, 2h, Learning outcomes:13 14.Final written exam, 2h, Learning outcomes:8,9,10,11,12,13 15.Final oral exam, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13				
Course content auditory	1.Functions of several variables, 2h, Learning outcomes:1 2.Graphical representation of functions of several variables, 2h, Learning outcomes:2 3.Partial derivatives, 2h, Learning outcomes:3 4.Tangent plane, 2h, Learning outcomes:4 5.Application of partial derivatives to error estimation, 2h, Learning outcomes:5 6.Local extrema of functions of several variables, 2h, Learning outcomes:6,7 7.Midterm exam, 2h, Learning outcomes:1,2,3,4,5,6,7 8.Double integral, 2h, Learning outcomes:8 9.Using double integrals to find volumes and areas, 2h, Learning outcomes:9 10.Triple integral, 2h, Learning outcomes:10 11.Double integrals in polar coordinates, 2h, Learning outcomes:11 12.Triple integrals in cylindrical and spherical coordinates, 2h, Learning outcomes:12 13.Applications of multiple integrals in physics, 2h, Learning outcomes:13 14.Final written exam, 2h, Learning outcomes:8,9,10,11,12,13 15.Final oral exam, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13				
Required materials	Basic: classroom, blackboard, chalk...				
Exam literature	1. S. Suljagić: Matematika II, skripta, 2000. http://www.grad.hr/nastava/matematika/ 2. M. Orlić, T. Perkov: Repetitorij matematike za studente graditeljstva, TVZ, Zagreb, 2014. Additional literature: 1. B. P. Demidovič i dr.: Zadaci i riješeni primjeri iz matematičke analize za tehničke fakultete, 7. ispravljeno izdanje, Golden marketing - Tehnička knjiga, Zagreb, 2003. 2. S. Kurepa: Matematička analiza I, Tehnička knjiga, Zagreb, 1970. 3. K. Singh: Engineering mathematics through applications, Palgrave Macmillan, 2003.				
Students obligations	It is required to achieve at least 30 points during the semester.				
Knowledge evaluation during	During the semester it is possible to achieve a maximum of 60 points, as follows: - course completed: 30 points,				

semester	- tests: 30 points. By achieving at least 45 points, a student is qualified for the oral exam, which is obligatory.
Knowledge evaluation after semester	At the exam it is possible to achieve a maximum of 40 points. The exam consists of written (for students with less then 45 points achieved during the semester) and oral part.
Student activities:	Aktivnost ECTS (Constantly tested knowledge) 2 (Written exam) 2 (Oral exam) 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	T. Perkov, M. Orlić Bachler, 11. 5. 2016.

Code WEB/ISVU	24030/186372	**ECTS**	6.0	**Academic year**	2018/2019
Name	Modern Construction Technologies				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:v.predavač Boris Uremović dipl.ing.građ. Lectures:mr.sc. Donka Wurth v. predavač Auditory exercises: Nina Šantek struč.spec.ing.aedif., predavač Auditory exercises: Domagoj Šojat struč.spec.ing.aedif. Auditory exercises:v.predavač Boris Uremović dipl.ing.građ. Auditory exercises: Sanela Vojnović mag.ing.aedif Construction exercises: Nina Šantek struč.spec.ing.aedif., predavač Construction exercises: Domagoj Šojat struč.spec.ing.aedif. Construction exercises:v.predavač Boris Uremović dipl.ing.građ. Construction exercises: Sanela Vojnović mag.ing.aedif				
Course objectives					
Remark	This course can not be used for final thesis theme				
Prerequisites:	No prerequisites.				

Code WEB/ISVU	23287/146708	**ECTS**	6.0	**Academic year**	2018/2019
Name	Modern Methods in Geotechnical Engineering				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+8+0+22) 120
Teachers	Lectures:1. dr.sc. Sonja Zlatović , profesor visoke škole Lectures: Želimir Ortolan Laboratory exercises: Ratko Savi struč.spec.ing.aedif. Laboratory exercises:dr.sc. Sonja Zlatović , profesor visoke škole Construction exercises: Ratko Savi struč.spec.ing.aedif. Construction exercises:dr.sc. Sonja Zlatović , profesor visoke škole				
Course objectives	Students will be sensitized to the significance of measurement in geotechnical engineering, and will be allowed to take part in the design process, which will provide them with good foundations for independent design in their professional work.				
Learning outcomes:	1.estimate slope stability according to a given geotechnical report. Level:6,7 2.propose slope geometry with a satisfactory safety level. Level:6,7 3.design foundations for a building or a similar structure. Level:6,7 4.design a free-standing retaining wall. Level:6,7 5.estimate danger of a hydraulic failure at the construction pit bottom. Level:6,7 6.propose method for reducing danger of hydraulic failure at the foundation pit bottom. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Simulations Modelling Discussion Questions and answers Seminar, students presentation and discussion Sites of geotechnical investigations are visited, as well as construction sites. Written materials are given to students an advance, but students are required active cooperation in the class. Best geotechnicians are invited to lectures according to topics. Active Learning Critical Thinking frame is used.				
Methods of carrying out laboratory exercises	Laboratory exercises on laboratory equipment Group problem solving Workshop				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Computer simulations Workshop				
Course content lectures	1.Introduction. Stresses in soil and influence of water., 4h, Learning outcomes:1,2,3,4,5,6 2.Role of Engineering Geology. Rock Mechanics., 4h, Learning outcomes:1,2,3,4,5,6 3.Geotechnical investigation., 4h, Learning outcomes:1,2,3,4,5,6 4.Slope stability., 4h, Learning outcomes:1,2 5.Shallow and deep foundations., 4h, Learning outcomes:3 6.Retaining structures., 4h, Learning outcomes:4 7.Deep excavations., 4h, Learning outcomes:4,5,6 8.Case histories, 2h, Learning outcomes:1,2,3,4,5,6 9.classes are organized in 4-hours blocks 10.classes are organized in 4-hours blocks 11.classes are organized in 4-hours blocks 12.classes are organized in 4-hours blocks 13.classes are organized in 4-hours blocks 14.classes are organized in 4-hours blocks 15.classes are organized in 4-hours blocks				
Course content laboratory	1.in situ investigation, 4h, Learning outcomes:1,2,3,4,5,6 2.laboratory testing, 4h, Learning outcomes:1,2,3,4,5 3.work on computers 4.work on computers 5.work on computers 6.work on computers 7.work on computers 8.work on computers 9.classes are organized in 4-hours blocks 10.classes are organized in 4-hours blocks 11.classes are organized in 4-hours blocks 12.classes are organized in 4-hours blocks 13.classes are organized in 4-hours blocks 14.classes are organized in 4-hours blocks 15.classes are organized in 4-hours blocks				

Course content constructures	1.lab, 4h 2.lab, 4h 3.hydraulic failure, 4h, Learning outcomes:5,6 4.slope stability , 4h, Learning outcomes:1,2 5.foundations, 4h, Learning outcomes:3 6.retaining structures, 4h, Learning outcomes:4 7.construction pit, 4h, Learning outcomes:1,2,3,4,5,6 8.case histories, 2h, Learning outcomes:1,2,3,4,5,6 9.classes are organized in 4-hours blocks 10.classes are organized in 4-hours blocks 11.classes are organized in 4-hours blocks 12.classes are organized in 4-hours blocks 13.classes are organized in 4-hours blocks 14.classes are organized in 4-hours blocks 15.classes are organized in 4-hours blocks
Required materials	Basic: classroom, blackboard, chalk... Special purpose laboratory General purpose computer laboratory Whiteboard with markers
Exam literature	Duboko temeljnje i poboljšanje temeljnog tla / Tanja Roje-Bonacci Potporne građevine i građevne jame / Tanja Roje-Bonacci Roje-Bonacci, Tanja, 2012 Zemljani radovi, Split : Sveučilište u Splitu, Fakultet građevinarstva, arhitekture i geodezije
Students obligations	no
Knowledge evaluation during semester	after each lecture students get questions, for each exercises tasks to solve each of 7 units leads to around 15 points if at least 7 points are obtained in each of the units, and at least 50 points, student passes the exam
Knowledge evaluation after semester	written and oral exam
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Oral exam) — 2 (Activity in class) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23868/173467	**ECTS**	6.0	**Academic year**	2018/2019
Name	Parametric modelling I				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+45 (0+0+0+45) 120
Teachers	Lectures:1. dr.sc. Mirela Katić-Žlepalo prof.mat. Lectures:2. v.predavač Boris Uremović dipl.ing.građ. Construction exercises:dr.sc. Mirela Katić-Žlepalo prof.mat. Construction exercises:v.predavač Boris Uremović dipl.ing.građ.				
Course objectives	The acquiring of all necessary knowledge about computer aided parametric modeling - interactive modeling, parametric modeling, object modeling				
Learning outcomes:	1.Compare procedures of 3D computer modeling. Level:6,7 2.come up with an algorithm for a planar parametric model. Level:6,7 3.come up with an algorithm for a spatial parametric model. Level:6,7 4.criticaly judge algorithms for planar and spatial parametric models. Level:7 5.manage sets of data. Level:6,7 6.create parametric models using vectors, cuves and surfaces. Level:6,7 7.create a planar parametric model based on the Voronoi diagram). Level:6,7 8.create a planar parametric model based on the Delaunay diagram. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Modelling Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Computer simulations Workshop				
Course content lectures	1.Basics of 3D modelling - concepts and examples, 1h, Learning outcomes:1,2,3,4,6 2.Basics of parametric modelling - concepts and examples, 1h, Learning outcomes:1,2,3,4,6 3.Model 3D parametrization, 1h, Learning outcomes:1,2,3,4,6 4.Input data types, 1h, Learning outcomes:1,2,3,4,6 5.Mathematical operators - Domains, Operators, Polynomials, Trigonometry, 1h, Learning outcomes:1,2,3,4,6 6.Data sets - Lists, Sets, Sequences, 1h, Learning outcomes:1,2,3,4,5,6 7.Data sets - Data Tree, 1h, Learning outcomes:1,2,3,4,5,6 8.Vector data - Plane, Point, Vector, 1h, Learning outcomes:1,2,3,4,6 9.Curves - Primitives, Spline, Division, Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6 10.Curves - Primitives, Spline, Division, Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6 11.Surfaces - Primitives, Freeform, Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6 12.Surfaces - Primitives, Freeform, Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6 13.Meshes - Primitives, Triangulation (Voronoi, Dealunay), Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6,7,8 14.Meshes - Primitives, Triangulation (Voronoi, Dealunay), Analysis, Tools, 1h, Learning outcomes:1,2,3,4,6,7,8 15.Intersections (Mathematical, Physical, Boolean) and transformations (Affine, Euclidean), 1h, Learning outcomes:1,2,3,4,6				
Course content constructures	1.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 2.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 3.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 4.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 5.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 6.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 7.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 8.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 9.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 10.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 11.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 12.Students work on their own parametric model of a part of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8 13.Final presentations of student projects, 3h, Learning outcomes:1,2,3,4,5,6,7,8 14.Final presentations of student projects, 3h, Learning outcomes:1,2,3,4,5,6,7,8 15.Final presentations of student projects, 3h, Learning outcomes:1,2,3,4,5,6,7				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Special purpose computer laboratory				

	Whiteboard with markers Overhead projector Operating supplies Special equipment 3D Printer, PLA, and PVA materials for print
Exam literature	1) Arturo Tedeschi - AAD_Algorithms-Aided Design - Parametric Strategies Using Grasshopper, 2014 English Edition - ISBN 978-88-95315-30-0 2) Rhinoceros v5.0, Level 1, Training Manual - Robert McNeel Associates, 2013 3) Rhinoceros v5.0, Level 2, Training Manual - Robert McNeel Associates, 2015
Students obligations	Finished student projects
Knowledge evaluation during semester	Checked student projects
Knowledge evaluation after semester	Parametric modelling exam
Student activities:	Aktivnost ECTS (Seminar Work) 6
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	dr.sc. Mirela Katić-Žlepalo prof.mat., 27.9.2017

Code WEB/ISVU	23883/173483	**ECTS**	6.0	**Academic year**	2018/2019
Name	Parametric modelling II				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+45 (0+0+0+45) 120
Teachers	Lectures:1. dr.sc. Mirela Katić-Žlepalo prof.mat. Lectures:2. Sanja Lađarević dipl.ing.arh. Lectures:3. v.predavač Boris Uremović dipl.ing.građ. Construction exercises: Goran Babić Construction exercises:dr.sc. Mirela Katić-Žlepalo prof.mat. Construction exercises:v.predavač Boris Uremović dipl.ing.građ.				
Course objectives	The acquiring of all necessary knowledge about complex computer aided parametric modeling - interactive modeling, parametric modeling, object modeling				
Learning outcomes:	1.determine the shape, funcionality and aesthetic demands while creating a spatial construction . Level:7 2.choose an appropriate/optimal geometrical form for a part of a building. Level:7 3.combine different geometrical forms for parts of a building. Level:6,7 4.grade procedures of 3D computer modeling. Level:7 5.choose an optimal procedure of 3D computer modeling for a specific model. Level:7 6.create an algorithm for a spatial parametric model. Level:6,7 7.develop planar and spatial parametric models. Level:6,7 8.create complex parametric models using vectors, cuves, surfaces and meshes. Level:6,7 9.create complex parametric models of parts of buildings and/or buildings as a whole. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Simulations Modelling Discussion Questions and answers Seminar, students presentation and discussion Homework presentation				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1.Spatial perception, 1h, Learning outcomes:1,2 2.Relation between surfaces and volumes, composition, 1h, Learning outcomes:1,2 3.Relation between surfaces and volumes, composition, 1h, Learning outcomes:1,2 4.Surface, textures, colors, 1h, Learning outcomes:1,2 5.Light and shadow, 1h, Learning outcomes:1,2 6.Platonic solids, 1h, Learning outcomes:1,2,3 7.Surface tessellation, 1h, Learning outcomes:1,2,3 8.Ruled surfaces, 1h, Learning outcomes:1,2,3 9.Fractal geometry, 1h, Learning outcomes:1,2,3 10.Golden mean and mathematics in architecure, 1h, Learning outcomes:1,2,3 11.Defining algorithms of dynamic models., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9 12.Making of dynamic models., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9 13.Preparation of models for digital production., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9 14.Animating the changes of a parametric model, 1h, Learning outcomes:1,2,3,4,5,6,7,8,9 15.Making of a video file containing the animation, 1h, Learning outcomes:1,2,3,4,5,6,7,8,9				
Course content constructures	1.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 2.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 3.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 4.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 5.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 6.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,6,7,8,9 7.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 8.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 9.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 10.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 11.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 12.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 13.Students work on their own parametric model of a building, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 14.Final presentations of student projects, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9 15.Final presentations of student projects, 3h, Learning outcomes:1,2,3,4,5,6,7,8,9				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector				

	Maquette Operating supplies Special equipment 3d printer, tools for maquette making (pliers, etc.)	
Exam literature	Arturo Tedeschi; AAD_Algorithmic Aided Design, Le Pensieur, 2014. Olga Popovic Larsen: Reciprocal Frame Architecture, Architectural Press, 2008.	
Students obligations	Finished student projects	
Knowledge evaluation during semester	Checked student projects	
Knowledge evaluation after semester	Parametric modelling exam	
Student activities:	Aktivnost (Seminar Work)	ECTS 6
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	Boris Uremović, 18.2.2018.	

Code WEB/ISVU	24015/186263	**ECTS**	3.0	**Academic year**	2018/2019
Name	Pavement Structures				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+15+0) 60
Teachers	Lectures:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Seminar exercises: Sandra Mihalinac mag.ing.aedif. Seminar exercises:doc.dr.sc. Miroslav Šimun dipl.ing.građ.				
Course objectives	This course is aimed at providing students with theoretical and practical knowledge relating to the planning, types, realization (construction) and maintenance of pavement structures.				
Learning outcomes:	1.create a pavement structure dimensioning report. Level:6,7 2.design a new asphalt or concrete pavement structure. Level:6,7 3.critically analyse various pavement structure alternatives. Level:7 4.combine various materials in a composite pavement structure. Level:6,7 5.standardise technical conditions for the realization of pavement structures. Level:6,7 6.propose various pavement structure alternatives. Level:6,7 7.recommend an optimum pavement structure alternative from the technical and economic aspects. Level:7 8.valorise bills of quantities for various pavement structures. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other Appropriate teaching aids (video projector) will be used as appropriate during theoretical presentation of course material.				
Methods of carrying out seminars	Essay writing Workshop				
Course content lectures	1.Introduction - History of road construction and modern pavement structure systems, 1h, Learning outcomes:3,4 2.Reference traffic loads and other factors influencing composition of pavement structures, 1h, Learning outcomes:1,2 3.Methods for dimensioning new and strengthening existing pavement structures , 1h, Learning outcomes:1,2,3,4,5,6,7,8 4.Methods for dimensioning new and strengthening existing pavement structures , 1h, Learning outcomes:1,2,3,4,5,6,7,8 5.Methods for dimensioning new and strengthening existing pavement structures , 1h, Learning outcomes:1,2,3,4,5,6,7,8 6.Subgrade, preparation and quality control, and subgrade stabilisation procedures, 1h, Learning outcomes:2,3,4,7,8 7.Subgrade, preparation and quality control, and subgrade stabilisation procedures, 1h, Learning outcomes:2,3,4,7,8 8.Base courses made of loose compacted stone materials, 1h, Learning outcomes:1,2,4,5 9.Base courses made of loose compacted stone materials, 1h, Learning outcomes:1,2,4,5 10.Base course made of cement-stabilised granular stone materials, 1h, Learning outcomes:1,2,4,5 11.Base course made of cement-stabilised granular stone materials, 1h, Learning outcomes:1,2,4,5 12.Asphalt layers of pavement structures, 1h, Learning outcomes:1,2,4,5,7,8 13.Asphalt layers of pavement structures, 1h, Learning outcomes:1,2,4,5,7,8 14.Surface properties of pavement structures, 1h, Learning outcomes:3,4,5,7,8 15.Surface properties of pavement structures, 1h, Learning outcomes:3,4,5,7,8				
Course content seminars	1.Methods for dimensioning new and strengthening existing pavement structures, 1h, Learning outcomes:1,2,3,4,5,6,7,8 2.Methods for dimensioning new and strengthening existing pavement structures, 1h, Learning outcomes:1,2,3,4,5,6,7,8 3.Subgrade, preparation and quality control and subgrade stabilisation procedures, 1h, Learning outcomes:2,3,4,7,8 4.Subgrade, preparation and quality control and subgrade stabilisation procedures, 1h, Learning outcomes:2,3,4,7,8 5.Base courses made of loose compacted stone materials, 1h, Learning outcomes:1,2,4,5 6.Base courses made of loose compacted stone materials, 1h, Learning outcomes:1,2,4,5 7.Base course made of cement-stabilised granular stone materials, 1h, Learning outcomes:1,2,4,5 8.Base course made of cement-stabilised granular stone materials, 1h, Learning outcomes:1,2,4,5 9.Asphalt layers - base and binder course, 1h, Learning outcomes:1,2,4,5 10.Asphalt layers - wearing course, 1h, Learning outcomes:1,2,4,5 11.Asphalt mixes, 1h, Learning outcomes:1,2,4,5 12.Surface properties of pavement structures and types of asphalt pavement damage, 1h, Learning outcomes:3,4,5,7 13.Use of geosynthetics in road construction, 1h, Learning outcomes:4,5,7,8 14.Maintenance of asphalt pavement structures with practical examples, 1h, Learning outcomes:3,4,5,6,7,8 15.Asphalt pavement recycling with practical examples, 1h, Learning outcomes:3,4,5,6,7,8				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment				
Exam literature	Babić, B.: Projektiranje kolničkih konsrrukcija, HDGI, Zagreb,1997. Babić , B.; Horvat, Z.: Građenje i održavanje kolničkih konstrukcija, Fakultet građevinskih znanosti Sveučilišta u Zagrebu, Zagreb, 1983. Opći tehnički uvjeti za radove na cestama, (OTU) knjiga III. Kolničke konstrukcije, HC/ HAC, Zagreb, 2001.				

	Wiehler, H-G. u.a: Strassenbau - Konstruktion und Ausfhrung, Verlag fr Bauwesen, Berlin, 1996. (odabrana poglavlja) Internetske stranice vezane uz određene prezentirane cjeline.
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Redovitost pohaa#10#0#50$Seminarski rad#1#100#60$
Knowledge evaluation after semester	design solution for a pavement structure; written part of the examination consists of 5 questions relating to the topics presented during lectures and exercises; oral part of the examination may be taken by students who obtained at least 60 points during the written part of the examination.
Student activities:	Aktivnost ECTS (Written exam) 1 (Oral exam) 1 (Seminar Work) 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	Miroslav Šimun, Ph.D. Asst.Prof.,Civ.Eng.

Code WEB/ISVU	23866/173465	**ECTS**	3.0	**Academic year**	2018/2019
Name	Perception and technical presentations of space				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				10+20 (0+0+0+20) 60
Teachers	Lectures:1. Sanja Lađarević dipl.ing.arh. Construction exercises: Goran Babić				
Course objectives	.				
Learning outcomes:	1... Level:6,7 2... Level:6 3... Level:6 4... Level:6,7 5... Level:6,7 6... Level:6				
Methods of carrying out lectures	Ex cathedra teaching Case studies Demonstration Modelling Discussion Questions and answers				
How construction exercises are held	Group problem solving Workshop				
Course content lectures	1.., 1h 2.., 1h 3.., 1h 4.., 1h 5.., 2h 6.., 2h 7.., 2h 8.. 9.. 10.. 11.. 12.. 13.. 14.. 15..				
Course content constructures	1.., 2h 2.., 3h 3.., 3h 4.., 3h 5.., 3h 6.., 3h 7.., 3h 8.. 9.. 10.. 11.. 12.. 13.. 14.. 15..				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Portable overhead projector Video equipment Maquette				
Exam literature	Z. Vrkljan, I. Kordiš: opreme građevinskih nacrta, Fakultet građevinskih znanosti, Zagreb, 1982. M. Mittag: Građevinske konstrukcije, građevinska knjiga , 2000.				

Students obligations	maximum of 3 absences from exercises	
Knowledge evaluation during semester	Assignments: assignment submittal required for second signature.	
Knowledge evaluation after semester	Examination (written and oral): in the scope of the written part of the examination, students are required to make a graphical representation relating to the course; comprehension of the topics presented during the course are verified during the oral examination.	
Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Written exam)	1
	(Oral exam)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	.	

Code WEB/ISVU	24023/186271	**ECTS**	3.0	**Academic year**	2018/2019
Name	Preservation of Cultural-Historic Heritage				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (0+0+15+0) 60
Teachers	Lectures:dr.sc. Dražen Arbutina dipl.ing.arh. Seminar exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	To introduce students with the basics of cultural heritage protection in order to encourage better attitude towards this issue.				
Learning outcomes:	1.develop a positive attitude toward the complex system of the entire monument heritage. Level:6,7 2.valorise basic monumental values of individual examples of architectural heritage. Level:7 3.evaluate appropriate research, documentation, protection and restoration methodology of architectural heritage. Level:7 4.evaluate principles and methodology for possible construction works for the protection and renewal of architectural heritage). Level:7 5.critically evaluate proposed or realized construction works for the protection and renewal of architectural heritage. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion Homework presentation Other General notions about preservation of monument heritage are provided (reasons for preservation, need for preservation, current attitudes to monument heritage, structure and policy - institutions and education); Historic facts and attitudes to monuments in different European centres in the late 19th and early 20th centuries are examined through an overview of history and theory of monument preservation. Basic principles for the rehabilitation of historic artefacts, buildings and ambient complexes, including inventory of monument heritage, are presented. A special emphasis is placed on the valorisation of cultural monuments. Students are introduced to terms relating to the protection of monument heritage from the standpoint of different professions and activities (architecture, town and city planning, painting, sculpture, plastic arts, design, photography, textile, finishing trades) as well as methodologies and techniques (restoration, conservation, remedy, rehabilitation, recomposition - anastylosis, facsimile restoration, revitalization, reconstruction). The following themes are also considered: monument heritage and rehabilitation (in specific conditions, e.g. post-war renewal or after natural disasters), heritage and tourism (protection of cultural monuments vs. economic development).				
Methods of carrying out seminars	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop Other				
Course content lectures	1.INTRODUCTION (basic terms relating to preservation of monument heritage), 2h, Learning outcomes:1,2,3,4,5 2.CULTURAL MONUMENT PRESERVATION THEORIES (Italy, Austria, England, Croatia), documents, 2h, Learning outcomes:1,2,3,4,5 3.PRESERVATION OF MONUMENTS IN THE 20TH CENTURY (Croatia), 2h, Learning outcomes:1,2,3,4,5 4.ORGANISATION OF CULTURAL MONUMENT PRESERVATION SERVICES (Croatia - Ministry of Culture, Office for the Preservation of Cultural Monuments, Historic Preservation Departments, UNESCO, ICOMOS, monument heritage - movable cultural heritage, immovable cultural heritage, archaeological zones, architectural heritage, garden and park heritage, nature monuments), 2h, Learning outcomes:1,2,3,4,5 5.MONUMENT HERITAGE DOCUMENTATION (document archiving methods, photograph archive, plan archive), 2h, Learning outcomes:1,2,3,4,5 6.MONUMENT HERITAGE INVESTIGATIONS (monument heritage inventory - architectural survey, investigation work on monument sites, archive documents - historic preservation study), 2h, Learning outcomes:1,2,3,4,5 7.VALORISATION OF HERITAGE I (interdisciplinary character - integrated approach to the preservation of monument heritage), 2h, Learning outcomes:1,2,3,4,5 8.VALORISATION OF HERITAGE II (design documents - treatment and presentation, physical planning treatment), 2h, Learning outcomes:1,2,3,4,5 9.PRESERVATION TERMS I (relationship between heritage and: architecture and town planning, painting and sculpture, music, plastic arts, design, photography, textile, finishing trades, etc.), 2h, Learning outcomes:1,2,3,4,5 10.PRINCIPLES OF PRESERVATION AND REHABILITATION OF HISTORIC MONUMENTS I (registration, preservation regimens, preservation principles), 2h, Learning outcomes:1,2,3,4,5				

	11.PRINCIPLES OF PRESERVATION AND REHABILITATION OF HISTORIC MONUMENTS II (methodology and techniques for rehabilitation of historic artefacts, individual structures and ambient complexes), 2h, Learning outcomes:1,2,3,4,5 12.REHABILITATION METHODOLOGY (basic terms: restoration, conservation, remedy, rehabilitation, recomposition (anastylosis), facsimile rehabilitation, revitalization, reconstruction), 2h, Learning outcomes:1,2,3,4,5 13.MONUMENT HERITAGE AND REHABILITATION IN SPECIFIC CONDITIONS (military activity and post-war renewal, disasters - risk preparedness), 2h, Learning outcomes:1,2,3,4,5 14.ARTS HERITAGE AND TOURISM (culture tourism, museology), 2h, Learning outcomes:1,2,3,4,5 15.PRESERVATION OF CULTURAL MONUMENTS AND MANAGEMENT (economy, management), 2h, Learning outcomes:1,2,3,4,5
Course content seminars	1.no classes 2.no classes 3.no classes 4.no classes 5.no classes 6.no classes 7.no classes 8.no classes 9.no classes 10.no classes 11.no classes 12.Basis in preparation of heritage documentation, 1h, Learning outcomes:3,4,5 13.Basics in research, collection and analysis of available material, 1h, Learning outcomes:3,4,5 14.Basics in heritage valorisation , 1h, Learning outcomes:3,4,5 15.Basics for approach in manner and methodology of architectural heritage restoration , 1h, Learning outcomes:3,4,5
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Portable overhead projector Video equipment
Exam literature	1. D. Arbutina: "Kulturno povijesna baština", Tehničko veleučilište u Zagrebu, Zagreb, 2011. 2. J. Marasović: "Metodologija obrade graditeljskog naslijeđa", Arhitektonski fakultet Sveučilišta u Zagrebu,Književni krug,Zagreb-Split, 2007. 3. T. Marasović: "Aktivni pristup graditeljskom naslijeđu", Split, 1985. 4. T. Marasović: "Zaštita graditeljskog naslijeđa", Split-Zagreb. 1983. 5. I. Maroević: "Sadašnjost baštine", Zagreb, 1987. 6. M. Špikić: "Anatomija povijesnog spomenika", Institut za povijest umjetnosti, Zagreb, 2007. 7. B. M. Feilden: "Uvod u konzerviranje kulturnog nasljeđa", Zagreb, 1981.; 8. J. Jokilehto: "History of Architectural Conservation CONSERVATION AND MUSEOLOGY)", Oxford, 1999.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	Seminar paper - Oral examination is mandatory for all students that meet minimal seminar paper requirements - examination is defined around the paper presentation and discussion about the information that are in the paper described. Paper includes synthesized interpretation of a thematic field relating to heritage preservation.
Student activities:	Aktivnost — ECTS (Seminar Work) — 2 (Activity in class) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146700;
Proposal made by	dr.sc. Dražen Arbutina dipl.ing.arh., 31.3.2017

Code WEB/ISVU	23645/163444	**ECTS**	4.0	**Academic year**	2018/2019
Name	Probability and Statistics				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+15 (13+2+0+0) 90
Teachers	Lectures:1. dr.sc. Mandi Orlić Bachler v.pred Lectures:2. mr. sc. Reni Banov dipl. ing. mat. Lectures:3. Ivana Božić Dragun dipl.prof.mat. Auditory exercises:mr. sc. Reni Banov dipl. ing. mat. Auditory exercises:dr.sc. Mandi Orlić Bachler v.pred Laboratory exercises:dr.sc. Mandi Orlić Bachler v.pred				
Course objectives	acquiring basic knowledge in probability and statistical data analysis				
Learning outcomes:	1.calculate probabilities of events using classical definition of probability. Level:6 2.calculate probabilities using sum rule. Level:6 3.calculate conditional probabilities. Level:6 4.calculate probabilities using the law of total probability. Level:6 5.determine expected values, variances and standard deviations of discrete random variables. Level:6 6.distinguish between discrete and continuous random variables. Level:6 7.calculate probabilities in normal distribution. Level:6 8.distinguish between populations and samples. Level:6 9.sketch histograms and frequency polygons. Level:6 10.find sample means and unbiased sample variances. Level:6 11.find confidence intervals for means. Level:6 12.find confidence intervals for variances. Level:6 13.accept or reject statistical hypoteses. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching				
Methods of carrying out auditory exercises	Group problem solving				
Methods of carrying out laboratory exercises	Laboratory exercises on laboratory equipment				
Course content lectures	1.Classical definition of probability, 1h, Learning outcomes:1 2.Operations on events, 1h, Learning outcomes:2 3.Conditional probability, 1h, Learning outcomes:3 4.Total probability, 1h, Learning outcomes:4 5.Discrete random variables, 1h, Learning outcomes:5 6.Continuous random variables, 1h, Learning outcomes:6,7 7.Midterm exam, 1h, Learning outcomes:1,2,3,4,5,6,7 8.Statistical population and random sample, 1h, Learning outcomes:8 9.Graphical representation of statistical data, 1h, Learning outcomes:9 10.Estimators, 1h, Learning outcomes:10 11.Confidence intervals for means, 1h, Learning outcomes:11 12.Confidence intervals for variances, 1h, Learning outcomes:12 13.Hypoteses testing, 1h, Learning outcomes:13 14.Final written exam, 1h, Learning outcomes:8,9,10,11,12,13 15.Final oral exam, 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13				
Course content auditory	1.Classical definition of probability, 1h, Learning outcomes:1 2.Operations on events, 1h, Learning outcomes:2 3.Conditional probability, 1h, Learning outcomes:3 4.Total probability, 1h, Learning outcomes:4 5.Discrete random variables, 1h, Learning outcomes:5 6.Continuous random variables, 1h, Learning outcomes:6,7 7.Midterm exam, 1h, Learning outcomes:1,2,3,4,5,6,7 8.Statistical population and random sample, 1h, Learning outcomes:8 9.Graphical representation of statistical data, 1h, Learning outcomes:9 10.Estimators, 1h, Learning outcomes:10,11,12 11.Hypoteses testing, 1h, Learning outcomes:13 12.- 13.- 14.Final written exam, 1h, Learning outcomes:8,9,10,11,12,13 15.Final oral exam, 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10,11,12,13				
Course content laboratory	1.- 2.- 3.- 4.- 5.- 6.- 7.- 8.- 9.-				

	10.- 11.- 12.Using computers in statistics, 1h, Learning outcomes:10,11,12 13.Hypoteses testing, 1h, Learning outcomes:13 14.- 15.-
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory
Exam literature	1. S. Suljagić: Vjerojatnost i statistika, skripta, 2003. http://nastava.tvz.hr/ssuljagic/ 2. M. Orlić, T. Perkov: Repetitorij matematike za studente graditeljstva, TVZ, Zagreb, 2014. Additional literature: 1. Ž. Pauše, Vjerojatnost, Školska knjiga, Zagreb, 1974. 2. I. Pavlić, Statistička teorija i primjena, Tehnička knjiga, Zagreb, 1971. 3. K. Singh: Engineering mathematics through applications, Palgrave Macmillan, 2003.
Students obligations	It is required to achieve at least 30 points during the semester.
Knowledge evaluation during semester	During the semester it is possible to achieve a maximum of 60 points, as follows: - course completed: 30 points, - tests: 25 points, - solving problems in class: 5 points. By achieving at least 40 points, a student is qualified for the oral exam, which is obligatory.
Knowledge evaluation after semester	At the exam it is possible to achieve a maximum of 40 points. The exam consists of written (for students with less then 40 points achieved during the semester) and oral part.
Student activities:	Aktivnost — ECTS (Constantly tested knowledge) — 1 (Written exam) — 1 (Oral exam) — 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146686;
Proposal made by	dr.sc. Mandi Orlić Bachler, 19. 6. 2018.

Code WEB/ISVU	23646/163450	**ECTS**	4.0	**Academic year**	2018/2019
Name	Project Management				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (4+0+11+0) 75
Teachers	Lectures:mr.sc. Petar Adamović prof.v.škole Lectures:mr.sc. Časlav Dunović , viši predavač Lectures:dr.sc. Mariela Sjekavica Klepo Auditory exercises:mr.sc. Petar Adamović prof.v.škole Auditory exercises:mr.sc. Časlav Dunović , viši predavač Auditory exercises:dr.sc. Mariela Sjekavica Klepo Seminar exercises:mr.sc. Petar Adamović prof.v.škole Seminar exercises:mr.sc. Časlav Dunović , viši predavač Seminar exercises:dr.sc. Mariela Sjekavica Klepo				
Course objectives	Students will master basic elements of project-oriented management of business, production, and service processes.				
Learning outcomes:	1.formulate/define the project management concept under conditions of uncertainty and limitations in time and resources. Level:6,7 2.select a competent team for project realization. Level:7 3.define an optimum organizational structure for project realization. Level:6,7 4.plan time and resources for project realization. Level:6,7 5.predict project implementation objectives and results under conditions of uncertainty. Level:6,7 6.prepare tasks for the project team. Level:6,7 7.evaluate project risks. Level:6,7 8.assign roles, tasks, duties and responsibilities of each member of the project team. Level:6,7 9.manage project to achieve objectives within the specified scope under continuously varying conditions. Level:6,7 10.manage project team during implementation of the project. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other The whole material is presented in lectures illustrated by drawings, tables and graphs to facilitate understanding of the topic. It can be presented on OHP or in Power Point.				
Methods of carrying out auditory exercises	Group problem solving Discussion, brainstorming Other Problems of each particular topic analysed are solved on the blackboard. After explaining and solving a problem of a topic, students are given a related one to solve it on their own but with assistance of the teacher. Using the BK technique and with assistance of their teacher, students create a smaller project.				
Methods of carrying out seminars	Group problem solving Discussion, brainstorming				
Course content lectures	1.What is a project? , 2h, Learning outcomes:1,2,3,8 2.Basic characteristics and project phases, 2h, Learning outcomes:1,2,3,4,7,8 3.Unreliability of a project, 1h, Learning outcomes:1,2,5,7,8 Project structure, 1h, Learning outcomes:1,3,5,6,7 4.Preparing and making project plans , 2h, Learning outcomes:1,6,9,10 5.Project costs and the flow of information, 2h, Learning outcomes:1,6,9,10 6.Managing projects - Project Manager, 2h, Learning outcomes:1,2,6,7,8,9,10 7.Organizational solutions, 1h, Learning outcomes:1,2,3,6,8 Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 1h, Learning outcomes:1,4 8.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 9.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 10.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 11.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 12.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 13.Necessary knowledge - tools - PERT, CPM, PD, Microsoft Project, Transplan, 2h, Learning outcomes:1,4 14.Optimisation of realised plans, 1h, Learning outcomes:1,5,7 Procedures for making project plans, 1h, Learning outcomes:1,4,5,7,9,10 15.Block chart techniques for making project plans, 2h, Learning outcomes:1,5,6,9,10				
Course content auditory	1.Drawing the structure of a network arrow char, 1h, Learning outcomes:1,2,3,4 2.Calculation back and forth (CPM i PERT, 1h, Learning outcomes:1,2,3,4 3.Calculation back and forth (CPM i PERT), 1h, Learning outcomes:1,2,3,4 4.Determination of the slack of the event and floats, 1h, Learning outcomes:1,2,3,4 5.Drawing PD and calculation of a network, fixed terms and overlaps, 1h, Learning outcomes:1,2,3,4 6.Drawing PD and calculation of a network, fixed terms and overlaps, 1h, Learning outcomes:1,2,3,4 7.Drawing PD and calculation of a network, fixed terms and overlaps, 1h, Learning outcomes:1,2,3,4 8.Drawing a network in a time diagram, 1h, Learning outcomes:1,2,3,4 9.Drawing a network in a time diagram, 1h, Learning outcomes:1,2,3,4 10.Making a network by BK technique, 1h, Learning outcomes:1,2,4 11.Making a network by BK technique, 1h, Learning outcomes:1,2,3,4 12.no classes, 1h 13.no classes, 1h				

	14.no classes, 1h 15.no classes, 1h
Course content seminars	1.no classes, 1h 2.no classes, 1h 3.no classes, 1h 4.no classes, 1h 5.no classes, 1h 6.no classes, 1h 7.no classes, 1h 8.no classes, 1h 9.no classes, 1h 10.no classes, 1h 11.no classes, 1h 12.Preparation of a seminar paper and its presentation in front of a group of students., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10 13.Preparation of a seminar paper and its presentation in front of a group of students., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10 14.Preparation of a seminar paper and its presentation in front of a group of students., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10 15.Preparation of a seminar paper and its presentation in front of a group of students., 1h, Learning outcomes:1,2,3,4,5,6,7,8,9,10
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment
Exam literature	1. Čala,I; i ostali autori: Inženjerski priručnik, dio 4, poglavlja 6. Planiranje i praćenje proizvodnje, Školska knjiga, Zagreb, 2002. 2. Vila, A; Štajdl, B; Čala, I; Karabajić, I: Metode planiranja proizvodnje, Informator, Zagreb, 1982. 3. Vila, A; Leicher, Z: Planiranje proizvodnje i kontrola rokova, Informator, 3. izdanje, Zagreb 1983. 4. Schroeder, Roger,G: Upravljanje proizvodnjom, Mate, Zagreb, 1999. 5. Bilješke koje nastavnik priprema za nastavu 1. Čala, I: Stupnjevito planiranje, izlaganje na savjetovanju Upravljanje proizvodnjom, CDI Zagreb, Briuni, 1989. 2. Dilworth,J.B.: Operations Management, Mc Grow Hill, inc., New York, 1995. 3. Schonberger,R.J., Knod, M.E.: Operations Management, Irwin, 1994. 4. Majstorović, V.: Upravljanje Proizvodnjom i projektima (Production and Project Management), Nakladnici Sveučilište u Mostaru i DAAAM International Vienna, Mostar-Wien 2001.
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Redovitost pohaa#8#15#50$Kolokvij, teorijska pitanja#2#50#50$Programski zadatak#1#35#100$
Knowledge evaluation after semester	Written and oral exam.
Student activities:	Aktivnost — ECTS (Project) — 2 (Written exam) — 2
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146687;
Proposal made by	prof.dr.sc. Vladimir Skendrović, 15.6.2012

Code WEB/ISVU	24024/186272	**ECTS**	6.0	**Academic year**	2018/2019
Name	Project Planning and Monitoring				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:1. mr.sc. Časlav Dunović , viši predavač Auditory exercises:dr.sc. Mariela Sjekavica Klepo Auditory exercises: Domagoj Šojat struč.spec.ing.aedif. Construction exercises:dr.sc. Mariela Sjekavica Klepo Construction exercises: Nina Šantek struč.spec.ing.aedif., predavač				
Course objectives	Students will acquire knowledge for the planning of civil engineering projects, preparation and monitoring of time schedules for the realization of construction projects from the standpoint of project manager and planner.				
Learning outcomes:	1.Define a time schedule suitable for the project monitoring and control process. Level:6,7 2.manage the project monitoring and control process using advance software tools. Level:6,7 3.classify risks that affect the project. Level:6,7 4.critically evaluate the project that is being monitored so as to enable timely interventions in the project. Level:7 5.present current status of the project to all participants in the project. Level:6,7 6.select an optimum solution for improving situation on the project. Level:6,7 7.recommend measures for improving situation on the project. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Simulations Discussion Questions and answers Other Appropriate teaching aids (video projector and computer) will be used as appropriate in the presentation of lectures.				
Methods of carrying out auditory exercises	Laboratory exercises, computer simulations Discussion, brainstorming Computer simulations Workshop Other Exercises are conducted in computer room where themes needed for preparation of the assignment (construction work time schedule) are successively presented using the MS Project software package.				
How construction exercises are held	Laboratory exercises, computer simulations Group problem solving Discussion, brainstorming Computer simulations Workshop Other Exercises are conducted in computer room where students are required to independently solve practical project planning and monitoring problems using the MS Project software package.				
Course content lectures	1.Participants in the project and time scheduling, 2h, Learning outcomes:1,2 2. Hierarchy of plans and project structure, 2h, Learning outcomes:1 3. Role of project managers and planners, construction planning, 2h, Learning outcomes:2 4. Non-linear and linear planning techniques , 2h, Learning outcomes:1,2 5.Planning principles and methodology, input data for the preparation of plans, plan preparation phases, distribution of activities, 2h, Learning outcomes:2,3 6.Planning and cost optimization methods, application at the level of a project/company, 2h, Learning outcomes:3,4 7.Planning and cost optimization methods, application at the level of a project/company, 2h, Learning outcomes:3,4 8. Resource planning and optimizing methods, application at the level of a project/company, 2h, Learning outcomes:6 9. Project control and monitoring system , 2h, Learning outcomes:3,4,5,6,7 10.Project monitoring, initial concept, collection of data and information systems, 2h, Learning outcomes:3,4,5,6,7 11.Project monitoring, initial concept, collection of data and information systems, 2h, Learning outcomes:3,4,5,6,7 12.Project monitoring methods and techniques, time scheduling, monitoring costs and qualities, data integration, 2h, Learning outcomes:4,5,6,7 13.Project monitoring methods and techniques, time scheduling, monitoring costs and qualities, data integration, 2h, Learning outcomes:4,5,6,7 14. Use of computer programs in project control and monitoring activities , 2h, Learning outcomes:2 15.Practical examples of project control and monitoring systems used on completed projects, 2h, Learning outcomes:1,2,3,4,5,6,7				
Course content auditory	1.Use of MS Project software in the production of plans through development of work structure, Gantt chart adjustment, information about activities, use of limitations, priorities and calendar of activities, 2h, Learning outcomes:1,2 2.Time scheduling of resources and costs, use of resource calendar, presentation of work and material resources, 1h, Learning outcomes:1,2 3.Advanced use of information adjustment capabilities, use of filters and organizer, formatting and storing adjusted information , 1h, Learning outcomes:1,2 4.Plan harmonization analysis and strategies, automatic and individual balancing of resources, use of priorities, limitations, 2h, Learning outcomes:1,2,3,4 5.Plan preparation monitoring, Adjusting and monitoring time-related and financial parameters of a plan, 2h, Learning outcomes:1,2,3,4 6. Production of reports and printing, 1h, Learning outcomes:5 7.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 8.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 9.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7				

	10.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 11.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 12.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 13.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 14.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7 15.Laboratory exercises, computer simulations, 2h, Learning outcomes:1,2,3,4,5,6,7
Course content constructures	1.Oral Exercises, 2h, Learning outcomes:1,2,3,4,5,6,7 2.Oral Exercises, 2h, Learning outcomes:1,2,3,4,5,6,7 3.Oral Exercises, 2h, Learning outcomes:1,2,3,4,5,6,7 4.Oral Exercises, 2h, Learning outcomes:1,2,3,4,5,6,7 5.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 6.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 7.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 8.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 9.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 10.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 11.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 12.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 13.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 14.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7 15.Independent elaboration of an operative construction plan (planning time, resources and costs), monitoring plan preparation, project monitoring; in electronic form, using the MS Project software package., 2h, Learning outcomes:1,2,3,4,5,6,7
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment Special equipment Exercises are conducted in computer room where students are required to independently solve practical project planning and monitoring problems using the MS Project software package.
Exam literature	Obvezna 1. B. Uremović, Č. Dunović: Upravljanje projektima uz pomoć programskog alata Microsoft Project 2007, Priručnici Tehničkog veleučilišta u Zagrebu, Zagreb 2010. 2. M.Radujković i suradnici: Planiranje i kontrola projekata, Udžbenici Sveučilišta u Zagrebu, Zagreb, 2012. Dopunska 1. J. Marušić: Organizacija građenja, Sveučilište u Zagrebu, 1994. 2. S.Nonveiller: Metode mrežnog planiranja i njihova primjena u rukovođenju građenjem, GF Zagreb, Zagreb 1982. 3. J. Branderberg, R. Konrad: Tehnika mrežnog planiranja, Tehnička knjiga, Zagreb 1970. 4. J. O'Brien, F.L.Plotnick: CPM in construction management, Mc Gray-Hill Companies, 1999.
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Redovitost pohaa#5#0#60$Kolokvij, numeri zadaci#1#50#60$Kolokvij, teorijska pitanja#1#50#60$
Knowledge evaluation after semester	Oral part of the examination after successful presentation and justification of the assignment.
Student activities:	Aktivnost — ECTS (Oral exam) — 4 (Written exam) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	163784;

Proposal made by	M.Sc.M.C.E. Časlav Dunović, senior lecturer

Code WEB/ISVU	23886/173486	**ECTS**	6.0	**Academic year**	2018/2019
Name	Protection and Repair of Structures				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+0+0+30) 120
Teachers	Lectures:mr.sc. Jure Galić predavač Lectures:mr.sc. Donka Wurth v. predavač Construction exercises:mr.sc. Jure Galić predavač Construction exercises:mr.sc. Donka Wurth v. predavač				
Course objectives	Acquiring knowledge necessary to carry out maintenance procedures RC structures; including research work, evaluation of the concrete structure, project development increased maintenance, rehabilitation or reconstruction, implementation of quality control materials (certification), quality control, operations, and monitoring programs. A special emphasis on the supervision of repair works of buildings of reinforced concrete.				
Learning outcomes:	1.link to a specific mechanism of degradation of concrete with the principle and method of repair of reinforced concrete structures. Level:6,7 2.differentiate and compare the different materials and systems for the repair and strengthening of reinforced concrete structures. Level:6 3.write the required properties of materials and systems and methods of quality control during and after carrying out maintenance and reinforcement of reinforced concrete structures. Level:6,7 4.analyze and compare the different methods of repair construction. Level:6 5.recommend and prescribe the optimal correction method and principle. Level:7 6.repair design structure that includes. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Seminar, students presentation and discussion				
How construction exercises are held	Laboratory exercises on laboratory equipment Group problem solving Discussion, brainstorming Interactive problem solving				
Course content lectures	1.Introduction, presentation of engineering structures of concrete, reinforced and prestressed concrete, 2h, Learning outcomes:4 2.The issue of maintenance and repairs to buildings, 2h, Learning outcomes:6 3.Degradation processes acting on the concrete and rebar, 2h, Learning outcomes:6 4.Errors in execution, 2h, Learning outcomes:6 5.The planning and construction of research work on the sheet material to determine, 2h, Learning outcomes:6 6.Introducing the standards for the implementation of rehabilitation and remedial materials EN 1504: 1-10 and conformity assessment of materials for carrying out repair and protection of RC structures, 2h, Learning outcomes:6 7.Kolloquium, 2h 8.Methods of repair : Surface protection, 2h, Learning outcomes:6 9. Methods of repair: reprofiling rehabilitation mortars and concretes, 2h, Learning outcomes:6 10.The methods of repair: crack repairs, 2h, Learning outcomes:6 11.Methods of repair: Gain structure, reinforcing the anchors, FRP strip Reinforcement korozijea, 2h, Learning outcomes:6 12.Design of repairing project, 2h, Learning outcomes:5 13.Supervision of repair works, engineering controls - control testing program, 2h, Learning outcomes:5 14.Case studies, 2h, Learning outcomes:4 15.Kolloquium, 2h				
Course content constructures	1.No lessons, 2h 2.Degradation processes in concrete in and reinforcement; error during execution, 2h, Learning outcomes:6 3.Error during execution, 2h, Learning outcomes:5 4.Test methods of concrete on a building, 2h, Learning outcomes:6 5.Test methods of concrete in laboratory, 2h, Learning outcomes:6 6.Planning research works, 2h, Learning outcomes:6 7.Investigation works in construction in order to determine the state of the material, 2h, Learning outcomes:6 8.Test methods for concrete and repair materials in the laboratory, 2h, Learning outcomes:6 9.Protection of concrete and reinforced concrete, 2h, Learning outcomes:6 10.Materials to carry out repairs ab construction, 2h, Learning outcomes:6 11.Materials to carry out repairs ab construction, 2h, Learning outcomes:6 12.Control tests, 2h, Learning outcomes:5 13.Making Report of research works and repair project, 2h, Learning outcomes:4 14.Cost estimate works for repair of damage, 2h, Learning outcomes:5 15.Report of research works and repair project, 2h, Learning outcomes:4				
Required materials	Basic: classroom, blackboard, chalk... Special purpose laboratory Whiteboard with markers				

	Overhead projector Tools	
Exam literature	Jure Radić i suradnici, BETONSKE KONSTRUKCIJE, SANACIJE, Hrvatska sveučilišna naklada, 2010 ACI MANUAL OF CONCTERE INSPECTION, American Concrete Institute, 1999. CONCRETE REPAIR MANUAL, Volume 1 2, ACI, ICRI, CS BRE J. Radić i suradnici, BETONSKE KONSTRUKCIJE, PRIRUČNIK, Hrvatska sveučilišna naklada, '06. J. Radić i suradnici, BETONSKE KONSTRUKCIJE, GRAĐENJE, Hrvatska sveučilišna naklada, '07. A.M. Neville, SVOJSTVA BETONA, BIGZ, 1976.	
Students obligations	Committed and positively evaluated the program; pohake all laboratory exercises (100%); attendance auditory exercises 80% write both preliminary exams for more than 50%	
Knowledge evaluation during semester	Colloquium I+II	
Knowledge evaluation after semester	Exam written	
Student activities:	Aktivnost	ECTS
	(Classes attendance)	1
	(Written exam)	1
	(Activity in class)	1
	(Seminar Work)	1
	(Practical work)	1
	(Research)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	24029/186278	**ECTS**	6.0	**Academic year**	2018/2019
Name	Public and industrial buildings - pre-school education, education and health care				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+73 (31+0+0+42) 77
Teachers	Lectures: Jagoda Bodić dipl.ing.arh. Lectures: Iva Ževrnja predavač Auditory exercises: Jagoda Bodić dipl.ing.arh. Auditory exercises: Iva Ževrnja predavač Construction exercises: Jagoda Bodić dipl.ing.arh. Construction exercises: Iva Ževrnja predavač				
Course objectives	-				
Learning outcomes:	1.-. Level:6,7 2.-. Level:6,7 3.-. Level:7 4.-. Level:6,7 5.-. Level:6,7 6.-. Level:6,7 7.-. Level:6,7 8.-. Level:7 9.-. Level:7 10.-. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion Homework presentation				
Methods of carrying out auditory exercises	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Other				
How construction exercises are held	Group problem solving Discussion, brainstorming Other -				
Course content lectures	1.-, 2h, Learning outcomes:1,2,3,4,6 -, 2h, Learning outcomes:1,2,4,7 2.-, 4h, Learning outcomes:1,2,8 3.-, 4h, Learning outcomes:1,6,7,8 4.-, 4h, Learning outcomes:1,2,8 5.-, 4h, Learning outcomes:1,6,7,8 6.-, 4h, Learning outcomes:1,2,8 7.-, 4h, Learning outcomes:1,6,7,8 8.-, 2h, Learning outcomes:6,7,8,10 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content auditory	1.-, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10 2.-, 2h, Learning outcomes:1,2,3,4,5,6,7,8,9,10 3.- 4.- 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				

Course content constructures	1.- 2.- 3.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 4.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 5.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 6.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 7.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 8.-, 4h, Learning outcomes:1,2,3,4,5,6,7,10 9.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 10.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 11.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 12.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 13.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 14.-, 2h, Learning outcomes:1,2,3,4,5,6,7,10 15.-, 5h, Learning outcomes:1,2,3,4,5,6,7,10
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment Maquette
Exam literature	[1]H. Auf Franić i sur.:Dječje jaslice i vrtići :Upute za programiranje, planiranje i projektiranje, Arhitektonski fakultet Sveučilišta u Zagrebu,2003 [2]A. Roth: The New Schoolhouse/Das Neue Schulhaus/La Nouvelle Ecole, Editions Girsberg, Zurich, 1957. [3]M. Baylon: Školske Zgrade, Građevinska knjiga Beograd, 1958. (1. izdanje) [4]G. Knežević, I. Kordiš: Stambene i javne zgrade, Tehnička knjiga, Zagreb, 1972. (1. izdanje) [5]H. Auf Franić i sur.:Osnovne škole :Programiranje, planiranje i projektiranje, Arhitektonski fakultet sveučilišta u Zagrebu, 2005 [6]Z. Bajbutović: Arhitektura školske zgrade, Svjetlost, Sarajevo, 1983. [7]Modeli fizičke kulture, RSIZ fizičke kulture Hrvatske, Zagreb 1989. [8]M. Vodička: Bolnice, Školska knjiga, Zagreb 1994 [9]D. Juračić: Zdravstvene zgrade, Arhitektonski fakultet Sveučilišta u Zagrebu,2005 [10]E. Neufert: Elementi arhitektonskog projektiranja, Golden marketing, 2002. [11]D. Arbutina, J. Bodić: Separati predavanja, 2011. [12]Pravilnik o zaštiti na radu za mjesta rada, NN 29/2013 [13]Pravilnik o osiguranju pristupačnosti građevina osobama s invaliditetom i smanjene pokretljivosti, NN 78/2013
Students obligations	-
Knowledge evaluation during semester	-
Knowledge evaluation after semester	-
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Project) — 4
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	173477;
Proposal made by	-

Code WEB/ISVU	24028/186277	**ECTS**	6.0	**Academic year**	2018/2019
Name	Public and industrial buildings - work, tourism and sport				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+45 (3+0+0+42) 105
Teachers	Lectures:1. dr.sc. Dražen Arbutina dipl.ing.arh. Lectures:2. Iva Ževrnja predavač Auditory exercises:dr.sc. Dražen Arbutina dipl.ing.arh. Construction exercises:dr.sc. Dražen Arbutina dipl.ing.arh.				
Course objectives	Students will learn to independently manage building construction projects and to perform administrative tasks related to such projects.				
Learning outcomes:	1.improve functionality of public and industrial buildings: schools, kindergartens, and administrative, hotel, sports, commercial and industrial buildings. Level:6,7 2.plan building position depending on construction conditions. Level:6,7 3.select structural system in accordance with the buldings size and occupancy. Level:7 4.link together functional groups in a drawing. Level:6,7 5.prepare conceptual design for public buildings/facilities. Level:6,7 6.combine knowledge gained (structural system, finishing work, building physics, building elements) in the scope of the design work. Level:6,7 7.write down technical information about the building. Level:6,7 8.critically analyze form of the selected structural system. Level:7 9.explain notion behind conceptual design with an emphasis on the functionality and structure. Level:7 10.valorise project results based on the task assigned and knowledge acquired. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion Other Appropriate teaching aids (projections) and blackboard presentations will be used in the course of the lectures.				
Methods of carrying out auditory exercises	Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop Other Instructions for preparation of assignments.				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Interactive problem solving Workshop Other Independent preparation of assignments, with corrections.				
Course content lectures	1.Principal properties of public buildings, typology and principal design determinants for public buildings, 1h, Learning outcomes:2,3,4,6 Technical and design documents, standards and regulations, 1h, Learning outcomes:2,4,7 2.Functional structure, technology design, physical analysis with examples, equipment and shaping , 2h, Learning outcomes:1,6,7,8 3.Functional structure, technology design, physical analysis with examples, equipment and shaping , 2h, Learning outcomes:1,6,7,8 4.Office buildings , 2h, Learning outcomes:2,3,4,7,9,10 5.Office buildings and educational buildings, 2h, Learning outcomes:2,3,4,7,9,10 6.Tourism-related buildings, 2h, Learning outcomes:2,3,4,7,9,10 7.Tourism-related buildings, 2h, Learning outcomes:2,3,4,7,9,10 8.Retail buildings, 2h, Learning outcomes:2,3,4,7,9,10 9.Retail buildings, 2h, Learning outcomes:2,3,4,7,9,10 10. Sports and recreation buildings, 2h, Learning outcomes:2,3,4,7,9,10 11. Sports and recreation buildings, 2h, Learning outcomes:2,3,4,7,9,10 12.Special public buildings (transport-related buildings), 2h, Learning outcomes:2,3,4,7,9 13.Types of industrial buildings, technology diagrams and designs, 2h, Learning outcomes:1,3,4,5,6,8,9 14.Types of industrial buildings, technology diagrams and designs, 2h, Learning outcomes:1,3,4,5,6,8,9 15.Ergonomic principles for the improvement of working environment: lighting, colour, temperature, 2h, Learning outcomes:6,7,8,10				
Course content auditory	1.Instructions for preparation of assignments, 4h, Learning outcomes:2,3,4,5,6,7,8,9,10 2.Instructions for preparation of assignments, 4h, Learning outcomes:2,3,4,5,6,7,8,9,10 3.Instructions for preparation of assignments, 2h, Learning outcomes:2,3,4,5,6,7,8,9,10 4.- 5.- 6.- 7.-				

	8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-
Course content constructures	1.- 2.- 3.1st assignment: Independent analysis of designed and completed public buildings (written and oral presentation) , 4h, Learning outcomes:6,8,9,10 4.1st assignment: Independent analysis of designed and completed public buildings (written and oral presentation) , 4h, Learning outcomes:6,8,9,10 5.1st assignment: Independent analysis of designed and completed public buildings (written and oral presentation) , 3h, Learning outcomes:6,8,9,10 6.1st assignment: Independent analysis of designed and completed public buildings (written and oral presentation) , 3h, Learning outcomes:6,8,9,10 2nd assignment: independent preparation of the assignment , 1h, Learning outcomes:2,3,4,5,6,7,10 7.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,5,6,7,10 8.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,5,6,7,10 9.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,5,6,7,10 10.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,5,6,7,10 11.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,6,7,10 12.2nd assignment: independent preparation of the assignment, 4h, Learning outcomes:2,3,4,5,6,7,10 13.2nd assignment: independent preparation of the assignment, 2h, Learning outcomes:2,3,4,5,6,7,10 14.2nd assignment: independent preparation of the assignment, 2h, Learning outcomes:2,3,4,5,6,7,10 15.2nd assignment: independent preparation of the assignment, 2h, Learning outcomes:2,3,4,5,6,7,10
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Portable overhead projector Video equipment
Exam literature	1.Modeli fizičke kulture, RSIZ fizičke kulture Hrvatske, Zagreb 1977 2. E. Neufert: Elementi arhitektonskog projektiranja, Golden marketing, 2002. 3.N. Pevsner: A History of Building Types, Princeton University Press 1976 4. W. Jones: New Transport Architecture: Travel Hubs in the 21st Century,MITCH,2006. 5. K. W. Griffin: Building Type Basics for Transit Facilities; Wiley; 2004. 10. D. Arbutina,j. Bodić,G. Poljanec: Separati predavanja, 2011.
Students obligations	Class attendance - measured as a minimum presence on 75% of the classes.
Knowledge evaluation during semester	During the semester, students will have short proficiency tests and other methods of their work evaluation (short assessment or short proficiency tests are possible on each of the classes, before or after the end of the presentation, as well as individual and group presentations and analysis of smaller student seminar tasks, with a record of students activities during discussion). During the semester colloquiums are not planned.
Knowledge evaluation after semester	design work - with oral examination for all students - synthesized interpretation of the thematic field related to issues of design of public and industrial buildings. The examination consists of the written and oral parts: Written part of the examination: textual and graphical verification of knowledge acquired during the course. Oral part of the examination: verification of theoretical knowledge.
Student activities:	Aktivnost ECTS (Project) 3 (Seminar Work) 2 (Oral exam) 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	173476;

Code WEB/ISVU	23647/163451	**ECTS**	4.0	**Academic year**	2018/2019
Name	Quality Management				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+15 (0+0+2+13) 75
Teachers	Lectures:1. dr.sc. Sonja Zlatović , profesor visoke škole Lectures:mr.sc. Donka Wurth v. predavač Seminar exercises:mr.sc. Donka Wurth v. predavač Seminar exercises:dr.sc. Sonja Zlatović , profesor visoke škole Construction exercises:mr.sc. Donka Wurth v. predavač Construction exercises:dr.sc. Sonja Zlatović , profesor visoke škole				
Course objectives	Students will gain knowledge in the field of quality management.				
Learning outcomes:	1.select quality management tools to solve problems in a particular working environment. Level:7 2.classify causes of problems by brainstorming and using the Ishikawa cause-and-effect diagram. Level:6,7 3.rank sources of errors using the Pareto diagram. Level:7 4.recommend quality improvements according to quality management principles based on ISO or other excellence models. Level:7 5.plan activities so as to avoid human errors, technical, random, and intentional errors due to poor communication. Level:6,7 6.propose corrective and preventive actions for processes in a particular working environment. Level:6,7 7.support quality requirements by means of technical legislation, Eurocode 1990, and regulations applicable to civil engineering. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Discussion Questions and answers Seminar, students presentation and discussion Homework presentation Drawings, tables and diagrams are used to facilitate understanding, as well as photographs and prepared materials used in companies.				
Methods of carrying out seminars	Other				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Interactive problem solving Workshop				
Course content lectures	1.Introduction. What is quality? What is quality management?, 4h, Learning outcomes:1 2.Deming. Shewhart. Deming Prize. 5S. Ishikawa. Ishikawa diagram. Pareto diagram., 4h, Learning outcomes:1,2,3 3.European standards. ISO standards. EFQM Excellence Model. OsliJuran., 4h, Learning outcomes:4 4.Juran trilogy. Quality improvement., 4h, Learning outcomes:5 5.Taguchi. Robust design. Crosby., 4h, Learning outcomes:5 6.Eurocode 1990., 4h, Learning outcomes:7 7.Quality management in Civil Engineering., 4h, Learning outcomes:7 8.Quality management in Civil Engineering., 2h, Learning outcomes:7 9. 10. 11. 12. 13. 14. 15.				
Course content seminars	1. 2. 3. 4. Presentation of students, 3h, Learning outcomes:1,2,3,4,5,6,7 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.				

Course content constructures	1.Quality management principles (ISO). Quality improvement (Juran)., 4h, Learning outcomes:1,4,5 2.Legislation in Civil Engineering. Ishikawa diagram., 4h, Learning outcomes:1,2,7 3.Standards in Civil Engineering. Pareto diagram., 4h, Learning outcomes:1,3,6,7 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Overhead projector
Exam literature	Ivica Oslić. 2008. Kvaliteta i poslovna izvrsnost. Mep Consult d.o.o. Zagreb Olga Štajdohar-Pađen. 2015. Plivati s ISO-om i ostati živ Što je kvaliteta i kako njome upravljati u poslovnom i privatnom životu AKTUALNI PROPISI U GRADITELJSTVU, http://www.mgipu.hr/default.aspx?id=3654 Preporučena dopunska literatura: EUROKOD 1990 Dale, Barrie G.; Ton van der Wiele; Jos van Iwaarden. 1999, 2003, 2007. Managing Quality. Blackwell Publishing. Androić, Boris; Dujmović, Darko; Džeba, Ivica. 2003. Inženjerstvo pouzdanosti 1, I.A. Projektiranje Juran, Joseph Moses; Frank M. Gryna. 1993, 1999. Planiranje i analiza kvalitete. MATE d.o.o. Zagreb, prijevod djela Quality Planning and Analysis. McGraw-Hill, Inc. Thorpe, Brian; Peter Sumner. 2004. Quality Management In Construction. Gower. Gulvanessian, Haig; Calgaro, J.A.; Holicky, Milan. 2002. Designers' Guide to EN 1990 Eurocode: Basis of Structural Design, Thomas Telford
Students obligations	-
Knowledge evaluation during semester	10 minitests and eseys (4 points each, possible 40 points in total), and 2 tests (30 points each, 60 points in total). Students who accumulate at least 24 points in minitests and eseys and at least 18 points on each tests do not need to take other type of exam.
Knowledge evaluation after semester	Written exam: 60 points of possible 100 points.
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Activity in class) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146688;
Proposal made by	dr.sc. Sonja Zlatović , prof.v.šk., 11.02.2014.

Code WEB/ISVU	23285/146698	**ECTS**	6.0	**Academic year**	2018/2019
Name	Solid Waste Disposals				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (12+0+0+18) 120
Teachers	Lectures:1. dr.sc. Mladen Petričec dipl.ing.građ. Lectures:2. Danko Fundurulja Auditory exercises: Filip Kalinić mag. ing. aedif. Construction exercises: Filip Kalinić mag. ing. aedif.				
Course objectives	Students will learn to recognise solid waste disposal problems and to independently solve basic problems related to solid waste disposal sites.				
Learning outcomes:	1.critically evaluate the problem of waste disposal. Level:7 2.present a modern waste management system. Level:6,7 3.develop an integrated solid waste disposal solution. Level:6,7 4.analyse quality of waste disposal solutions, including organisation and work at the disposal site (list advantages and drawbacks). Level:7 5.manage work at the disposal site. Level:6,7				
Methods of carrying out lectures	By application of technical equipment, focus is put on practical examples, documented by photographs, video recordings and graphical explanations. For some units, offprints are prepared, which include basic overviews of lecture contents, pictures, sketches and the most important elements of presentations, with the aim to enable student participation in the knowledge transfer (asking questions, encouragement to independently form conclusions, discussion). A planned organized visit to a modern solid waste disposal.				
Methods of carrying out auditory exercises	Solving tasks and key problems in relation to lectures, with active student participation.				
How construction exercises are held	Preparation of programs based on topics dealt with in auditory exercises, under lecturer				
Course content lectures	1.Uvod - odstranjivanje, zbrinjavanje i odlaganje otpada., 2h, Learning outcomes:1 2.Zbrinjavanje - odlaganje., 2h, Learning outcomes:1 3.Cjelovit odriv sustav gospodarenja otpadom (CSGO)., 2h, Learning outcomes:2 4.Smanjivanje i izbjegavanje (spreanje) otpada., 2h, Learning outcomes:2 5.CSGO i odlaganje krutog otpada., 2h, Learning outcomes:1,2 6.Utjecaj odlagalita otpada na okoli i okolicu., 2h, Learning outcomes:1,3 7.Osnove projekta odlagalita otpada., 2h, Learning outcomes:3 8.I. kolokvij, 1h, Learning outcomes:1,2 CSGO i odlagalite obrag otpada., 1h, Learning outcomes:3 9.Izbor lokacije odlagalita otpada. , 2h, Learning outcomes:3 10.Sadraj odlagalita otpada., 2h, Learning outcomes:3,4 11.Organizacija odlagalita u gradnji, koritenju i nakon zatvaranja., 2h, Learning outcomes:4 12.Ekonomsko financijske osnove odlagalita otpada., 2h, Learning outcomes:4,5 13.Ekonomsko financijske osnove odlagalita otpada., 1h, Learning outcomes:4 Monitoring odlagalita u gradnji, koritenju i nakon zatvaranja., 1h, Learning outcomes:4,5 14.Monitoring odlagalita u gradnji, koritenju i nakon zatvaranja., 2h, Learning outcomes:4,5 15.II. kolokvij, 2h, Learning outcomes:3,4,5				
Course content auditory	1.Razlike u lokacijama odlagalita otpada u kontinentalnom i primorskom podru., 2h, Learning outcomes:1,2,3 2.Plan gospodarenja otpadom velia povrina odlagalita., 2h, Learning outcomes:3,4 3.Izrada programa istranih radova., 2h, Learning outcomes:3,4 4.Izrada programa istranih radova., 2h, Learning outcomes:3,4 5.Prora volumena i geometrije odlagalita., 2h, Learning outcomes:3,4 6.Prora volumena i geometrije odlagalita., 2h, Learning outcomes:3,4 7.Nema vjebi. 8.Nema vjebi. 9.Nema vjebi. 10.Nema vjebi. 11.Nema vjebi. 12.Nema vjebi. 13.Nema vjebi. 14.Nema vjebi. 15.Nema vjebi.				
Course content constructures	1.Nema vjebi. 2.Nema vjebi. 3.Nema vjebi. 4.Nema vjebi. 5.Nema vjebi. 6.Nema vjebi. 7.Terenske vjebe - odlagalite otpada., 2h, Learning outcomes:3,4,5 8.Terenske vjebe - odlagalite otpada., 2h, Learning outcomes:3,4,5 9.Terenske vjebe - odlagalite otpada., 2h, Learning outcomes:3,4,5 10.Stabilnost odlagalita otpada - seminarski rad., 2h, Learning outcomes:4 11.Gornji i donji brtveni sloj - seminsrski rad., 2h, Learning outcomes:3,4 12.Gornji i donji brtveni sloj - seminsrski rad., 2h, Learning outcomes:3,4 13.Prora voda i odlagalinog plana - seminarski rad., 2h, Learning outcomes:3,4				

	14.Prora voda i odlagalinog plana - seminarski rad., 2h, Learning outcomes:3,4 15.Kriti osvrt na organizaciju rada odlagalita otpada., 2h, Learning outcomes:5
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Video equipment
Exam literature	Basic literature: 1. Z. Milanović, Separati nastavnika. 2. Z. Milanović Linkovi na materijale na web-u. Additional literature: 1. Zbornici radova sa simpozija Gospodarenje komunalnim otpadom (1994.-2004.) 2. Građevinski godišnjaci (odabrana godišta)
Students obligations	Izraseminarski rad, uredno pohae nastave. Uspjeno poloen Kolokvij s numerim i teoretskim odrednicama.
Knowledge evaluation during semester	Aktivan i konstruktivan rad na vjebama. Uspjeno izra i objanjeni seminarski radovi i poloen Kolokvij. Prema sakupljenom broju bodova dobivaju se sljedeocjene: 61-80 bodova - dovoljan (2) 81-100 bodova - dobar (3) 101-110 bodova - vrlo dobar (4) vie od 111 bodova - izvrstan (5).
Knowledge evaluation after semester	Ispit se polae u dva dijela: pismeni i usmeni dio.
Student activities:	Aktivnost — ECTS (Classes attendance) — 6
Remark	This course can not be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	v.predavač Zlatko Milanović 31.3.2014.

Code WEB/ISVU	23294/146740	**ECTS**	6.0	**Academic year**	2018/2019
Name	Steel Engineering Structures				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:1. prof.vis.šk. Boris Baljkas Lectures:2. dr.sc. Krunoslav Pavković dipl.ing.građ. Auditory exercises:prof.vis.šk. Boris Baljkas Auditory exercises:dr.sc. Krunoslav Pavković dipl.ing.građ. Construction exercises:dr.sc. Krunoslav Pavković dipl.ing.građ.				
Course objectives	Students will acquire knowledge needed for the design, analysis and realization of steel structures.				
Learning outcomes:	1.develop a cost-effective solution for a load bearing steel system. Level:6,7 2.anticipate failure modes for complex steel structures. Level:6,7 3.generate numerical models for static steel systems. Level:6,7 4.critically analyze results obtained by numerical analysis of complex systems. Level:7 5.recommend engineering solutions for increasing the level of safety in structures. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Modelling Discussion Seminar, students presentation and discussion Other				
Methods of carrying out auditory exercises	Group problem solving Discussion, brainstorming Computer simulations Other				
How construction exercises are held	Group problem solving Discussion, brainstorming Workshop				
Course content lectures	1.Architecture and steel, 4h, Learning outcomes:4,5 2.Design procedures, 4h, Learning outcomes:4,5 3.Reliability, Multiple compression members, 2h, Learning outcomes:4,5 4.Thin-walled sections and problems with stability of thin-walled elements, 2h, Learning outcomes:4,5 5.Steel-concrete composite structures, 2h, Learning outcomes:4,5 6.Structural properties of elements and connections, 2h, Learning outcomes:4,5 7.Plasticity methods, 2h, Learning outcomes:4,5 8.Load modelling, 4h, Learning outcomes:5 9.Frame systems and multistorey steel skeletons, 2h, Learning outcomes:4,5 10.Space trusses, 2h, Learning outcomes:4,5 11.Structures realized with steel cables, 4h, Learning outcomes:4,5 12.- 13.- 14.- 15.-				
Course content auditory	1.Structural system selection, 2h, Learning outcomes:4,5 2.Selection of design model and use of computer software in the analysis, 2h, Learning outcomes:4,5 3.Steps in the analysis of structural elements, 2h, Learning outcomes:4,5 4.Presentation of working drawings with details, 2h, Learning outcomes:4,5 5.- 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Structural analysis of a structure, 2h, Learning outcomes:4,5 2.Structural analysis of a structure, 2h, Learning outcomes:4,5 3.Structural analysis of a structure, 2h, Learning outcomes:4,5 4.Structural analysis of a structure, 2h, Learning outcomes:4,5 5.Structural analysis of a structure, 2h, Learning outcomes:4,5 6.Structural analysis of a structure, 2h, Learning outcomes:4,5 7.Structural analysis of a structure, 2h, Learning outcomes:4,5 8.Structural analysis of a structure, 2h, Learning outcomes:4,5 9.Preparation of workshop drawings of the structure, with typical details, 2h, Learning outcomes:4,5 10.Preparation of workshop drawings of the structure, with typical details, 2h, Learning outcomes:4,5				

	11.Preparation of workshop drawings of the structure, with typical details, 2h, Learning outcomes:4,5 12.- 13.- 14.- 15.-
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Portable overhead projector Video equipment Special equipment Program package for finite element analisys
Exam literature	Basic literature: B. Androić, D. Džeba, I. Dujmović: ČELIČNE KONSTRUKCIJE 1, IAP, Zagreb, 2009. B. Androić, D. Džeba, I. Dujmović: METALNE KONSTRUKCIJE 1, IAP, Zagreb, 2003. B. Androić, D. Džeba, I. Dujmović: METALNE KONSTRUKCIJE 4 Posebna poglavlja, IAP, Zagreb, 2003. B. Androić, D. Džeba, I. Dujmović: Modeliranje konstrukcija prema Eurocode 3, IAO, Zagreb, 2004. B. Baljkas; K. Pavković, Projektiranje čeličnih konstrukcija,Zagreb: TVZ, 2014 Additional literature: 1. H. C. Schulitz, W. Sobek, K. J. Habermann: STEEL CONSTRUCTION MANUAL, Birkhauser Basel, 1999. 2. Stahl im Hochbau, priručnik 3. Eurocode 0, 1, 2, 3, 4, 5, 8
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Projekt zadane konstrukcije
Knowledge evaluation after semester	written exam oral exam
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Seminar Work) — 2 (Activity in class) — 1 (Practical work) — 1 (Oral exam) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	Prof. Boris Baljkas, dipl.ing., 28.4.2014

Code WEB/ISVU	23653/163457	**ECTS**	4.0	**Academic year**	2018/2019
Name	Structural Engineering				
Status	1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - obligatory course1st semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - obligatory course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				15+30 (10+0+0+20) 75
Teachers	Lectures:1. dr.sc. Dalibor Gelo mag.ing.aedif. Auditory exercises:dr.sc. Dalibor Gelo mag.ing.aedif. Construction exercises:dr.sc. Dalibor Gelo mag.ing.aedif.				
Course objectives	An introduction with techniques of numerical modeling of static systems.				
Learning outcomes:	1.Analyze of difference between linear and nonlinear static systems.. Level:6 2.Evaluate displacements and rotation of observed point on structure.. Level:7 3.Solve two or more times statically indeterminate structures by force method.. Level:6 4.formulation of flexibility matrix.. Level:6 5.Formulation of displacement method and engineering displacement method.. Level:6,7 6.Formulation of finite element method.. Level:6,7 7.formulation of stiffness matrix.. Level:6 8.Analyze of numerical integration in numerical modeling.. Level:6				
Methods of carrying out lectures	Ex cathedra teaching Case studies Simulations Modelling Questions and answers				
Methods of carrying out auditory exercises	Group problem solving Computer simulations				
How construction exercises are held	Other				
Course content lectures	1.Equilibrium, internal forces, drawing diagrams of internal forces, differential equations., 1h, Learning outcomes:1 2.Geometric and material characteristics, linear and nonlinear theory., 1h, Learning outcomes:1 3.Determination of the displacement and rotation of the observed point., 1h, Learning outcomes:1,2 4.The force method for one times statically indeterminate systems., 1h, Learning outcomes:1,2 5.Force method two and more times statically indeterminate system, flexibility matrix., 1h, Learning outcomes:1,2,3 6.Displacement method, the definition of the basic elements., 1h, Learning outcomes:4 7.Application of displacement method., 1h, Learning outcomes:4 8.Engineering displacement method, comparison with the displacement method., 1h, Learning outcomes:4 9.The first colloquium., 1h, Learning outcomes:1,2,3,4,5 10.Finite element analysis, defining the final element, the formation of stiffness matrix for a bar element., 1h, Learning outcomes:6,7 11.Finite element analysis, the formation of stiffness matrix using the deformation curves., 1h, Learning outcomes:6,7 12.Finite element analysis, the condensation of the stiffness matrix., 1h, Learning outcomes:6,7 13.Finite element analysis, stiffness matrix for the plate elements., 1h, Learning outcomes:6,7 14.Iterative procedures for solving linear and nonlinear numerical problems., 1h, Learning outcomes:8 15.The second colloquium., 1h, Learning outcomes:6,7,8				
Course content auditory	1.Solving equilibrium problem, determination of internal forces, drawing the internal forces diagrams., 2h, Learning outcomes:1 2.Draw internal forces diagrams., 2h, Learning outcomes:1 3.Determination of the displacement and rotation of the observed point., 2h, Learning outcomes:1,2 4.Solving numerical problems using the force method for one times statically indeterminate systems., 2h, Learning outcomes:1,2 5.Solving numerical problems using the force method for two and more times statically indeterminate systems., 2h, Learning outcomes:1,2,3 6.Displacement method, formulating the stiffness matrix., 2h, Learning outcomes:4 7.Displacement method, drawing the internal forces diagrams., 2h, Learning outcomes:3,4 8.Solving numerical problems by engineering displacement method., 2h, Learning outcomes:3,4,5 9.The first colloquium., 2h, Learning outcomes:1,2,3,4,5 10.The finite element method, the formation of the global stiffness matrix., 2h, Learning outcomes:3,6,7 11.Finite element, forming a matrix of rotation, the transformation matrix stiffness from the local to the global system and from the global to the local system., 2h, Learning outcomes:3,6,7 12.Finite element analysis, the condensation of the stiffness matrix., 2h, Learning outcomes:3,6,7 13.Finite element analysis, drawing the internal forces diagrams., 2h, Learning outcomes:3,6,7 14.Finite element analysis, introduction to software formed based on the finite element method., 2h, Learning outcomes:3,8 15.The second colloquium., 2h, Learning outcomes:5,6,7,8				
Course content constructures	1.No classes. 2.No classes. 3.No classes. 4.No classes. 5.No classes. 6.No classes. 7.No classes. 8.No classes.				

	9.No classes. 10.No classes. 11.No classes. 12.No classes. 13.No classes. 14.No classes. 15.No classes.
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers
Exam literature	1. Bilješke s predavanja. 2. Werner - Inženjesko modeliranje 2 [22.05.18] 3. Jurica Sorić - Metoda konačnih elemenata
Students obligations	In semester is possible to achieve 60 points. -first colloquium 30 points -second colloquium 30 points Terms for taking the exam (signature): 30 points from the two colloquium out of a possible 60 points Extra examination for students who achieve between 15 and 30 points in two colloquium. Max can be achieved 30 points.
Knowledge evaluation during semester	In semester is possible to achieve 60 points. -first colloquium 30 points -second colloquium 30 points Terms for taking the exam (signature): 30 points from the two colloquium out of a possible 60 points Class attendance. Extra examination for students who achieve between 15 and 30 points in two colloquium. Max can be achieved 30 points.
Knowledge evaluation after semester	The exam consists of written and oral part. Written 30 points. Oral 10 points. Conditions for obtaining grade: Min 30 points colloquia or colloquia + extra examination. Written min. 15 points. Oral min. 5 points. Class attendance. Grading: 2 from 50 to 64 points 3 from 65 to 79 points 4 from 80 to 89 points 5 from 90 and 100 points
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Constantly tested knowledge) — 1 (Written exam) — 1 (Oral exam) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	dr.sc. Dalibor Gelo mag.ing.aedif., 24.10.2016

Code WEB/ISVU	24013/186261	**ECTS**	6.0	**Academic year**	2018/2019
Name	Structural Modelling and Design				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+30+0+0) 120
Teachers	Lectures:1. prof.vis.šk. Boris Baljkas Lectures:2. dr.sc. Krunoslav Pavković dipl.ing.građ. Lectures:3. doc. dr. sc. Dean Čizmar dipl. ing. građ. Laboratory exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Laboratory exercises:dr.sc. Krunoslav Pavković dipl.ing.građ.				
Course objectives	Students will be educated to independently prepare building finite element model				
Learning outcomes:	1.classify complex structures with regard to linear, planar and volumetric elements. Level:6,7 2.select the complex structure calculation model based on the finite element method. Level:7 3.analyse mechanical condition of the structure with regard to predefined external actions. Level:6,7 4.analyze acceptability of the approximation obtained for critical areas of the structure. Level:7 5.propose improvement of the numerical model for the analysis of the required mechanical condition. Level:6,7 6.estimate suitability of structural analysis contained in technical documentation for construction work. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Simulations Modelling Discussion Questions and answers				
Methods of carrying out laboratory exercises	Group problem solving Discussion, brainstorming Computer simulations Workshop				
Course content lectures	1.Basic concept, assumptions, design system; equilibrium equations., 2h, Learning outcomes:1,2 2.Member stiffness matrix, vectors of load and other actions, transformation matrix, structural stiffness matrix. , 2h, Learning outcomes:1,2 3.Bearings. Geometrical and natural boundary conditions. , 2h, Learning outcomes:1,2 4.Elastic theory - basic notions , 2h, Learning outcomes:1,2 5.Elastic theory - basic notions , 2h, Learning outcomes:1,2 6.Material continuum, mathematical model, linearization. Stress and strain. Equilibrium equations, deformation and displacement correlations, constitutive equations. Boundary tasks. , 2h, Learning outcomes:1,2 7.Material continuum, mathematical model, linearization. Stress and strain. Equilibrium equations, deformation and displacement correlations, constitutive equations. Boundary tasks. , 2h, Learning outcomes:1,2 8.Finite element method , 2h, Learning outcomes:2,4,5 9.Finite element method , 2h, Learning outcomes:2,4,5 10.Finite element method , 2h, Learning outcomes:2,4,5 11.Finite element method , 2h, Learning outcomes:2,4,5 12.Finite element method , 2h, Learning outcomes:2,4,5 13.use of commercial software; input data; interpretation of results., 2h, Learning outcomes:1,2,3,4,5 14.use of commercial software; input data; interpretation of results., 2h, Learning outcomes:1,2,3,4,5 15.use of commercial software; input data; interpretation of results., 2h, Learning outcomes:1,2,3,4,5				
Course content laboratory	1.Introduction to the software package for numerical modeling, 6h, Learning outcomes:2,3 2.Simplified beam models,, 6h, Learning outcomes:3,4,5 3.Complex beam modelling (trusses, bridges), 10h, Learning outcomes:1,2,3,4 4.Plane element models, 4h, Learning outcomes:1,2,3,4 5.Modelling of structure, 4h, Learning outcomes:1,2,3,4,5 6.- 7.- 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Overhead projector Assisted by the lecturer and teaching assistant, students will independently prepare their assignments.				
Exam literature	Obavezna: 1. J. Sorić: Metoda konačnih elemenata; Golden marketing-Tehnička knjiga, Zagreb, 2004. (udžbenik) 2. D.Lazarević i J. Dvornik;Plošni nosači, Bilješke s predavanja, GF,2013. Additional literature: 1. Bathe, Wilson:Numerical Methods in Finite Element Analysis, PRENTICE-HALL, New Jersey,1982.				

	2. Timošenko, Gudier: Teorija elastičnosti, Građevinska knjiga, Beograd, 1962. 3. Timošenko, Vojnovski-Kriger: Teorija ploča i ljuski, Građevinska knjiga, Beograd, 1962.	
Students obligations	maximum of 3 absences from exercises and lectures	
Knowledge evaluation during semester	Colloquium during semester	
Knowledge evaluation after semester	Writen examination Oral examination	
Student activities:	Aktivnost (Constantly tested knowledge) (Oral exam) (Written exam) (Activity in class)	ECTS 2 1 2 1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	Dean Čizmar, 4.4.2017.	

Code WEB/ISVU	23871/173471	**ECTS**	6.0	**Academic year**	2018/2019
Name	Train Stations				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (0+0+0+30) 120
Teachers	Lectures:mr.sc. Ante Goran Bajić viši predavač Construction exercises:mr.sc. Ante Goran Bajić viši predavač				
Course objectives	Students will gain an in-depth theoretical, practical and operative knowledge about the design, construction and maintenance of train stations and railway yards, and will make study visits to large train stations.				
Learning outcomes:	1.evaluate basic problems in the organisation of railway transport and use of train stations. Level:7 2.critically evaluate similarities and differences between throughway stations and terminus stations, and the influence of their plans on train passing capacity. Level:7 3.create basic elements of a railway station, present practical knowledge on the construction and maintenance of railway stations. Level:6,7 4.select special in-track devices (turnouts) types, differences, and use-related problems. Level:7 5.arrange all horizontal elements of a track turnout in train station and prepare a 1:500 final stakeout plan. Level:6,7 6.define factor of safety for vehicles passing through turnouts of a given radius and separation angle. Level:7 7.propose all track separation elements and draw a stakeout plan. Level:6,7				
Methods of carrying out lectures	Case studies Discussion Questions and answers Other Appropriate teaching aids (slides, overhead projector, and video films) will be used during lectures. Comprehension of course material will additionally be enhanced by visit of significant train stations.				
How construction exercises are held	Other Students independently solve tasks relating to their assignments.				
Course content lectures	1.Introduction. Role and use of train stations. Transport and tractive operations, 2h, Learning outcomes:1 2.Properties of railway transport and traction, 2h, Learning outcomes:1 3.Definition and classification of train stations. Railway tracks. Classification of railway tracks. Useful length of railway tracks, 2h, Learning outcomes:1,2 4.Railway points (turnouts). Pantographs, 2h, Learning outcomes:4 5.Track routes. Train station and track plans , 2h, Learning outcomes:4 6. Signals. Optical signals, shape-based signals and light signals. Train station signals, 2h, Learning outcomes:1 7.Passenger station equipment, 2h, Learning outcomes:1,3 8.Freight station equipment., 2h, Learning outcomes:1,3 9.First preliminary exam, 2h 10.Freight train marshalling. Marshalling yards: shaping, three groups, marshalling hump, automation. , 2h, Learning outcomes:1,5 11.Tracks in train stations. Spacing between tracks. Modification of track spacing., 2h, Learning outcomes:3,5,6 12.Track diagrams in single track and double track interstations, with one or more overpassing tracks., 2h, Learning outcomes:3,5 13.Big train station, 2h, Learning outcomes:1,3 14.Railway node shaping., 2h, Learning outcomes:1,3 15.Second final preliminary exam, 2h				
Course content constructures	1.Instructions, numerical examples and regulations for making tasks on constructive exercises , 3h, Learning outcomes:4,5,6,7 2.Design of the current state, 2h, Learning outcomes:3,4,7 3.Design of the current state, 2h, Learning outcomes:3,4 4.Making an existing situation in scale 1:1000, 2h, Learning outcomes:3,4 5.Making an existing situation in scale 1:1000, 2h, Learning outcomes:3,4 6.Analysis of reconstruction of the station (new state), 2h, Learning outcomes:3,4 7.Analysis of reconstruction of the station (new state), 2h, Learning outcomes:3,4 8.Making of reconstruction station situation (new state) in scale 1:1000, 2h, Learning outcomes:3,4 9.Making of reconstruction station situation (new state) in scale 1:1000, 2h, Learning outcomes:3,4 10.Drawing up the draft of the reconstruction of the railway station in scale 1:500, 2h, Learning outcomes:3,4,5 11.Drawing of drafting of the deformation of the main passageways in scale 1:500/10, 2h, Learning outcomes:3,4,5,7 12.Making a cross-section through a cellular plate with perons, 2h, Learning outcomes:3,4 13.Making a cross section through a reception building, 2h, Learning outcomes:3,4 14.Making a cross section through a warehouse, 2h, Learning outcomes:3,4 15.Making the technical description and submission of the program, 1h, Learning outcomes:3,4				
Required materials	Basic: classroom, blackboard, chalk... Whiteboard with markers Overhead projector Portable overhead projector Video equipment Maquette Students independently solve tasks relating to their assignments.				
Exam literature	1. Stipetić, A.: Kolodvori i kolodvorska postrojenja, FPZ, Zagreb, 2010. 2. Pollak, B.: ŽELJEZNICE, Građevinski institut, FGZ, Zagreb, 1988. 3. Bajić, A.G.: Separati predavanja. 4. Sinković, M.: KOLODVORI I KOLODVORSKA POSTROJENJA, Sveučilište u Zagrebu, 1948. P-314 PRAVILNIK O GORNJEM USTROJU, Hrvatske željeznice, Zagreb				

Students obligations	maximum of 3 absences from exercises	
Knowledge evaluation during semester	Redovitost pohaa#20#0#80$Programski zadatak#1#0#100$	
Knowledge evaluation after semester	Written part of the examination (concerning topics presented during lectures). Oral part of the examination for students who obtained at least 60 points during the written examination.	
Student activities:	Aktivnost	ECTS
	(Project)	3
	(Classes attendance)	2
	(Constantly tested knowledge)	1
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	

Code WEB/ISVU	24016/186264	**ECTS**	6.0	**Academic year**	2018/2019
Name	Tunnels				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (14+0+0+16) 120
Teachers	Lectures:mr.sc. Željko Lebo v. pred. Lectures:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Auditory exercises: Sandra Mihalinac mag.ing.aedif. Auditory exercises: Ivan Mustapić Construction exercises: Sandra Mihalinac mag.ing.aedif. Construction exercises: Ivan Mustapić				
Course objectives	Students will gain fundamental knowledge about preliminary investigations, design and construction of underground facilities and tunnels.				
Learning outcomes:	1.classify rock mass in which tunnel construction is planned. Level:6,7 2.design tunnel cross section depending on the planned use of the tunnel. Level:6,7 3.explain selection of the tunnel support technology. Level:7 4.estimate tunnel route accuracy in plan, longitudinal profile, and cross-section. Level:7 5.manage tunnel construction works. Level:6,7 6.analyse tunnel design alternatives. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Modelling Discussion Questions and answers Other Various underground structures and facilities in different stages of realization (preliminary investigations, design and construction) are presented to students using simple models, drawings, and photographs. Students are encouraged to actively participate in the lectures.				
Methods of carrying out auditory exercises	Group problem solving Other Appropriate problems are solved in the course of these exercises. Students are expected and encouraged to actively participate in the exercises.				
How construction exercises are held	Group problem solving Discussion, brainstorming Other Students independently elaborate their assignments in the scope of these exercises.				
Course content lectures	1.Introduction of the tunnel issue , 2h, Learning outcomes:5 2.Position and traffic function of tunnel , 2h, Learning outcomes:4 3.Methods of tunneling, 2h, Learning outcomes:3 4.General information about underground construction from geotechnical aspects of view, 2h, Learning outcomes:1 5.Geotechnical research, 2h, Learning outcomes:1 6.Primary and secondary stress and rock mass classification, 2h, Learning outcomes:1 7.New Austrian Tunneling Method, rock as an engineering material, 2h, Learning outcomes:1 8.Classical methods of construction, 2h, Learning outcomes:3 9.Modern methods of construction, 2h, Learning outcomes:3 10.Tunnel classes, 2h, Learning outcomes:4,5,6 11.TBM method, 2h, Learning outcomes:3 12.ADECCO method, 2h, Learning outcomes:3,6 13.Pipe roof method, 2h, Learning outcomes:3,6 14.Portal buildings, Tunnel construction, 2h, Learning outcomes:2 15.Safety in tunnel, 2h, Learning outcomes:5				
Course content auditory	1.Introduction of the program, distribution of the programmes, presentation of the program, 1h, Learning outcomes:1 Road and railway clearance profile in the tunnel, as well as pedestrian and emergency exits, 1h, Learning outcomes:2 2.No lessons, 2h 3.Tunnel lining geometry of a typical road tunnel, 1h, Learning outcomes:4 No lessons, 1h 4.Defining of the tunnel lining axis, tunnel lining division on lamellas with their lengths, 1h, Learning outcomes:2 No lessons, 1h 5.Graphostatical calculation of the tunnel lining, 1h, Learning outcomes:2,4 No lessons, 1h 6.Loads from the self-weight of the tunnel lining, 1h, Learning outcomes:1,2,4 No lessons, 1h 7.Calculation of the hill pressure - Protodjacon theory, 1h, Learning outcomes:1,2,4 No lessons, 1h 8.Loads from the hill pressure (vertical load), 1h, Learning outcomes:1,2,4 No lessons, 1h 9.Loads from the active pressure (lateral horizontal load), 1h, Learning outcomes:1,2,4 No lessons, 1h 10.Resultant force from total load on tunnel lining per lamella, 1h, Learning outcomes:1,2,4 No lessons, 1h 11.Pressure line of tunnel lining and the resultant of all loads, 1h, Learning outcomes:1,2,4				

	No lessons, 1h 12.Stresses on the cross section between the lamellas, 1h, Learning outcomes:1,2,4 No lessons, 1h 13.Typical cross-section of the road tunnel, 1h, Learning outcomes:5 No lessons, 1h 14.Number of tunnel tubes and disposition of emergency exits, lay-bys and basic tunnel niches in the road tunnels, 1h, Learning outcomes:4 No lessons, 1h 15.No lessons, 2h
Course content constructures	1.No lessons, 2h 2.Defining and creation of the road clearance profile in the subject tunnel, 2h, Learning outcomes:2 3.No lessons, 1h Defining and creation of the tunnel lining geometry of the subject tunnel, 1h, Learning outcomes:2 4.No lessons, 1h Defining and creation of the tunnel lininh axis of the subject tunnel, division of tunnel lining on lamellas, 1h, Learning outcomes:2 5.No lessons, 1h Graphostatical calculation of the tunnel lining of the subject tunnel, 1h, Learning outcomes:2,4 6.No lessons, 1h Calculation of the loads from the self-weight of the tunnel lining of the subject tunnel, 1h, Learning outcomes:1,2,4 7.No lessons, 1h The basics of defining the hill pressure for the subject tunnel according to Protodjacon theory, 1h, Learning outcomes:1,2,4 8.No lessons, 1h Calculation of the roads from the hill pressure (vertical load) for the subject tunnel, 1h, Learning outcomes:1,2,4 9.No lessons, 1h Calculation of the loads from the active pressure (lateral horizontal load) for the subject tunnel, 1h, Learning outcomes:1,2,4 10.No lessons, 1h Defining the resultant force from total loads on tunnel lining per lamellas, 1h, Learning outcomes:1,2,4 11.No lessons, 1h Defining the pressure line of tunnel lining and the resultant of all loads for the subject tunnel, 1h, Learning outcomes:1,2,4 12.No lessons, 1h Defining the stresses on the cross section between the lamellas for the subject tunnel, 1h, Learning outcomes:1,2,4 13.No lessons, 1h Creation of thr typical cross-section of the subject tunnel, 1h, Learning outcomes:5 14.No lessons, 1h Defining and drafting the number of tunnel tubes and disposition of emergency exits, lay-bys and basic tunnel niches in the subject tunnel, 1h, Learning outcomes:4 15.Final control and submission of the program, 2h, Learning outcomes:1,6
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment
Exam literature	Basic literature: 1. Ž. Lebo: Separati predavanja na webu 2. M. Šimun: Separati predavanja na webu 3. P. Lunardi: The Analysis of Controlled Deformation in Rocks and Soils (ADECO-RS) Additional literature:
Students obligations	Orderly class attendance, drafting and surrender of the program
Knowledge evaluation during semester	no the colloquium
Knowledge evaluation after semester	Written and verbal exam
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Written exam) — 2 (Oral exam) — 2 (Activity in class) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
Proposal made by	mr.sc. Željko Lebo, lecturer, 12.6.2017, Miroslav Šimun, PhD. Asst.Prof. C.E

Code WEB/ISVU	24014/186262	**ECTS**	6.0	**Academic year**	2018/2019
Name	Urban Transport Facilities				
Status	2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course2nd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (14+0+0+16) 120
Teachers	Lectures:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Auditory exercises: Sandra Mihalinac mag.ing.aedif. Auditory exercises:doc.dr.sc. Miroslav Šimun dipl.ing.građ. Construction exercises: Sandra Mihalinac mag.ing.aedif. Construction exercises:doc.dr.sc. Miroslav Šimun dipl.ing.građ.				
Course objectives	Students will learn to deal with complex problems encountered in the planning, design and construction of urban transport facilities.				
Learning outcomes:	1.formulate/define requirements for the planning and design of urban roads and intersections. Level:6,7 2.compare traffic, structural, urban planning, and environmental parameters for selecting an optimum form of an urban intersection. Level:6,7 3.select transport and technical cross-sectional elements of urban roads. Level:7 4.design an at-grade intersection (traditional and circular intersections). Level:6,7 5.evaluate individual alternative solutions for selecting an optimum intersection form. Level:7 6.reexamine existing road and intersection solutions in urban areas. Level:6,7 7.define urban road maintenance elements. Level:7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Questions and answers Other Appropriate teaching aids (overhead projector, video projector) will be used to illustrate theoretical presentation of course material.				
Methods of carrying out auditory exercises	Computer simulations Other The material exposed during these exercises is illustrated by practical solutions and concepts presented by means of video projector.				
How construction exercises are held	Computer simulations Other Independent task solving using an appropriate computer software.				
Course content lectures	1.Urban transport facilities and urban transport subsystems, 2h, Learning outcomes:1,3 2.Categorization and classification, spatial models, 2h, Learning outcomes:1,3 3.Starting points and conditions for the design of transport facilities, 2h, Learning outcomes:1,3,7 4.Design elements for roads and streets, 2h, Learning outcomes:1,3,6 5.Grade separated intersections, 2h, Learning outcomes:2,5 6.At-grade intersections - I part, 2h, Learning outcomes:2,5 7.At-grade intersections - II part, 2h, Learning outcomes:2,5 8.Roundabouts , 2h, Learning outcomes:2,4,7 9.Parking lots and garages , 2h, Learning outcomes:2,4,7 10.Secondary and special transport facilities , 2h, Learning outcomes:1,7 11.Public city transport of passengers, 2h, Learning outcomes:1,3,7 12.Pathways for bicycles and pedestrians, 2h, Learning outcomes:1,3,7 13.Communal equipment and drainage of roads, 2h, Learning outcomes:1,3,6 14.Traffic and other equipment, traffic signs and markings, 2h, Learning outcomes:1,3,6 15.Introduction to maintenance of urban transport facilities, studies and design documents , 2h, Learning outcomes:6,7				
Course content auditory	1.Introduction, tasks division and interpretation of divisional island shapin, 2h, Learning outcomes:1,2,3,4 2.Interpretation of divisional island shapin, 2h, Learning outcomes:1,2,3,4 3.Interpretation of divisional island shapin, 2h, Learning outcomes:1,2,3,4 4.Making divisional island shapin, 2h, Learning outcomes:1,2,3,4 5.Making divisional island shapin, 2h, Learning outcomes:1,2 6.Defining capacity for intersections not equipped with traffic lights, 1h, Learning outcomes:4,5,6 Checking capacity for intersections not equipped with traffic lights, 1h, Learning outcomes:4,5,6 7.Interpretation of triangular islands, 2h, Learning outcomes:2,3,4 8.Interpretation of the turning lane in left , 1h, Learning outcomes:2,3,4 Making the turning lane in left, 1h, Learning outcomes:2,3,4 9.Interpretation of the additional right lane, 1h, Learning outcomes:2,3,4 Making the additional right lane, 1h, Learning outcomes:2,3,4 10.Interpretation of edge pavement for side driveway, 2h, Learning outcomes:2,3,4 11.Making the edge pavement for side driveway, 2h, Learning outcomes:2,3,4 12.Interpretation of the bus station and pedestrian crossing, 1h, Learning outcomes:2,3,4 Making the bus station and pedestrian crossing, 1h, Learning outcomes:2,3,4 13.Making all elements in program, 2h, Learning outcomes:1,2,3,4 14.Interpretation of technical description and delivery program, 1h, Learning outcomes:1,4,6 Making technical description and delivery program, 1h, Learning outcomes:1,4,6 15.Control and delivery of programs, 2h, Learning outcomes:1,4				
Course content constructures	1.No lessons, 2h 2.No lessons, 2h 3.No lessons, 2h				

	4.Making divisional island shapin, 2h, Learning outcomes:1,2,3,4 5.Making divisional island shapin, 2h, Learning outcomes:1,2,3,4 6.No lessons, 1h Checking capacity for intersections not equipped with traffic lights, 1h, Learning outcomes:4,5,6 7.No lessons, 1h 8.No lessons, 1h Making the turning lane in left , 1h, Learning outcomes:2,3,4 9.No lessons, 1h Making the additional right lane, 1h, Learning outcomes:2,3,4 10.No lessons, 2h 11.Making the edge pavement for side driveway, 2h, Learning outcomes:2,3,4 12.No lessons, 1h Making the bus station and pedestrian crossing, 1h, Learning outcomes:2,3,4 13.Making all elements in program, 2h, Learning outcomes:1,2,3,4 14.No lessons, 1h Making technical description and delivery program, 1h, Learning outcomes:1,4,6 15.Control and delivery of programs, 2h, Learning outcomes:1,4
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment
Exam literature	Obavezna literatura: Legac, I. i koautori: Gradske prometnice, Fakultet prometnih znanosti, Zagreb, 2011. Maletin, M.: Planiranje i projektovanje saobraćajnica u gradovima, Orion, Beograd, 2005. Dopunska literatura: Highway Capacity Manual HCM2000, National Research Council, Washington, 2000. Handbuch fr die Bemessung von Strassenverkehrsanlagen (HBS), FSV, Kln, 2001. Smjernice za projektiranje raskrižja u naseljima sa stajališta sigurnosti prometa, Fakultet prometnih znanosti, Zagreb, 2004.
Students obligations	maximum of 3 absences from exercises
Knowledge evaluation during semester	Redovitost pohaa#10#0#50$Programski zadatak#1#0#100$
Knowledge evaluation after semester	Written part of the examination consists of 5 questions relating to the topics presented during lectures and exercises; Oral part of the examination may be taken by students who obtained at least 60 points during the written part of the examination.
Student activities:	Aktivnost — ECTS (Classes attendance) — 1 (Written exam) — 2 (Oral exam) — 2 (Activity in class) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146710;
Proposal made by	Miroslav Šimun, PhD.Asst.Prof.C.E., 20.2.2016.

Code WEB/ISVU	24007/186254	**ECTS**	6.0	**Academic year**	2018/2019
Name	Wastewater Treatment				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+6+6+8) 120
Teachers	Lectures:1. mr.sc. Gorana Ćosić-Flajsig viši predavač Auditory exercises: Dejan Kovačević dipl.ing.građ. Laboratory exercises: Marin Ganjto Seminar exercises: Dejan Kovačević dipl.ing.građ. Construction exercises: Dejan Kovačević dipl.ing.građ.				
Course objectives	Students will be able to recognise importance of the wastewater discharge limitations and control, and will also be able to understand and independently solve problems related to water treatment and drainage facilities.				
Learning outcomes:	1.critically analyse input data and support documents for the selection of waste water treatment procedures. Level:7 2.estimate relation between sewage system and wastewater treatment activities. Level:6,7 3.critically analyse environmental impact of sewage system ad waste water treatment facilities. Level:7 4.select an alternative for dimensioning individual units of a municipal waste water treatment device. Level:7 5.formulate/define the waste water treatment concept by means of the first, second and third level of purification. Level:6,7 6.formulate/define the sludge treatment and disposal concept. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Guest lecturer Case studies Demonstration Modelling Discussion Questions and answers Seminar, students presentation and discussion Integrating and expanding acquired knowledge in the fields of water use, water protection and water structures to gain a broader perspective of sewerage and wastewater treatment processes. Up to-date educational means are used in lectures, and explanations are supplemented by graphic presentations.Planned visit to several wastewater treatment facilities (Zagreb, kovec, Varadin, Koprivnica, Karlovac, etc.).				
Methods of carrying out auditory exercises	Laboratory exercises on laboratory equipment Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Mind mapping Workshop Other Solving examples of subject matter explained in lectures.				
Methods of carrying out laboratory exercises	Laboratory exercises on laboratory equipment Group problem solving Traditional literature analysis Discussion, brainstorming Computer simulations Workshop Other Visit to laboratory which performs water analyses and learning about water quality determination process.				
Methods of carrying out seminars	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Interactive problem solving				
How construction exercises are held	Group problem solving Traditional literature analysis Interactive problem solving Workshop				
Course content lectures	1.The plan of the course content and exams, 2h Water protection and basic elements of the sewerage system, 1h, Learning outcomes:1 Therm of agglomeration and defining the level of wastewater treatment,, 1h, Learning outcomes:1 2.Legislation regarding the level of wastewater treatment, 1h, Learning outcomes:1 Overview of the sewage system, 1h, Learning outcomes:2 Water quality management, 1h, Learning outcomes:3 Diffuse sources of pollution, 1h, Learning outcomes:3 3.General Waste Water Treatment, 2h, Learning outcomes:3 Basic of wastewater treatment, 2h, Learning outcomes:1,3 4.The previous level of the treatment, 1h, Learning outcomes:4,5 The first level of the treatment, 1h, Learning outcomes:4,5 The secondary level of the treatment,, 2h, Learning outcomes:4,5 5.The secondary level of the treatment, 2h, Learning outcomes:4,5				

	6.The third level of the treatment, 2h, Learning outcomes:4,5 7.No lessons 8.No lessons 9.The third level treatment, 2h, Learning outcomes:4,5 10.Sludge treatment, 2h, Learning outcomes:6 11.Management of the wastewater treatment plant, 1h, Learning outcomes:5,6 Rainwater purification, 1h, Learning outcomes:5,6 12.No lessons 13.No lessons 14.Natural processes of the wastewater treatment, 2h, Learning outcomes:4,5,6 15.No lessons
Course content auditory	1.No lesssons 2.No lesssons 3.No lesssons 4.No lesssons 5.No lesssons 6.Point sources of pollution, Placing the First Program, 1h, Learning outcomes:1 7.The first program - submission and explanation, 1h, Learning outcomes:1 First Colloquium, 1h, Learning outcomes:1,2,3 8.Introduction to laboratory techniques, Placing the second program, 1h, Learning outcomes:2,3,4 Analysis of the performance of the Zagreb wastewater treatment water, 1h, Learning outcomes:2,3,4 9.No lesssons 10.No lesssons 11.No lesssons 12.No lesssons 13.Designing of the WWTP, Placing the Third Program, 2h, Learning outcomes:4,5,6 14.Second Colloquium, 1h, Learning outcomes:4,5,6 The second program - submission and explanation, 1h, Learning outcomes:2,3,4 15.The third program - submission and explanation, 1h, Learning outcomes:4,5,6
Course content laboratory	1.No lesssons 2.No lesssons 3.No lesssons 4.No lesssons 5.No lesssons 6.No lesssons 7.No lesssons 8.No lesssons 9.Field tour of Zagreb wastewater treatment plant, 2h, Learning outcomes:4,5,6 10.Laboratory exercises at WWTP Zagreb, 4h, Learning outcomes:4,5,6 11.No lesssons 12.No lesssons 13.No lesssons 14.No lesssons 15.No lesssons
Course content seminars	1.No lesssons 2.No lesssons 3.No lesssons 4.No lesssons 5.No lesssons 6.No lesssons 7.No lesssons 8.No lesssons 9.No lesssons 10.No lesssons 11.Monitoring the characteristic parameters of Zagreb wastewater treatment plant, 3h, Learning outcomes:2,3,4 12.Monitoring the characteristic parameters of Zagreb wastewater treatment plant, 3h, Learning outcomes:2,3,4 13.No lesssons 14.No lesssons 15.No lesssons
Course content constructures	1.No lesssons 2.No lesssons 3.No lesssons 4.No lesssons 5.No lesssons 6.Point sources of pollution, 3h, Learning outcomes:1 7.No lesssons 8.No lesssons 9.No lesssons 10.No lesssons 11.No lesssons 12.No lesssons 13.Designing of the WWTP, 2h, Learning outcomes:4,5,6 14.Designing of the WWTP, 3h, Learning outcomes:4,5,6 15.No lesssons

Required materials	Whiteboard with markers Overhead projector Video equipment
Exam literature	1. Ćosić-Flajsig: Interna skripta kolegija Pročišćavanje voda, TVZ, Graditeljski odjel 2. Tedeschi S: Zaštita voda, HDGI, Zagreb, 2007 3. Oborinske i otpadne vode: teret onelišćenja, mjere zaštite, Građevinsko-arhitektonski fakultet Sveučilišta u Splitu, Split, 2007 4.Tušar B.: Pročišćavanje otpadnih voda, KIGEN, GFV, Zagreb, 2009. Preporučena literatura: 1.Metcalf Eddy: Wastewater Enguineering, Treatment Disposal, Reuse, McGraw-Hill International Edditions, 2007 2. Margeta J.: Guidelines on Sewage Treatment and Disposal for the Mediterranean region, WHO-GEF, Athens, 2004. 3 Margeta, J.: Kanalizacija naselja, Sveučilište u Splitu, Građevinski fakultet Split, 1998. 4. Tušar, B: Ispuštanje i pročišćavanje otpadne vode, Croatiaknjiga, 2004. 5. Valić i sur; Zdravstvena ekologija, Medicinska naklada, Zagreb, 2001.
Students obligations	The requirement to receive a signature is the finish and defense of the program in the given terms, with the achievement of the required minimum number of points, the attendance of the colloquium with the achievement of the required minimum number of points, and regular attendance of exercises and lectures (maximum 35% absences from the whole classroom). Each student during the semester should, with the help of the teacher, create 3 (three) programs. For each program the student can collect a certain number of points: - I program - Point sources of contamination: 5 points - individually - II. program - Second stage analysis of waste water treatment plants: 15 points - joint presentation of results - III. Program - dimensioning of waste water treatment plans: 10 points - individually which makes a total of 30 points. The following must be collected for the signature: - from the 1st program minimum of 3 points - from II. program minimum of 8 points - from III. program minimum of 6 points which is a total minimum of 17 points. Students must be guided by the prescribed deadlines, and when the program responds to the questions asked and thus defends the created program. To get the signature students need to get at least 13 points per colloquium (26 points total) and 17 points for three programs - a total of 43 points.
Knowledge evaluation during semester	During the semester, 2 colloquies are predicted (a combination of theoretical and practical knowledge in the way presented during lectures and exercises) through which students geting points. Total can be collected 1 x 30 + 1 x 30 = 60 points. For the passage of the colloquium it is necessary to collect 16 points per colloquium. For signing, 13 points should be collected from the first round and 13 points from the second round, which is 26 points. Students who do not have enough points to sign must write a correctional colloquium. A student can only write one correctional colloquium.
Knowledge evaluation after semester	Students who collected 60 points and more passed the exam with the following success: - 60 and more points - sufficient (2) - 67 and more points - good (3) - 75 and more points - very good (4) - 85 and more points - excellent (5) On the verbal part of the exam, the student can achieve 10 points. The oral exam is obligated for students who have achieved sufficient score during the semester! Students who have obtained the right to sign the exam, are going on a regular exam period.
Student activities:	Aktivnost — ECTS (Written exam) — 2 (Oral exam) — 2 (Project) — 2
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23890/173490	**ECTS**	6.0	**Academic year**	2018/2019
Name	Water Resources Modelling				
Status	4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course4th semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (6+0+8+16) 120
Teachers	Lectures:dr.sc. Darko Barbalić dipl.ing.građ. Auditory exercises:dr.sc. Darko Barbalić dipl.ing.građ. Seminar exercises:dr.sc. Darko Barbalić dipl.ing.građ. Construction exercises:dr.sc. Darko Barbalić dipl.ing.građ.				
Course objectives	Acquisition of basic theoretical and practical knowledge on model application in water management, and acquisition of practical skills for participation in model preparation as well as in model use and analysis of modelling results.				
Learning outcomes:	1.Select type of model. Level:7 2.Design a modeling process. Level:6,7 3.Plan data collection for modeling. Level:6,7 4.Prepare model. Level:6,7 5.Evaluate model results. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Simulations Modelling Discussion Questions and answers				
Methods of carrying out auditory exercises	Group problem solving Discussion, brainstorming Interactive problem solving				
Methods of carrying out seminars	Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Discussion, brainstorming Interactive problem solving				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Essay writing Computer simulations				
Course content lectures	1.The role of modeling in water management, modelling process and model types, 2h, Learning outcomes:1,2 2.Data essentials for modelling, 2h, Learning outcomes:2,3,4 3.GIS and remote sensing, 2h, Learning outcomes:2,3,5 4.Conceptual and mathematical models, numerical methods, 2h, Learning outcomes:1,2,3,4,5 5.Meteorological and climatic models and bases, 2h, Learning outcomes:2,4,5 6.Data driven models and simple models, 2h, Learning outcomes:2,3 7.Data driven models and simple models, 2h, Learning outcomes:3,4,5 8.Hydrologic models, 2h, Learning outcomes:2,3 9.Hydrologic models, 2h, Learning outcomes:4,5 10.Hydraulic models, 2h, Learning outcomes:2,3 11.Hydraulic models, 2h, Learning outcomes:4,5 12.Flood risk managements and water protection, 2h, Learning outcomes:1,2,3,4,5 13.Water usage, 2h, Learning outcomes:1,2,3,4,5 14.Water management, groundwater and marine models, 2h, Learning outcomes:2,3,4,5 15.Assessment and analysis of modelling results and modelling project, 2h, Learning outcomes:2,3,4,5				
Course content auditory	1.nema nastave 2.nema nastave 3.Problem solving, 2h, Learning outcomes:1,2,3,4,5 4.nema nastave 5.nema nastave 6.nema nastave 7.Problem solving, 2h, Learning outcomes:1,2,3,4,5 8.nema nastave 9.nema nastave 10.nema nastave 11.Problem solving, 2h, Learning outcomes:1,2,3,4,5 12.nema nastave 13.nema nastave 14.nema nastave 15.nema nastave				

Course content seminars	1.Introduction to seminar work, 2h, Learning outcomes:1,2,3,4,5 2.nema nastave 3.nema nastave 4.Discusion on seminars, 2h, Learning outcomes:1,2,3,4,5 5.nema nastave 6.nema nastave 7.nema nastave 8.nema nastave 9.nema nastave 10.nema nastave 11.nema nastave 12.Discusion on seminars, 2h, Learning outcomes:1,2,3,4,5 13.nema nastave 14.Seminar presentation, 2h, Learning outcomes:1,2,3,4,5 15.nema nastave
Course content constructures	1.nema nastave 2.Introduction to assignment, 2h, Learning outcomes:1,2,3,4,5 3.nema nastave 4.nema nastave 5.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 6.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 7.nema nastave 8.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 9.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 10.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 11.nema nastave 12.nema nastave 13.Work on the assignment / Consultation, 2h, Learning outcomes:1,2,3,4,5 14.nema nastave 15.Presentation of the results, 2h, Learning outcomes:1,2,3,4,5
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Portable overhead projector
Exam literature	Obavezna: 1. Vuković Ž.: Osnove hidrotehnike I/1 i 2, Akvamarine, Zagreb, 1994., 1995. 2. Jović V.: Osnove hidromehanike, Udžbenici Sveučilišta u Splitu, Element, Zagreb, 2006. 3. Loucks D.P., van Beek E.: Water Resources Systems Planning and Management, An Introduction to Methods, Models and Applications, Studies and Reports in Hydrology, UNESCO, 2005 4. Smooth Modelling in Water Management, Good Modelling Practice Handbook; STOWA report 99-05, Dutch Dept. of Public Works, Institute for Inland Water Management and Waste Water Treatment report 99.036, ISBN 90-5773-056-1., STOWA/RIZA, 1999. Additional literature: 1. Srebrenović D.: Primjenjena hidrologija, Tehnička knjiga, Zagreb, 1986. 2. Žugaj R.: Hidrologija, Rudarsko-geološko-naftni fakultet, Zagreb, 2000. 3. Agroskin: Hidraulika 4. Palmer M.D: Water quality modeling: a guide to effective practice, The International Bank for Reconstruction and Development / THE WORLD BANK, USA, 2001
Students obligations	Regular attendance of lectures and exercises. A total of 30 or more points scored in preliminary exams. Submitted and accepted seminar paper. Submitted and accepted program.
Knowledge evaluation during semester	During the semester (two preliminary exams) the student can score up to 60 points. A student who has scored in total less than 15 points in two preliminary exams, re-enrolls the subject. A student who has scored in total more than 15 and less than 30 points in two preliminary exams is entitled to supplementary preliminary exam. A student who has scored in total 30 or more points during the semester (including a supplementary exam, if entitled to) can attend final exam.
Knowledge evaluation after semester	At the final exam, student can score up to 40 points. For a positive final grade of the course, the student must score at least 20 points at the final exam. The final grade of the course consists of the sum of the points scored during the semester and points scored at the final exam, as follows: 90 -100 points - excellent (5) 80 - 89,9 points - very good (4) 65 - 79,9 points - Good (3) 50 - 64,9 points - sufficient (2)
Student activities:	Aktivnost ECTS (Seminar Work) 1 (Project) 1

	(Constantly tested knowledge) (Oral exam)	2 2
Remark	This course can be used for final thesis theme	
Prerequisites:	No prerequisites.	
Proposal made by	Darko Barbalić Ph.D. , 27.07.2017	

Code WEB/ISVU	24008/186255	**ECTS**	6.0	**Academic year**	2018/2019
Name	Water Resources Systems				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+8+12) 120
Teachers	Lectures:1. dr.sc. Mladen Petričec dipl.ing.građ. Lectures:2. mr.sc. Gorana Ćosić-Flajsig viši predavač Auditory exercises: Ivana Bartolić , pred. Seminar exercises:dr.sc. Mladen Petričec dipl.ing.građ. Construction exercises: Ivana Bartolić , pred.				
Course objectives	Students will learn how to integrate knowledge and skills gained in the fields of water use, water protection and river engineering, and to use such knowledge for recognizing and solving problems relating to the planning and implementation of water systems.				
Learning outcomes:	1.determine the basis for managing water systems (objectives, criteria, constraints).. Level:7 2.evaluate elements of for evaluating the water system.. Level:7 3.determine their ability level and implementation of simulation and optimization techniques in the management of water systems.. Level:6,7 4.predložiti opseg informacijskog sustava, kod upravljanja vodnim sustavima.. Level:6,7 5.evaluate the possible applications and elements of for the economic evaluation of alternative solutions.. Level:6,7 6.evaluate the major impact of building and operation of the water system on the environment.. Level:6,7 7.formulate phases and content study in planning water system.. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching Case studies Discussion Lectures are performed orally, with aid of modern IT equipment; graphic and photographic illustrative presentations of constituent components of water systems. In auditory exercises, a field excursion is planned to view water systems and/or its components.				
Methods of carrying out auditory exercises	Group problem solving Discussion, brainstorming Computer simulations Problem-solving on the blackboard, with active student participation.				
Methods of carrying out seminars	Traditional literature analysis Data mining and knowledge discovery on the Web Discussion, brainstorming Workshop Some teaching cjelinuse are processed through seminars, presenting in front of colleagues and teachers, and answer questions				
How construction exercises are held	Group problem solving Traditional literature analysis Data mining and knowledge discovery on the Web Preparation of programs in groups, under lecturer				
Course content lectures	1.Introduction and basic terms., 2h, Learning outcomes:1 2.The basic theory management systems., 2h, Learning outcomes:1 3.Types of water systems, according ways of water use and use., 2h, Learning outcomes:2 4.Techniques a systemic analysis and synthesis., 2h, Learning outcomes:2 5.Simulation method of water systems., 2h, Learning outcomes:3 6.Methods for optimizing the water management systems., 2h, Learning outcomes:3 7.Methods for optimizing the water management systems., 2h, Learning outcomes:3 8.I. preliminary exam., 2h, Learning outcomes:1,2,3 9.Information systems within the framework water system., 2h, Learning outcomes:4 10.Information systems within the framework water system., 1h, Learning outcomes:4 The economic evaluation of of water systems., 1h, Learning outcomes:5 11.The economic evaluation of of water systems., 2h, Learning outcomes:5 12.Water systems and the an environment., 2h, Learning outcomes:6 13.Water systems and the an environment., 1h, Learning outcomes:6 Planning water system., 1h, Learning outcomes:7 14.Planning water system., 2h, Learning outcomes:7 15.II. preliminary exam., 2h, Learning outcomes:4,5,6,7				
Course content auditory	1.Input and methods of valorization of water systems., 2h, Learning outcomes:1,2 2.Solving the tasks of optimizing the management of water systems using linear programming., 2h, Learning outcomes:2,3 3.Solving the tasks of optimizing the management of water systems using linear programming., 2h, Learning outcomes:2,3 4.Solving the task of optimization the management water systems using dynamic programming., 2h, Learning outcomes:2,3 5.Solving the task of optimization the management water systems using dynamic programming., 2h, Learning outcomes:3 6.Solving the task of optimizing components water systems using the economic analysis., 2h, Learning outcomes:3 7.Solving task of optimization components water systems using cost benefit method., 2h, Learning outcomes:3 8.No lessons.				

	9.No lessons. 10.No lessons. 11.No lessons. 12.No lessons. 13.No lessons. 14.No lessons. 15.No lessons.
Course content seminars	1.No lessons. 2.No lessons. 3.No lessons. 4.No lessons. 5.No lessons. 6.No lessons. 7.No lessons. 8.Explanations tasks and define input parameters and procedures for of solving program., 2h, Learning outcomes:2,3 9.Explanations tasks and define input parameters and procedures for of solving program., 2h, Learning outcomes:2,3 10.No lessons. 11.No lessons. 12.No lessons. 13.No lessons. 14.Presentation and view of solving programming task., 2h, Learning outcomes:2,3 15.Repeated I. or II. preliminary exam, 2h, Learning outcomes:1,2,3,4,5,6,7
Course content constructures	1.No lessons. 2.No lessons. 3.No lessons. 4.No lessons. 5.No lessons. 6.No lessons. 7.No lessons. 8.No lessons. 9.No lessons. 10.Solving the tasks of optimization the water system., 2h, Learning outcomes:2,3 11.Solving the tasks of optimization the water system., 2h, Learning outcomes:2,3 12.Solving the tasks of optimization the water system., 2h, Learning outcomes:2,3 13.Solving the tasks of optimization the water system., 2h, Learning outcomes:2,3 14.No lessons. 15.No lessons.
Required materials	Basic: classroom, blackboard, chalk... General purpose computer laboratory Whiteboard with markers Overhead projector Video equipment
Exam literature	Basic literature: 1. Mladen Petričec: Vodni sustavi (dopunjeno) - interna skripta, Zagreb, 2012. 2. Husno Hrelja: Vodoprivredni sistemi; IP "Svjetlost" Sarajevo d.d., zavod za udžbenike i nastavna sredstva, Sarajevo, 1996. 3. Branislav Đođević: Vodoprivredni sistemi, Građevinski fakultet, Beograd, 1990. Dodatna: 1. Warrem A. Hall, John A. Dracup: Water Resources system Engineering; Mc Graw-Hill Inc., New York, 1970. 2. Jure Margeta: Osnove gospodarenja vodama; Građevinski fakultet Sveučilišta u Splitu, 1992. 3. Mas A. et all: Design of Water Resources System; Harvard University Press, Cambridge, 1970
Students obligations	Attendance of lectures and exercises. It is necessary to achieve 30 or more points score through activities during the semester (preliminary exams, seminars,...).
Knowledge evaluation during semester	Through activities during the semester a student can achieve 30-60 points score. Student who achieve more than 15 and less than 30 points score is allowed to write additional test. If student achieve minimum of 30 points score or more, student is allowed to take final exam. Student who achieve less than 15 mark points during semester in the next year must enrol the subject again.
Knowledge evaluation after semester	Final exam, by which student can achieve 40 points score, is obligatory for all subjects. For a positive final exam evaluation it is required 20 points score (50%). The final subject mark contains points achieved during the semester and on final exam as a percentage of acquired knowledge and skills as follows: 90 - 100 - A 80 - 89.9 - B 65 - 79.9 - C 60 - 649 - D 50 - 59.9 - E
Student activities:	Aktivnost (Classes attendance) — ECTS 6
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.
ISVU equivalents:	146734;

Proposal made by	dr.sc. Mladen Petričec, prof. v. šk.

Code WEB/ISVU	23290/146732	**ECTS**	6.0	**Academic year**	2018/2019
Name	Water Treatement				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+8+0+12) 120
Teachers	Lectures:1. Stjepan Kordek dipl.ing.građ. Auditory exercises: Stjepan Kordek dipl.ing.građ. Laboratory exercises: Stjepan Kordek dipl.ing.građ. Construction exercises: Stjepan Kordek dipl.ing.građ.				
Course objectives	Students will be able to recognize importance of preserving sanitary quality of drinking water, and will also be able to understand and independently solve problems related to the water conditioning process				
Learning outcomes:	1.evaluate basic problems relating to conditioning of drinking water. Level:7 2.define differences between individual technological procedures for water conditioning. Level:7 3.create basic elements of water conditioning devices, show practical knowledge relating to construction and maintenance of these devices. Level:6,7 4.select technological procedure for specific cases of pollution to drinking water. Level:7 5.manage water conditioning procedures on existing buildings/structures. Level:6,7 6.define quantity of chemicals that are used in individual drinking water conditioning phases. Level:7 7.propose necessary remedial works and interventions on existing water conditioning facilities. Level:6,7				
Methods of carrying out lectures	Other Integration and expansion on acquired knowledge in the fields of water use, water protection and hydraulic structures for the purpose of gaining insight into the process of drinking water provision. Lectures are performed with aid of modern education tools and graphic presentations.A planned visit to a water conditioning plant (Zagreb, c, Virovitica, etc.).				
Methods of carrying out auditory exercises	Group problem solving Other Solving tasks from areas explained in lectures				
Methods of carrying out laboratory exercises	Other Visiting a laboratory which performs water analyses and learning about the process of determination of water quality				
How construction exercises are held	Other Writing of seminar work on the given topic				
Course content lectures	1.Water quality according to Croatian and EU regulations, 2h 2..Natural water systems, surface waters and groundwater, 2h 3.Raw water, drinking water, water for industry (technological, cooling, operational, etc.), water for irrigation, 2h 4.Changes in water quality, water pollution, water contamination, aquatic communities and changes, eutrophication of water, 2h 5.Drinking water - transfer of pathogenic microorganisms via water, 2h 6.Water analysis and water quality assessment, 2h 7.Water analysis and water quality assessment, 2h 8.I. preliminary exam, 2h 9.Water quality improvement, 2h 10.Water quality improvement, 2h 11.Water quality improvement, 2h 12.Water purification facilities, 2h 13.Water purification facilities, 2h 14.Water purification facilities, 2h 15.II. preliminary exam, 2h				
Course content auditory	1.Technological procedures of water conditioning, 2h 2.Technological procedures of water conditioning, 2h 3..Examples of sizing of water conditioning facilities and plants, 2h 4..Examples of sizing of water conditioning facilities and plants, 2h 5..Examples of sizing of water conditioning facilities and plants, 2h 6..No lectures, 2h 7..No lectures, 2h 8..No lectures, 2h 9..No lectures, 2h 10..No lectures, 2h 11..No lectures, 2h 12..No lectures, 2h 13..No lectures, 2h 14..No lectures, 2h 15..No lectures, 2h				
Course content laboratory	1..No lectures, 2h 2..No lectures, 2h 3..No lectures, 2h 4..No lectures, 2h 5..No lectures, 2h				

	6..Learning about the process of sampling and water analysis, 2h 7..Learning about the process of sampling and water analysis, 2h 8..Learning about the process of sampling and water analysis, 2h 9..Learning about the process of sampling and water analysis, 2h 10..No lectures, 2h 11..No lectures, 2h 12..No lectures, 2h 13..No lectures, 2h 14..No lectures, 2h 15..No lectures, 2h
Course content constructures	1.No lectures, 2h 2.No lectures, 2h 3.No lectures, 2h 4.No lectures, 2h 5.No lectures, 2h 6.No lectures, 2h 7.No lectures, 2h 8.No lectures, 2h 9.No lectures, 2h 10.Writing of seminar work on the given topic, 2h 11.Writing of seminar work on the given topic, 2h 12.Writing of seminar work on the given topic, 2h 13.Writing of seminar work on the given topic, 2h 14.Writing of seminar work on the given topic, 2h 15.Writing of seminar work on the given topic, 2h
Required materials	Basic: classroom, blackboard, chalk... Special purpose computer laboratory Whiteboard with markers Overhead projector Video equipment
Exam literature	Gulić I: Kondicioniranje vode, HSGI, Zagreb, 2003 Valić i sur; Zdravstvena ekologija, Medicinska naklada, Zagreb, 2001
Students obligations	Redovito pohae nastave i najmanje 25% bodova iz kolokvija
Knowledge evaluation during semester	Redovito pohae nastave i najmanje 55% bodova iz kolokvija
Knowledge evaluation after semester	Ispit se sastoji iz pismenog i usmenog dijela. Uvjet za pristup usmenom dijelu ispita je najmanje 50% uspjeha na pismenom.
Student activities:	Aktivnost — ECTS (Project) — 1 (Seminar Work) — 1 (Oral exam) — 2 (Constantly tested knowledge) — 1 (Written exam) — 1
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.

Code WEB/ISVU	23293/146739	**ECTS**	6.0	**Academic year**	2018/2019
Name	Wooden Engineering Structures				
Status	3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Redovni specijalisti graditeljstva) - elective course3rd semester - Polytechnic graduate professional study programme specialization in Civil Engineering (NOVI Izvanredni specijalisti graditeljstva) - elective course				
Teaching mode	Lectures + exercises (auditory + laboratory + seminar + metodology + construction) work at home				30+30 (10+0+0+20) 120
Teachers	Lectures:1. prof.vis.šk. Boris Baljkas Lectures:2. doc. dr. sc. Dean Čizmar dipl. ing. građ. Auditory exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Auditory exercises: Ivan Volarić struč.spec.ing.aedif. Construction exercises:doc. dr. sc. Dean Čizmar dipl. ing. građ. Construction exercises: Ivan Volarić struč.spec.ing.aedif.				
Course objectives	Students will acquire knowledge needed for the design, analysis and realization of timber structures.				
Learning outcomes:	1.integrate knowledge gained in this course with the knowledge from mathematics, geotechnics, and structural analysis. Level:6,7 2.propose to client the facts that have to be adopted in order to select economically most favourable shape and system of the timber structure. Level:6,7 3.select the most favourable shape and static system for planar or spatial timber structures. Level:7 4.make analysis of all actions and combinations of actions acting on the structure. Level:6,7 5.propose and prove choice of all dimensions of a selected structure. Level:6,7 6.calculate mechanical resistance and usability of timber structures. Level:6,7 7.prepare detailed design and working design of planar, complex, and spatial timber structures. Level:6,7				
Methods of carrying out lectures	Ex cathedra teaching				
Methods of carrying out auditory exercises	Computer simulations				
How construction exercises are held	Computer simulations Interactive problem solving Main and execution project				
Course content lectures	1.Structural reliability concept, 2h, Learning outcomes:1 2. Wood as structural material, 4h, Learning outcomes:1,2 3. Durability of timber structures and fire protection, 4h, Learning outcomes:1,2 4. Materials for wooden structures and quality control, 2h, Learning outcomes:2 5.Ultimate limit states, 2h, Learning outcomes:1,4 6.Structural properties of elements and connections, 2h, Learning outcomes:1,5,6 7.Connections in timber structures, 4h, Learning outcomes:1,5,6 8.Assembled elements, 2h, Learning outcomes:5,6 9.Timber-concrete composite girders, 2h, Learning outcomes:4,5,6 10. Frame and arch systems, 4h, Learning outcomes:3,4,5,6 11.Spatial concepts: hyperbolic paraboloids, lattice structures, 2h, Learning outcomes:3,4,5,6 12.- 13.- 14.- 15.-				
Course content auditory	1.Introduction about project. Description of a project, structural system of special shape laminated girders and guidelines. , 2h, Learning outcomes:1,3 2.Load models and design according to Eurocode 5. Calculation and design of secodary element., 2h, Learning outcomes:3,4 3.Design of main structure according to EC5. Spatial stability of main structure., 2h, Learning outcomes:3,4 4.Numerical (spatial) model of main structure. Spatial stability, , 2h, Learning outcomes:5,6 5.Numerical examples - design of main structure. , 2h, Learning outcomes:5,6 6.Details in laminated structures. Design of details. Execution details., 2h, Learning outcomes:7 7.Details of timber bridges, Example of details calculation,, 2h, Learning outcomes:7 8.- 9.- 10.- 11.- 12.- 13.- 14.- 15.-				
Course content constructures	1.Layout of a structure., 2h, Learning outcomes:1,3 2.Design of secondary structure., 2h, Learning outcomes:4,5,6 3.Numerical (spatial) model of main structure., 2h, Learning outcomes:3,4 4.Design of main structure., 2h, Learning outcomes:4,5,6 5.Details in laminated structures. , 2h, Learning outcomes:7 6.Prezentation of students work and projects. , 6h, Learning outcomes:1,2,3,4,5,6,7 7.- 8.- 9.- 10.- 11.-				

	12.- 13.- 14.- 15.-
Required materials	Whiteboard with markers Overhead projector Video equipment
Exam literature	Basic literature: 1. A. Bjelanović; Vlatka Rajčić : DRVENE KONSTRUKCIJE PREMA EUROPSKIM NORMAMA, Građevinski fakultet Sveučilišta u Zagrebu, 2007. 2. Z. Žagar: DRVENE KONSTRUKCIJE I i II, Pretei, d.o.o. Zagreb 3. S. Takač: NOVI KONCEPT SIGURNOSTI DRVENIH KONSTRUKCIJA, Građevinski fakultet , J.J. Strossmayer, Osijek, 1997 Additional literature: 1. Timber Construction Manual - 6th Edition, American Institute of Timber Construction (AITC), 2012. 2.Handbook 1 - Timber structures, TEMTIS, 2008. 3. Handbook 2 - Design of timber structures according to EC5, TEMTIS, 2008. 4. G. Steck: 100 HOLZBAUBEISPILE, Werner Verlag 2007. 5. G. Werner, K. Zimmer: Holzbau 1. Springer Verlag Berlin, Haidelberg 1999. 6. G. Werner, K. Zimmer: Holzbau 2. Springer Verlag Berlin, Haidelberg 1999.
Students obligations	Maximum of 3 absences from exercises
Knowledge evaluation during semester	Design project. Oral test.
Knowledge evaluation after semester	Written exam. Oral exam.
Student activities:	Aktivnost — ECTS (Written exam) — 6
Remark	This course can be used for final thesis theme
Prerequisites:	No prerequisites.