UNIVERZITET U SARAJEVU

FAKULTET ZA SAOBRAĆAJ I KOMUNIKACIJE

STUDIJSKI PROGRAM
ŽELJEZNIČKI SAOBRAĆAJ
II CIKLUS STUDIJA
NA UNIVERZITETU U SARAJEVU – FAKULTETU ZA SAOBRAĆAJ I KOMUNIKACIJE

Nastavni plan

Popis obaveznih i predviđenih izbornih predmeta sa šiframa, brojem ECTS bodova i brojem kontakt sati nastave potrebnih za njihovu izvedbu (vježbe, predavanja, praksa, seminar, terenski rad, laboratorijske vježbe isl.);

NASTAVNI PLAN ZA ODSJEK: SAOBRAĆAJ, USMJERENJE: ŽELJEZNIČKI SAOBRAĆAJ

NASTAVNI PLAN ZA ODSJEK: SAOBRAĆAJ, USMJERENJE: ŽELJEZNIČKI SAOBRAĆAJ

R.b.	Šifra predmeta	Naziv predmeta	Status	I sem.				II sem.				III sem.				IV sem.
				P	V	L	ECTS	P	V	L	ECTS	P	V	L	ECTS	Izrada rada (ECTS)
1.	01ATCOS020101	Menadžment u transportu i komunikacijama	obavezni	3	2	1	6									
2.	02TRWOS020101	Održivi razvoj i okolišni inžinjering	obavezni	3	2	1	6									
3.	03TRWOS020101	Logistika i inteligentni transportni sistemi	obavezni	3	2	1	6									
4.	04TRWOS020101	Planiranje saobraćajno transportnih sistema u željezničkom saobraćaju	obavezni	3	2	1	6									
5.	05TRWOS020101	Modeliranje u željezničkom saobraćaju	obavezni	3	2	1	6									
6.	06TRWOS020102	Intermodalni transport	obavezni					3	2	1	6					
7.	07TRWOS020102	Informacione tehnologije i špediterskо poslovanje	obavezni					3	2	1	6					
8.	08TRWOS020102	Tehnologija i organizacija rada željezničkih stanica i čvorova	obavezni					3	2	1	6					
9.			izborni					3	2	1	6					
10.			izborni					3	2	1	6					
11.	11TRWOS020203	Upravljanje projektima i investicijama u saobraćaju i komunikacijama	obavezni									3	2	1	6	
12.	12TRWOS020203	Upravljanje rizicima u željezničkom saobraćaju	obavezni									3	2	1	6	

13.			izborni			3	2	1	6	
14.			izborni			3	2	1	6	
15.			izborni			3	2	1	6	
16.	16TRWOS020204	Završni master rad	obavezni							30
Broj potrebnih kredita				**30**	**30**	**30**				**30**

Izborni predmeti: usmjerenje: željeznički saobraćaj

Šifra predmeta	**Naziv predmeta**	**Broj sati**			**ECTS**	**Semestar**
		P	**V**	**L/PR**		
09-10-1TRWES020102	Tehnički elementi sigurnosti željezničkog sistema	3	2	1	6	**II**
09-10-2TRWES020102	Redovi vožnje i propusna moć željezničkih pruga	3	2	1	6	**II**
09-10-3TRWES020102	Standardizacija u željezničkom saobraćaju	3	2	1	6	**II**
09-10-4TRWES020102	Signalni sistemi i kontrola željezničkog saobraćaja	3	2	1	6	**II**
09-10-5TRWES020102	Sigurnost električnih vozila	3	2	1	6	**II**
09-10-6TRWES020102	Sigurnosni rizici u transportu opasnih materija	3	2	1	6	**II**
13-14-15-1TRWES020203	Metode vrednovanja i odlučivanja u saobraćajnom projektovanju	3	2	1	6	**III**
13-14-15-2TRWES020203	Tehnološke analize željezničkog saobraćaja	3	2	1	6	**III**
13-14-15-3TRWES020203	Šinski sistemi u javnom gradskom prevozu	3	2	1	6	**III**
13-14-15-4TRWES020203	Metodologija istraživačkog i naučnog rada	3	2	1	6	**III**
13-14-15-5TRWES020203	Saobraćajna politika	3	2	1	6	**III**
13-14-15-6TRWES020203	Geoinformacijski sistemi	3	2	1	6	**III**
13-14-15-7TRWES020203	E logistika i ev infrastruktura	3	2	1	6	**III**
13-14-15-8TRWES020203	Obuka i oprema za transport opasnih materija	3	2	1	6	**III**
13-14-15-9TRWES020203	Logistika opasnih materija	3	2	1	6	**III**

Opis silabusa na studijskom programu Željeznički saobraćaj na b/h/s jeziku

Šifra predmeta: 01ATCOS020101	**Naziv predmeta:** **MENADŽMENT U TRANSPORTU I KOMUNIKACIJAMA**		
Ciklus: II	**Godina: I**	**Semestar: I**	**Broj ECTS kredita: 6**
Status: Obavezni predmet		**Ukupan broj sati: 90** Razrada distribucije sati po tipu: Predavanja: 45 Vježbe: 45 Seminar: Terenski rad:- Laboratorijske vježbe: - Praksa:-	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Cilj predmeta je upoznavanje sa djelovanjem saobraćajnog sistema u tržišnim uvjetima i međunarodnim standardima, kako bi se obezbjedilo efektivno i efikasno poslovanje. Osposobljavanje studenata u sticanju određenih znanja o standardima i standardizaciji, kao i međuvezama različitih dijelova proizvodnje i ekonomskih procesa na koje utiče tehnička standardizacija.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Osnove menadžmenta. Pojam, proces menadžmenta i međuzavisnost sa organizacijom. Pojam menadžmenta i procesa menadžmenta. Karakteristike savremenog menadžera. Funkcije menadžera. 2. Opće i specifične karakteristike menadžmenta u prometnom sustavu. Problematika organizacije i menadžmenta u prometnom sustavu. Definicije i sadržaj menadžmenta. Menadžment i poduzetništvo u transportnim i telekomunikacijskim preduzećima. 3. Opće i specifične karakteristike menadžmenta u prometnom sustavu. Menadžerski poslovi u upravama, zavodima i agencijama. Razvitak logističkog menadžmenta. Odnosi prometne politike i menadžmenta. Razvoj prometnog sustava i prostorno-gospodarsko strukturiranje. 4. Menadžerski koncepti poboljšanja i/ili inoviranje poslovnih procesa. Procesno-orjentirani menadžment. Inoviranje i/ili reinženjering poslovih procesa. 5. Planiranje kao funkcija i aktivnost menadžmenta. Planiranje u prometnom preduzeću. Politike i strategije prometnog preduzeća. Procesni pristup strategijskom planiranju. 6. Planiranje kao funkcija i aktivnost menadžmenta. Strategijska analiza konkurentske strukture prometne grane. Metode scenarija u izboru efektivne strategije preduzeća. 7. Organizacijska struktura i procesi organizacije.Pojam i šira shvatanja organizacije. Organizacijska struktura.		

	8. Organizacijska struktura i procesi organizacije.Uređivanje odnosa u organizaciji. 9. Organizacijska struktura i procesi organizacije.Procesna i na znanju utemeljena organizacija. Primjeri organizacijske strukture nekih transportnih i telekomunikacijskih poduzeća. 10. Vođenje poslova i motiviranje.Vođenje poslova i vodstvo. 11. Vođenje poslova i motiviranje.Utjecaji na ponašanje ljudi i motivacija. 12. Upravljanje ljudskim resursima.Upravljanje ljudskim resursima kao funkcija menadžmenta 13. Upravljanje ljudskim resursima.Aktivnosti u procesu upravljanja ljudskim resursima. Osobni razvitak menadžera. 14. Menadžerska kontrola i upravljanje kvalitetom. Osnove savremene standardizacije. Metode preuzimanja i označavanja standarda, stepeni usklađenosti i terminologija u vezi sa preuzimanjem standarda.Infrastruktura kvaliteta. 15. Menadžerska kontrola i upravljanje kvalitetom.Standardi sistema upravljanja (MSS - Management Systems Standards). Integrisani sistemi upravljanja (IMS - Integrated Management Systems).
Ishodi učenja:	Znanje: Stečena znanja koristit će se za prepozanavanje glavnih tehnoloških procesa, kao i modela upravljanja specifičnih za saobraćajne sisteme. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti menadžmenta u prometu. Kompetencije: Sistemski pristup u razumjevanju standardizacije, ovladavanje savremenom poslovnom terminologijom, kao i predočeni praktični primjeri iz područja saobraćaja i komunikacija, pomoći će studentima u njihovom uključivanju u tehničke i druge aktivnosti po završetku studija i zapošljavanju.
Ciljevi održivog razvoja (SDGs)	SDG4 – Kvalitetno obrazovanje SDG8 – Dostojanstven rad i ekonomski rast SDG9 – Industrija, inovacije i infrastruktura SDG11 – Održivi gradovi i zajednice SDG12 – Održiva potrošnja i prozvodnja SDG16 – Mir, pravda i snažne institucije
Metode izvođenja nastave:	Metoda usmenog izlaganja, metoda razgovora, metoda demonstracije, metoda rada u skupini.
Metode provjere znanja sa strukturom ocjene:	Ocjena kreativnosti na nastavi i vježbama uz izradu samostalnih radova, ocjena parcijalnog testa u toku nastave kao i ocjena završnog ispita. Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: – Domaća zadaća/seminarski rad/praktični rad/ 15 bodova (%), položeno ako se osvoji najmanje 55 %. – I Parcijalni ispit/test/provjera znanja/35 bodova (%), položen je ako se osvoji najmanje 55 %. – Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji najmanje 55 %. – Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji najmanje 55 %.

	Završni ispit se organizuje kao pismeni/usmeni. Student na završnom ispitu može da polaže gradivo koje nije polagao i/ili uspješno okončao tokom trajanja semestra. Potreban uslov za uspješno okončan ispit je postignut rezultat od najmanje 55% bodova od maksimalnog broja bodova na parcijalnom i završnom dijelu ispita, a dovoljan uslov je da suma ostvarenih bodova (kroz: domaću zadaću, prisustvo, parcijalni i završni ispit) bude 55. Zadaća se organizuje kroz pisanje domaće zadaće i projekata. Zadaća nema mogućnost popravljanja. Za studente koji nisu uspješno okončali parcijalni ispit, završni ispit se sastoji iz cjelokupnog pređenog gradiva u toku nastave. Popravni ispit se organizuje kao i završni ispit. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 (A) - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 (B) - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, manje od 55 bodova. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza i polaganjem parcijalnog i završnog ispita, a prema kvalitetu stečenih znanja i vještina, i sadrži maksimalno 100 bodova, te se utvrđuje prema sljedećoj skali: Obaveze studenta Bodovi (%) Prisutnost na predavanjima i vježbama... - Zadaća/Seminarski/Praksa/.....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni) .....50 bodova (%) Završni ispit (Integralni) .....85 bodova (%)
Literatura (obavezna):	1. Vujadin B. Vešović, „MENADŽMENT U SAOBRAĆAJU“, Univerzitet u Beogradu, Saobraćajni fakultet, 1997. 2. Šefkija Čekić, Ivan Bošnjak, „MENADŽMENT U TRANSPORTU I KOMUNIKACIJAMA“, Fakultet za saobraćaj i komunikacije UNSA, Fakultet prometnih znanosti UNIZG, Sarajevo, Zagreb, 2000.

Literatura (dodatna):	1. Alija Behmen, Sabira Salihović: MATERIJALI I ROBE U TRANSPORTU - Knjiga I, klasifikacija, standardizacija, identifikacija, Fakultet za saobraćaj i komunikacije Sarajevo i DES-Sarajevo, Sarajevo, 2007. 2. Alija Behmen, Sabira Salihović: MATERIJALI I ROBE U TRANSPORTU - Knjiga II, kvalitet: osnove, principi, kontrola, Fakultet za saobraćaj i komunikacije Sarajevo i DES-Sarajevo, Sarajevo, 2008. 3. Međunarodni/regionalni/nacionalni standardi

Šifra predmeta: 02TRWOS020101	**Naziv predmeta: ODRŽIVI RAZVOJ I OKOLIŠNI INŽINJERING**		
Ciklus: II	**Godina: I**	**Semestar: I**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj sati: 90** Razraditi distribuciju sati po tipu: Predavanja: 30, Vježbe: 20, Seminar: 10, Laboratorijske vježbe: 10, Praksa: 10, Terenski rad: 10.	
Učesnici u nastavi	Predmetni nastavnik: Red. Prof. dr. Osman Lindov, dipl.inž.saob.		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje edukacijskih oblika u realizaciji programa iz elemenata održivog razvoja i okolišnog inžinjeringa, te praktične analize, elaborati i projekti iz oblasti održivog razvoja i okolišnog inžinjeringa.		
Tematske jedinice:	1. Uvod – osnove održivog razvoja i ekološkog inženjeringa 2. Zakonski okvir iz oblasti održivog razvoja i okolišnog inženjeringa 3. Zagađenje zraka od saobraćaja - monitoring kvalitete zraka 4. Metode detekcije zagađivača 5. CORINAIR/ COPERT 6. Elementi i način izrade karata buke 7. Elementi izrade studija uticaja na okoliš 8. Javni gradski prijevoz putnika, mobilnost i održivi razvoj 9. Energetska efikasnost, eko test i eko vožnja 10. NEAP, KEAP, LEAP, saobraćaj i transport 11. SEAP, saobraćaj i transport 12. SUMP - saobraćaj i transport 13. SECAP - saobraćaj i transport 14. Nisko karbonski transport i transport nulte emisije 15. Primjeri terenskih istraživanja iz oblasti održivog razvoja i okolišnog inženjeringa		
Ishodi učenja:	Znanje: Teorijska i praktična znanja iz oblasti uticaja održivog razvoja i okolišnog inžinjeringa. Osnovni propisi, pravila, metode i postupci u oblasti procjene i analize stanja održivog razvoja. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti održivog razvoja i okolišnog inžinjeringa u funkciji očuvanja i zaštite privrednog i drugog		

	razvoja društva sa jedne strane, odnosno unaprijeđenja i razvoja održivog transporta sa druge strane. Kompetencije: Sposobnosti samostalnog razumijevanja i korištenja propisa, korištenja stručne literature, primjene metoda i postupaka, mjerenja i istraživanja, izrada analiza, procjena i praktičnih rješenja, preventivnog djelovanja, te postupaka neophodnih za adekvatnu analizu, procjenu i upravljanje oblasti održivog razvoja i okolišnog inžinjeringa.
Ciljevi održivog razvoja (COR):	COR4 – Kvalitetno obrazovanje - Osigurati uključivo i kvalitetno obrazovanje, te promovirati mogućnosti cjeloživotnog učenja svih ljudi, svih životnih dobi COR5-Rodna ravnopravnost - Postići rodnu ravnopravnost i osnažiti sve žene i djevojčice. COR8-Dostojanstven rad i ekonomski rast - Promovirati uključiv i održiv ekonomski rast, zaposlenost i dostojanstven rad za sve. COR9- Industrija, Inovacije i Infrastruktura -Izgraditi izdržljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost. COR11 – Održivi gradovi i lokalne zajednice - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim. COR12-Održiva potrošnja i proizvodnja - Osigurati održive oblike potrošnje i proizvodnje. COR13-Zaštita klime - Poduzeti hitne akcije u borbi protiv klimatskih promjena i njihovih posljedica COR17- Partnerstvom do ciljeva- Uvrstiti globalno partnerstvo za održivi razvoj
Metode izvođenja nastave:	Usmeno iznošenje sa prezentacijom i prikazom različitih analiza, studija, modela i metoda u oblasti okolišnog inžinjeringa uz korištenje video i audio zapisa, softvera, mjerne opreme, te samostalno izlaganje pojedinih konkretnih istraživanja. Iniciranje rasprava i diskusija o problemima iz prakse, pojedinačnih zapažanja iz različitih okruženja, izrada samostalnih analiza, istraživanja, mjerenja i modeliranja u oblasti okolišnog inžinjeringa i održivog razvoja.
Metode provjere znanja sa strukturom ocjene:	Ocjena kreativnosti na nastavi i vježbama uz izradu samostalnih radova, ocjena parcijalnog testa u toku nastave kao i ocjena završnog ispita. Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: – Seminar 15 bodova (%), položeno ako se osvoji preko 50 %. – I Parcijalni ispit/test/provjera znanja/35 bodova (%), položen je ako se osvoji preko 50 %. – Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji preko 50 %. – Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji preko 50 %. Ukupan broj bodova (%) koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova (%), što sa Završnim (II parcijalnim) čini 100 bodova (%). Za studente koji nisu položili I Parcijalni ispit, Završni ispit (Integralni) se organizuje iz cjelokupnog pređenog gradiva u toku nastave i vježbi, i vrednuje se sa 85 bodova (%), što sa seminarskim radom/praktičnim radom čini 100 bodova (%). Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 (A) - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 (B) - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 (F, FX) - ne zadovoljava minimalne

<table>
<tr><td></td><td>uslove, manje od 55 bodova.

Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza i polaganjem parcijalnog i završnog ispita, a prema kvalitetu stečenih znanja i vještina, i sadrži maksimalno 100 bodova, te se utvrđuje prema sljedećoj skali:
<table>
<tr><td>Obaveze studenta</td><td>Bodovi (%)</td></tr>
<tr><td>Prisutnost na predavanjima i vježbama. (obavezno je prisustvu svim oblicima nastave min. 80 % i ovo je uslov za ovjeru/potpis urednog pohađanja)</td><td>0 bodova</td></tr>
<tr><td>Seminar</td><td>15 bodova (%)</td></tr>
<tr><td>I Parcijalni ispit/Test/Provjera znanja/</td><td>35 bodova (%)</td></tr>
<tr><td>Završni ispit (II Parcijalni)</td><td>50 bodova (%)</td></tr>
<tr><td>Završni ispit (Integralni)</td><td>85 bodova (%)</td></tr>
</table></td></tr>
<tr><td>Literatura:</td><td>Obavezna
1. Lindov, O.: Transport i okoliš, univerzitetski udžbenik Fakultet za saobraćaj i komunikacije Sarajevo, 2011.
2. Lindov, O.: Uticaj cestovnih vozila i cestovne infrastrukture na ekološke parametre. Međunarodni naučni skup “Ekološki problemi savremenog saobraćaja”, Sarajevo, 2003.
3. Lindov, O., Omerhodžić A.: Održivi razvoj i okolišni inžinjering. Skripta vježbi i testova, Fakultet za saobraćaj i komunikacije, Sarajevo, 2020.
Dopunska:
1. EC (EvropeanCommission), Directorate General Transport, 1996, Transport Research APAS Road Transport: Assessment of road transport models and systems architectures, VII-31,. ECSCEEC- EAEC, Brussels – Luxembourg.
2. EC (Evropean Commission), Directorate General Transport, 1996, Transport RTD Programme, Summary of Projects resulting from the First Call for Proposals, p.29.
3. Prascevic M.R., Cvetkovic D.S., Stojanovic V.O., (1997), “Mathematical models for describing road traffic noise », Proceedings Inter-Noise 97, Budapest.
4. Pronello C., Iannelli F., 2002. Modelli di previsione del rumore da trafficoincontesti operativi e territorialidifferenti, inCollanaTrasporti, Editore Franco Angeli
5. Pronello C., André M., Pollutant emissions estimation in road transport models, Report INRETSLTE n° 2007, March 2000, BRON Cedex – France, 113 pp.
6. Pronello C., André M., Estimation tool of traffic pollutant emissions in function of macroscopic driving Promjenljive, Report INRETS-LTE, n° 2006, March 2000, BRON Cedex – France, 91 pp.</td></tr>
</table>

Šifra predmeta: 03TRWOS020101	**Naziv predmeta:** **LOGISTIKA I INTELIGENTNI TRANSPORTNI SISTEMI**		
Ciklus: II	**Godina: I**	**Semestar: I**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja 45	

	Vježbe 30 Seminar 15
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**
Preduslov za upis:	nema
Cilj (ciljevi) predmeta:	Cilj predmeta je usvajanje znanja iz područja primjene inteligentnih transportnih sustava u logističke sustave čime se omogućava digitalizacija logističkih procesa.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Osnovne pretpostavke za razvoj i koncept pametne lgistike 2. Tehnološke faze razvoja logistike 3. Digitalna transformacija logistike 4. Organizacija, planiranje i upravljanje u inteligentnim logističkim sustavima 5. Inteligentni teret i transportna oprema 6. Redizajniranje transportnih i logističkih procesa sustavima ITS-a 7. Pametna skladišta u logistici 8. Napredn ethnologije u logistici 9. Tehnologija proširene stvarnosti u logistici 10. Tehnologija Blockchain u logistici 11. Logistički softverski sustavi 12. Logističke platforme 13. Gradska logistika i ITS 14. Tehnologije umjetne inteligencije i automatske identifikacije u inteligentnoj logistici 15. Budući izazovi digitalne transformacije logistike
Ishodi učenja:	Znanje: Predmet Inteligentni transportni sustavi i logistika treba osigurati potreban nivo znanja o tehnologijama, funkcijama i učnicima ITS-a u logističkim sustavima koja će omogućiti planiranje razvoj i implementaciju intelihgentnih logističkih sustava i provođenje procesa digitalizacije u logističkim sustavima. Vještine: Predmet inteligentni transportni sistemi i logistika omogućava stjecanje vještina neophodnih za mjerenje, analizu i procjenu učinkovitosti, sigurnosti, utjecaja na okoliš i ekonomskih koristi od implementacije ITS-a u logističke sustave. Kompetencije: Studenti kroz nastavni proces predavanja, vježbe, i seminarski rad trebaju steći odgovarajuće kompetencije za dizajniranje, razvoj i upravljanje logističkim procesima primjenom inteligentnih transportnih sustava.
Cilj održivog razvoja (SDG):	"SDG3 – Zdravlje i blagostanje"; "SDG 9 Industrija, inovacije i infrastruktura ", „SDG11- Održivi gradovi i zajednce", SDG 12 Održiva potrošnja i proizvodnja, SDG 13-Zaštita klime"
Metode izvođenja nastave:	Predavanja, vježbe i seminarski rad.
Metode provjere znanja sa strukturom ocjene:	1. Prisustvo na na nastavi i semiraski rad 15 bodova 2. Prva provjera znanja 35 bodova 3. Završna provjera znanja 50 bodova
Literatura:	Obavezna: 1. Nastavni materijal dostupan na online platformi za učenje Fakulteta za saobraćaj i komunikacije

	Dopunska: 1. Mac Sullivan, Johannes Kern: The Digital Transformation of Logistics, IEEE Press, New Jersey,2021 2. Rosanna Fornasiero:Next Generation Supply Chains, Springer, Cham, 2021. 3. Albert Tan, Sameer Shukkla : Title: Digital transformation of the supply chain : a practical guide for executives, World Scientific Publishing, London,2021. 4. John M. Longshore and Angela L.: Managing Logistics Systems, Routledge, New York, 2022. 5. Anthony M. Pagano, Matthew Liotine: Technology in Supply Chain Management and Logistics, elsevier, Amsterdam, 2020,

Šifra predmeta: 04TRWOS020101	**Naziv predmeta: PLANIRANJE SAOBRAĆAJNO TRANSPORTNIH SISTEMA U ŽELJEZNIČKOM SAOBRAĆAJU**		
Ciklus: II	**Godina: I**	**Semestar: I**	**Broj ECTS kredita:** 6
Status: obavezan predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 45 Vježbe:30 Seminarski i projektni zadatak:15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Cilj predmeta je osposobiti studente za razumijevanje i primjenu osnovnih principa planiranja i projektovanja saobraćajno prevoznih sistema. Kroz nastavu, studenti će steći znanja o analizi potražnje i ponude u saobraćaju, identifikaciji tokova putnika i roba, korištenju novih tehnologija u planiranju i projektovanju sistema u gradskom saobraćaju.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod u planiranje i projektovanje saobraćajno prevoznih sistema 2. Saobraćajni i prevozni sistemi 3. Elementi i obilježja kao osnova za planiranje i projektovanje saobraćajno prevoznih sistema 4. Tokovi putnika i roba u mreži saobraćajnica i terminalima 5. Definiranje željezničke potražnje. Istraživanje potražnje i ponude u saobraćaju i prevozu 6. Analiza stanja u saobraćaju i prevozu 7. Metode planiranja potražnje i ponude usluga u saobraćaju i prevozu 8. Nove tehnologije u planiranju potražnje i ponude u saobraćaju i prevozu		

	9. Planiranje i projektovanje sistema u gradskom saobraćaju i prevozu 10. Projektno planiranje u saobraćaju i prevozu 11. Modeli prognoziranja željezničke potražnje 12. Modeli ekstrapolacije trenda i faktora rasta 13. Regresioni model prognoziranja željezničke potražnje 14. Gravitacioni model prognoziranja željezničke potražnje 15. Četvorostepeni model u prognoziranju željezničke potražnje
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i vještine vezano za planiranje sistema u saobraćaju i prevozu roba i putnika. Vještine: Izučavanje i praktična primjena, treba da osigura potreban nivo znanja studentima da mogu uspješno planirati i projektovati saobraćajne i prevozne sistema Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 9: Industrija, inovacije i infrastruktura - Izgraditi otpornu infrastrukturu, promovirati uključivu i održivu industrializaciju i poticati inovacije, SDG 11: Održivi gradovi i zajednice - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim, SDG 13: Zaštita klime - Hitno djelovati na ublažavanju klimatskih promjena i njihovih posljedica
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni / popravni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):..... 50 bodova (%)

	Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 8 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati i prisustvo na nastavi je uslov za ovjeru urednog pohađanja nastave. Student može, u opravdanim slučajevima (bolest) odsustvovati sa nastave, za što je obavezan dostaviti zdrastveno opravdanje. Seminarski rad i domaća zadaća će biti bodovane samo ako budu predane prema definisanim terminima. Naknadne predaje istih neće se bodovati. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Pađen, J.: Osnove prometnog planiranja, Zagreb, 1986. 2. Pađen, J.: Metode prostorno-prometnog planiranja, Ekonomski institut, Zagreb, 1978. 3. Jovanović, N.: Planiranje saobraćaja, Saobraćajni fakultet, Beograd, 1990. 4. Jović, J.: Planiranje saobraćaja u gradovima- praktikum, Saobraćajni fakultet, Beograd, 1996. 5. Kiso, Fahrudin.: Planiranje saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 1994.g. 6. Mehanović, M: Planiranje usluga u gradskom prometu putnika, Fakultet za saobraćaj i komunikacije, Sarajevo, 2011.g.

	7. Mehanović, M: Mreže u saobraćaju, prevozu i komunikacijama, Fakultet za saobraćaj i komunikacije, Sarajevo, 2015.g. 8. Mehanović, M: Javni gradski saobraćaj – primjeri iz teroije i prakse; Fakultet za saobraćaj i komunikacije, Sarajevo, 2005.g. 9. Bublin, M., Prostorno planiranje i zaštita okoline, Univerzitetska knjiga Sarajevo, 2010. Dopunska: 1. Meyer, M.D.; Miler, E.J.: Urban Transportation Planning, McGraw-Hill, 1984. 2. Steierwald, G.; Kűnne, H.D.: Stadtverkehrs-planung, Stuttgart, 1993.g. 3. HCM2000; Capacity Manual, Special Report 209, 4. Transportation Research Board, Washington D.C., 1994.

Šifra predmeta: 05TRWOS020101	**Naziv predmeta: MODELIRANJE U ŽELJEZNIČKOM SAOBRAĆAJU**		
Ciklus: II	**Godina: I**	**Semestar: I**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 45 Vježbe: 30 Seminarski i projektni zadatak: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Osnovni cilj predmeta je da studente osposobi za primjenu i izradu različitih analitičkih i simulacionih modela u željezničkom saobraćaju u funkciji optimiziranja organizacije, tehnologije i kapaciteta u željezničkom saobraćaju.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod 2. Teorijske pretpostavke modeliranja saobraćaja 3. Razvoj saobraćajnih i transportnih modela. Detaljnost modela. Neformalan i formalan opis modela. 4. Primjeri modeliranja i simulacija u tehnologiji saobraćaja i transporta 5. Podjela i vrste saobraćajnih modela, razvoj i evaluacija saobraćajnih modela. 6. Elementi i komponente saobraćajnog modeliranja 7. Simulacije u saobraćajnom modeliranju. Prednosti i nedostaci simulacija u saobraćaju i transportu 8. Analitičko modeliranje SMO u željezničkom saobraćaju 9. Simulaciono modeliranje u željezniučkom saobraćaju i transportu		

	10. Modeliranje željezničkih sistema korištenjem linearnog i dinamičkog programiranja 11. Modeli višekriterijumske analize.Primjena višekriterijumske analize u željezničkom sobraćaju 12. Savremene metode za modeliranje u željezničkom saobraćaju 13. Postupci analize i provjere rezultata modeliranja i simulacije realnih problema željezničkog saobraćaja 14. Program za modeliranje i simulacije u željezničkom saobraćaju OpenTrack 15. Program za modeliranje i simulacije u željezničkom saobraćaju RailSys
Ishodi učenja:	Znanje: Studenti će steći znanja o načinima kreiranja modela željezničkih sistema i kriterijima za odabir modela optimizacije u željezničkom saobraćaju; Vještine: Razumijevanje, analiza problema i opis razloga i načina primjene metoda za rješavanje problema organizacije i tehnologije željezničkog saobraćaja; Kompetencije: Korištenje specijaliziranih računarskih programa za modeliranje i ispitivanje željezničkih tehničkih podsistema kao i simulacije željezničkih operacija potrebnih za učenje i temeljito razumijevanje željezničkog sistema u cijelosti.
Cilj održivog razvoja (SDG):	SDG 4: Kvalitetno obrazovanje - Osigurati inkluzivno i kvalitetno obrazovanje, te promovirati mogućnosti cjeloživotnog učenja za sve, SDG 9: Industrija, inovacije i infrastruktura - Izgraditi otporniju infrastrukturu, promovirati inkluzivnu i održivu industrializaciju te poticati inovacije, SDG 13: Klimatske akcije - Hitno djelovati na smanjenju klimatskih promjena i njihovih posljedica, SDG 11: Održivi gradovi i zajednice - Učiniti gradove i naselja inkluzivnim, sigurnim, prilagodljivim i održivim.
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni / popravni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao

	ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):..... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 8 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. ***Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati i prisustvo na nastavi je uslov za ovjeru urednog pohađanja nastave. Student može, u opravdanim slučajevima (bolest) odsustvovati sa nastave, za što je obavezan dostaviti zdrastveno opravdanje.*** ***Seminarski rad i domaća zadaća će biti bodovane samo ako budu predane prema definisanim terminima. Naknadne predaje istih neće se bodovati.*** Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Mirko J. Čičak: Modeliranje u železničkom saobraćaju, Saobraćajni Fakultet i ŽELNID, Beograd, 2003.

	2. Radanović, R. Teorija modeliranja i simulacija, Univerzitet u Novom Sadu, Fakultet tehničkih nauka, Novi Sad, 2005. Dopunska: 1. Algers S., Review of Micro-Simulation Models. Institute for Transport Studies, University of Leeds. 1998. doi: http://www.its.leeds.ac.uk/projects/smartest/Deliv3.PDF 2. Fellendorf M., Vortisch P. Microscopic traffic flow simulator VISSIM (Pog. 2 v: Fundamentals of Traffic Simulation, International Series in Operations Research & Management Science, editor Jaume Barcelo), Vol. 145, pp. 63-93. 2010. 3. Hansen, I. A.; Pachl, J. (eds.): Railway Timetable & Traffic. Analysis - Modelling - Simulation. Eurailpress 2008 Časopisi: – Transportation Research; – Yujor; – Transportation Science; – Operations Research Journal; – Research Record

Šifra predmeta: 06TRWOS020102	**Naziv predmeta: INTERMODALNI TRANSPORT**		
Ciklus: II	**Godina: II**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj sati: 90** Razraditi distribuciju sati po tipu: Predavanja: 45, Vježbe: 45, Seminar: -, Laboratorijske vježbe: 15, Praksa: -, Terenski rad:-.	
Učesnici u nastavi	Predmetni nastavnik: Doc. dr Adnan Omerhodžić		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima upoznavanje sa savremenim transportnim lancima, osnovama tehnološkog projektovanja i racionalizacije transportnih procesa kao i sa savremanim tehnološkim rješenjima koja se nude u okviru pojedinih tehnologija kombinovanog transporta i uz primjenu principa logistike i mogućnosti koje pružaju nove informacione i telekomunikacijske tehnologije.		
Tematske jedinice:	1. Tehnološke promjene; klasični transportni lanac; racionalizacija; savremeni transportni lanac 2. Sistemski pristup analizi transportnog procesa kao složenog tehnološkog sistema 3. Robni tokovi; industrijski transport; tovarne jedinice 4. Paletni sistem transporta, paletni lanac 5. Kontejnerski sistem transporta, tipične tehnologije za realizaciju kontejnerskog transportnog lanca 6. Sistem VOZILO-VOZILO		

	7. Sistem RO-RO transporta, sistem transporta barži riječnog saobraćaja 8. Skladištenje, zalihe, kapacitet skladišta, projektovanje skladišnih sistema 9. Logistika i logistički principi 10. EU transportna politika, evropski koncept intermodalizma 11. Kopneni terminali, ocjena kvaliteta rada terminala, teorija redova 12. Lučki kontejnerski terminali – skladišni platoi u terminalima 13. Komponente logističkih usluga –RTC 14. Elementi savremenog kombinovanog transporta 15. ITS i primjena telematike u savremenom kombinovanom transportu
Ishodi učenja:	Studenti kroz nastavni proces predavanja, vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti savremenih tehnologija robnog transporta. Također predmet omogućava sticanje znanja i vještina neophodnih za adekvatnu analizu, procjenu i upravljanje transportnim tokovima zasnovano na logističkim principima.
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Ocjena aktivnosti i kreativnosti na nastavi i vježbama uz izradu samostalnih radova, ocjena parcijalnog testa u toku nastave kao i ocjena završnog ispita. Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: – Seminarski rad/ zadaća 15 bodova (%), položeno ako se osvoji preko 50 %. – I Parcijalni ispit/test/provjera znanja/ 35 bodova (%), položen je ako se osvoji preko 50 %. – Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji preko 50 %. – Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji preko 50 %. Ukupan broj bodova (%) koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova (%), što sa Završnim (II parcijalnim) čini 100 bodova (%). Za studente koji nisu položili I Parcijalni ispit, Završni ispit (Integralni) se organizuje iz cjelokupnog pređenog gradiva u toku nastave i vježbi, i vrednuje se sa 85 bodova (%), što sa seminarskim radom/praktičnim radom čini 100 bodova (%). Studenti da bi položili ispit, trebaju položiti svaki od navedenih dijelova (svaki dio minimalno 50%) i to: seminarski rad, prvi parcijalni ispit (test) i završni ispit (drugi parcijalni ili integralni). Evaluacija seminarskog rada i prvog parcijalnog ispita (testa) se realizira u toku trajanja nastave. Studenti ponovci koji u prethodnoj akademskoj godini nisu položili ispit,

	a koji su ispunili određene obaveze i ostvarili određene bodove, iste mogu prenijeti u tekuću akademsku godinu. Studenti ponovci koji žele izvršiti prenos bodova, trebaju informisati predmetnog nastavnika na početku semestra, do kraja prve sedmice nastave. Prenos bodova se može izvršiti samo jednom. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 (A) - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 (B) - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, manje od 55 bodova. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza (seminarski rad) i polaganjem parcijalnog i završnog ispita, a prema kvalitetu stečenih znanja i vještina, i sadrži maksimalno 100 bodova, te se utvrđuje prema sljedećoj skali: Obaveze studenta Bodovi (%) Prisutnost na predavanjima i vježbama.....0 bodova (Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80%, a prisustvo na nastavi je uvjet za ovjeru urednog pohađanja nastave) Seminarski rad/.....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni) .....50 bodova (%) Završni ispit (Integralni) .....85 bodova (%)
Literatura:	Obavezna i dopunska: 1. Kiso F., Karičić S., Omerhodžić A.: Multimodalni transport, Fakulet za saobraćaj i komunikacije Univerziteta u Sarajevu, 2023. 2. Dalla Chiara B., Ercolani F., Gačanin E., Kiso F.: Intermodalni transport, Education and Culture TEMPUS , Sarajevo 2004. 3. Perišić R.: Savremene strategije i tehnologije razvoja transporta , SANU, Beograd, 2002. 4. Perišić R.: Sistem kvaliteta usluga logistika i informatika, SANU, Beograd, 2002. 5. Marković I.: Nove tehnologije transporta, Fakultet prometnih znanosti Zagreb, 1985. 6. Terminologija u kombiniranom transportu: UN/ECE, Prevod Kiso F., Education and Culture TEMPUS, Sarajevo, 2004. 7. Kiso,F.: „Logistika-osnovne postavke“, predavanje skripta, FSK Sarajevo,2019. 8. Kiso,F.:“Skladištenje i teorija zaliha“, predavanje skripta, FSK Sarajevo, 2016.

Šifra predmeta: 07TRWOS020102	**Naziv predmeta: INFORMACIONE TEHNOLOGIJE I ŠPEDITERSKO POSLOVANJE**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Obavezan		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 45 Vježbe:30 Seminarski i projektni zadatak: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Upoznavanje sa savremenim informacionim i komunikacijskim tehnologijama koje se primjenjuju u oblasti logističke špedicije, specifičnim softverskim alatima, te metodama i efektima njihove primjene.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod 2. Identifikacija tehnoloških procesa logističke špedicije 3. Identifikacija ključnih interesnih skupina u logističkom špediterskom lancu 4. Teoretske postavke aktuelnih informacionih tehnoloških rješenja koje se primjenjuju u oblasti špedicije 5. Značaj i mogućnosti primjene aplikativnih softvera u upravljanju sistema logističke špedicije i implementacija najboljih praksi 6. Metodološki pristupi u projektovanju informaciono-tehnoloških rješenja u logističkoj špediciji 7. CRM (Customer Relationship Management) u logističko špediterskim kompanijama 8. Planiranje i optimiziranje špediterske usluge- maksimiziranje korisnosti i snižavanje troškova procesa narudžbi, bukiranja i otpreme robe 9. Upravljanje procesima uvoza, izvoza i globalne vanjsko-trgovinske razmjene (harmonizirane tarife, ugovori o vanjskoj trgovini, INCOTERMS) 10. Softverske aplikacije za Business-to-Bussiness SCM (Supply Chain Management) 11. Softverske aplikacije za upravljanje carinskim procedurama bazirane na EU legislativi 12. Softverske aplikacije za upravljanje poslovima skladištenja 13. Softverske aplikacije za upravljanje transportnim lancem 14. Web aplikacije i on-line usluge za vanjskotrgovinsku usklađenost, tarifske klasifikacije, uvozno-izvoznu dokumentaciju, elektronsko izvještavanje, verifikacija 15. Povezivanje segmentiranih softverskih aplikacija u holistički logističko-špediterski informacioni sistem (End-to-End Management)		

Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i vještine za praktičnu primjenu kroz: razvoj IT i evaluaciju efekata njihove primjene u logističkoj špediciji, te samostalnu formulaciju ciljeva istraživanja i primjenu odgovarajućih metoda i modela za njihovu realizaciju Vještine: Sistemski pristup u projektovanju IT poslovnih procesa logističke špedicije i razumijevanje algoritama kao osnove špediterskih softverskih rješenja; identifikaciju i korištenje relevantnih informacionih tehnoloških rješenja iz područja logističke špedicije, kritičku analizu, procjenu i sintezu raspoloživih znanja; razvoj i primjenu špediterskih softverskih upravljačkih modela, te prezentaciju stečenih znanja stručnoj i naučnoj javnosti.planira, upravlja i kontroliše realizaciju različitih tipova projekta u poslovnim sistemima. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 4: Kvalitetno obrazovanje - Osigurati uključivo i kvalitetno obrazovanje, te promovisati mogućnosti cjeloživotnog učenja za sve, SDG 8: Dostojanstven rad i ekonomski rast - Promovisati održivi, uključivi i održivi ekonomski rast, zapošljavanje i dostojanstven rad za sve, SDG 9: Industrija, inovacije i infrastruktura - Izgraditi otpornu infrastrukturu, promovirati uključivu i održivu industrializaciju i poticati inovacije, SDG 12: Odgovorna potrošnja i proizvodnja - Osigurati održive obrasce potrošnje i proizvodnje, SDG 16: Mir, pravda i snažne institucije - Promovisati mirne i uključive društva za održivi razvoj, osigurati pristup pravdi za sve i izgraditi efikasne, odgovorne i uključive institucije na svim nivoima
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Seminarski rad / projektni zadatak: od 0 do 15 bodova, položeno ako se osvoji preko 50% I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova, položeno ako se osvoji preko 50% Završni ispit – pismeni 20 bodova Završni ispit – usmeni 30 bodova Završni ispit (Inegralni) – pismeni - 40 bodova Završni ispit (Inegralni) – usmeni – 45 bodova Da bi student položio ispit mora položiti usmeni dio ispita. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II

	parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):.....35 bodova (%) Završni (II parcijalni ispit):.....50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 50% (aktivnost, parcijalni ispit, završni ispit-pismeni), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 7,5 bodova - I test / I provjera znanja / parcijalni ispit: 17,5 bodova - Završni ispit (II parcijalni ispit) – pismeni dio: 10 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati i prisustvo na nastavi je uslov za ovjeru urednog pohađanja nastave. Student može, u opravdanim slučajevima (bolest) odsustvovati sa nastave, za što je obavezan dostaviti zdrastveno opravdanje. Seminarski rad i domaća zadaća će biti bodovane samo ako budu predane prema definisanim terminima. Naknadne predaje istih neće se bodovati. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95- 100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova
Literatura:	Obavezna:

	1. R. Zelenika: Logistička špedicija, Ekonomski fakultet, Zagreb, 2000. 2. Zelenika, R.: Logistički sustavi, Ekonomski fakultet u Rijeci, 2005.; 3. Gordana M. Radivojević, Upravljanje informacijama u logistici. Beograd 2023. 4. Ivanković, Č.: Špedicija i logistika, Fakultet prometnih znanosti, Zagreb, 2005. 5. R. Zelenika: Međunarodna špedicija, Ekonomski fakultet, Zagreb, 1996. 6. Deljanin: Logistika u saobraćaju i komunikacijama, Skripta, FSK, 2013. 7. Deljanin: Logistički sistemi, Skripta, FSK, 2014. Dopunska: 1. Andrijanić I., Aržek Z., Prebežac D., Zelenika R., Transportno i špeditersko poslovanje, Zagreb, 2001. 2. Z. Aržek, G. Badovinac: Transport i osiguranje, Izdavačko-instruktivni biro, Zagreb, 1986. 3. J. Mađarić: Međunarodna špedicija, Fakultet prometnih znanosti, Zagreb, 1991. 4. Grabovac: Odgovornost poduzetnika multimodalnog prijevoza stvari, Prometni fakultet, Split, 1986. 5. Shipping and logistics management, Y H V Lun; Kee-hung Lai; T C E Cheng Publisher: New York; London : Springer, 2010. 6. International logistics supply chain outsourcing: from local to global, Alan Rushton; Steve WalkerPublisher:London : Kogan Page, 2007. 7. Transportation Management with SAP TM, Bernd Lauterbach, Stefan Sauer, Jens Kappauf, Jens Gottlieb, Dominik Metzger, Christopher Sürie, 2nd, updated and revised edition 2016. 8. Warehouse Management with SAP EWM, Balaji Kannapan, Hari Tripathy, Vinay Krishna, 2nd, updated and revised edition 2016. ČASOPISI – International Journal of Phisical Distribution, – Computers and Operation Research – International Journal of Information Management – European Journal of Operational Research – Journal of Bussines Logistics

Šifra predmeta: 08TRWOS020102	**Naziv predmeta: TEHNOLOGIJA I ORGANIZACIJA RADA ŽELJEZNIČKIH STANICA I ČVOROVA**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45	

	Vježbe: 30 Seminari i projektni zadaci: 15
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**
Preduslov za upis:	NE
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima ovladavanje tehnološkim znanjima o radu službenih mjesta na željezničkim prugama. Usvajanje procedura i modela za dimenzionisanje željezničkih kapaciteta.
Tematske jedinice:	1. Tehnologija i organizacija rada stanica 2. Tehnologija manevarskog rada 3. Proračun i dimenzionisanje staničnih kapaciteta 4. Propusna i preradna moć željezničkih stanica 5. Potreban broj kolosijeka radi izvršenja tehnološkog zadatka i usklađivanje rada sa priključnim i odvojnim prugama 6. Dimenzionisanje staničnih zgrada i perona 7. Dimenzionisanje podhodnika, pasarela i prelaza u nivou 8. Dimenzionisanje skladišta, utovarno-istovarnih i pretovarnih rampi 9. Planiranje kapaciteta sa postrojenjima za robne operacije 10. Kapaciteti za opsluživanje putničkih terminala 11. Kapaciteti postrojenja i uređaja za održavanje lokomotiva i putničkih garnitura 12. Optimizacija i uvođenje savremenih tehničko-tehnoloških rješenja u radu stanica 13. Tehnologija i organizacija rada čvorova 14. Organizacija putničkog saobraćaja i tehnološki proces rada putničkih stanica 15. Kvalitet usluge u željezničkom saobraćaju
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva kako bi mogli ponuditi određena tehnološka rješenja kod dimenzionisanja kapaciteta u željezničkom prometu. Vještine: Kvalitetne tehnološke analize garantuju studentima sticanje određenih stručnih kompetencija. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 8 - Promicati održivi ekonomski rast, produktivnost i dostojanstven rad za sve, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju

	zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.

Literatura:	Obavezna: 1. Salketić, S., Kudumović, Dž., Branković, N.:Osnove tehnologije željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 2016. 2. Beširević, S.:Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 1997. 3. Branković, N.: Infrastruktura željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 2010. 4. Bogović, B.:Organizacija željezničkog prometa, Fakultet prometnih znanosti, Zagreb, 1987 5. Kovačević, P.:Eksploatacija železnica, Viša železnička škola, Beograd, 1998. 6. Čičak, M. Vesković, S. Mladenović, S.: Modeli za utvrđivanje kapaciteta železnice, Saobraćajni fakultet Univerziteta u Beogradu, 2009. 7. Čičak, M. Vesković, S.: Organizacija železničkog saobraćaja II, Saobraćajni fakultet Univerziteta u Beogradu, 2005. 8. Mandić, D.:Organizacija vuče vozova, Saobraćajni fakultet Univerziteta u Beogradu, Beograd, 2002. Dopunska: 1. Fejzić, E.: Pojava i razvoj željeznice i željezničkih putničkih terminala, IKD UNIVERSITY PRESS Sarajevo i Građevinska Knjiga, Beograd, 2011. 2. Milošević, B.:Železničke pruge, Saobraćajni fakultet u Beogradu, Beograd, 1979 3. Bukljaš, Z.: Tehnički elementi sigurnosti željezničkog prometa, Fakultet prometnih znanosti Zagreb, 1989. 4. Badanjak, D., Bogović B., Jenić V.: Organizacija željezničkog prometa, Fakultet prometnih znanosti Zagreb, 2006

Šifra predmeta:11TRWOS020203	**Naziv predmeta: UPRAVLJANJE PROJEKTIMA I INVESTICIJAMA U SAOBRAĆAJU I KOMUNIKACIJAMA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: obavezni		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 45 Vježbe: 30 Seminarski/projektni zadatak: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		

Preduslov za upis:	NE
Cilj (ciljevi) predmeta:	Osnovni ciljevi predmeta se ogledaju u sticanju znanja iz oblasti upravljanja projektima i investicijama, razumjevanju metoda i tehnika koje se primjenjuju u procesima upravljanja projektima i investicijama, te osposobljavanju studenata za praktičnu primjenu znanja iz ove oblasti.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Opšti pojmovi investicija: Pojam i definisanje investicija. Vrste investicija u saobraćaju 2. Priprema investicionih projekata: Prethodna studija opravdanosti. Studija opravdanosti 3. Ocjena studije opravdanosti: Finansijska ocjena. Nacionalna ocjena. Ocjena investicija u uslovima neizvjesnosti 4. Cost - Benefit analiza: Principi cost-benefit analize. Utvrđivanje troškova i koristi. Vrednovanje troškova i koristi. Kriterijumi koji se koriste u cost-benefit analizi. Primjene cost-benefit analize 5. Biznis plan: Pojam biznis plana. Sadržaj biznis plana 6. Unido metodologija: Priprema industrijskih projekata. Ocjena industrijskih projekata 7. Ocjena investicionih projekata od strane Svjetske banke: Globalna procedura razmatranja i ocjene investicionih projekata. Ocjena rentabilnosti projekata 8. Upravljanje projektima: Koncept upravljanja projektima. Organizacija za upravljanje projektom. 9. Standardni računarski programi za upravljanje projektima 10. Primjena koncepta upravljanja projektima u saobraćaju 11. Realizacija projekta: Planiranje realizacije projekta. Planiranje vremena. Planiranje troškova i resursa. 12. Praćenje i kontrola realizacije projekta: Praćenje i kontrola vremena realizacije projekta. Praćenje i kontrola resursa i troškova realizacije projekta. 13. Upravljanje promjenama u projektu 14. Upravljanje rizicima u projektu 15. Izvještaj: Sistem izvještavanja o realizaciji projekta. Zatvaranje projekta
Ishodi učenja:	Znanje: Studenti će steći znanja iz oblasti upravljanja projektima i investicijama, metoda i tehnika koje se primjenjuju u procesima upravljanja projektima i investicijama, te osposobljavanju studenata za praktičnu primjenu znanja iz ove oblasti.

	Vještine: Nakon završetka kursa studenti će biti sposobni da razumije procese upravljanja projektima i investicijama, procijeni odgovarajuće metode u procesu upravljanja projektima, procijeni odgovarajuće metode u procesu upravljanja investicijama, planira aktivnosti za oba procesa, primjeni koncept upravljanja određenim projektom u realnom sistemu i poslovnom okruženju, primjeni koncept upravljanja investicijskim aktivnostima u realnom sistemu i poslovnom okruženju, planira, upravlja i kontroliše realizaciju različitih tipova projekta u poslovnim sistemima. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima.
Cilj održivog razvoja (SDG):	SDG 8: Dostojanstven rad i ekonomski rast - Promovisati održivi, uključivi i održivi ekonomski rast, zapošljavanje i dostojanstven rad za sve; SDG 9: Industrija, inovacije i infrastruktura - Izgraditi otpornu infrastrukturu, promovirati uključivu i održivu industrializaciju i poticati inovacije; SDG 12: Odgovorna potrošnja i proizvodnja - Osigurati održive obrasce potrošnje i proizvodnje.
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni / popravni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na

	ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja..... bodovi (%) Seminarski / Projektni zadatak:.....15 bodova (%) I test / I provjera znanja (Iparcijalni ispit): 35 bodova (%) Završni ispit (II parcijalni ispit):.....50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 8 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati i prisustvo na nastavi je uslov za ovjeru urednog pohađanja nastave. Student može, u opravdanim slučajevima (bolest) odsustvovati sa nastave, za što je obavezan dostaviti zdrastveno opravdanje. Seminarski rad i domaća zadaća će biti bodovane samo ako budu predane prema definisanim terminima. Naknadne predaje istih neće se bodovati.

	Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. Vujadin Vešović, „Upravljanje projektima“, 9. Izdanje, Beograd, 2010. 3. Vladimir B. Depolo, „Upravljanje projektima u saobraćajnom inžinjerstvu“, Beograd, 2010. Dopunska: 1. Petar Jovanović, “Upravljanje investicijama”, 8. izdanje, Beograd, 2013.

Šifra predmeta: 12TRWOS020203	**Naziv predmeta: UPRAVLJANJE RIZICIMA U ŽELJEZNIČKOM SAOBRAĆAJU**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima sticanje znanja iz oblasti procjene rizika u željezničkom saobraćaju i elemenata koji utječu na njih. Izučavanje i analiza vanrednih događaje na željeznici kao i faktora koji utiču na njih.		
Tematske jedinice:	1. Rizici u saobraćaju općenito 2. Osnovni pojmovi o bezbijednosti (sigurnosti) saobraćaja općenito 3. Nauka u funkciji pružanju pomoći sigurnosti saobraćaja 4. Čovjek kao sudionik rizika i incidenata u saobraćaju i uticaj umora na sigurnost saobraćaja 5. Sistem upravljanja sigurnosti upravitelja infrastrukture i		

	željezničkih prijevoznika 6. Zajednički sigurnosni pokazatelji 7. Rizici i incidenti u željezničkom saobraćaju 8. Metode analize i procjene rizika u željezničkom saobraćaju 9. Željeznički propisi i željezničke izvršne službe 10. Kontrola kao faktor uticaja na sigurnost željezničkog saobraćaja 11. Pojam i klasifikacija vanrednih događaja na željeznici 12. Deskriptivne statističke metode za analizu vanrednih događaja na željeznici 13. Savremena EU regulativa u oblasti analize vanrednih događaja na željeznici 14. Metodologije za izračunavanje ekonomskog uticaja nesreća. 15. Postupci pri upravljanju rizicima u željezničkom saobraćaju
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja iz oblasti rizika u željezničkom saobraćaju. Vještine: Trebaju ovladati metodologijom isleđenja vanrednih događaja na željeznici i praviti kvalitetne analize istih sa definisanjem uzroka i kvantificiranjem posljedica. Očekuje se da studenti ovladaju savremenim metodologijama i analize stanja sigurnosti željezničkog saobraćaja i da ovladaju disciplinama analize i procjene potencijalnih rizika . Kompetencije: Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja iz oblasti rizika u željezničkom saobraćaju. Vještine: Trebaju ovladati metodologijom isleđenja vanrednih događaja na željeznici i praviti kvalitetne analize istih sa definisanjem uzroka i kvantificiranjem posljedica. Očekuje se da studenti ovladaju savremenim metodologijama i analize stanja sigurnosti željezničkog saobraćaja i da ovladaju disciplinama analize i procjene potencijalnih rizika . Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim; SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje

	student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Salketić, S., Kudumović, Dž., Branković, N.:Osnove tehnologije željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 2016. 2. Beširević, S.:Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 1997. 3. Branković, N.: Infrastruktura željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 2010.

	4. Bogović, B.:Organizacija željezničkog prometa, Fakultet prometnih znanosti, Zagreb, 1987 5. Čičak, M. Vesković, S. Mladenović, S.: Modeli za utvrđivanje kapaciteta železnice, Saobraćajni fakultet Univerziteta u Beogradu, 2009. 6. Čičak, M. Vesković, S.: Organizacija železničkog saobraćaja II, Saobraćajni fakultet Univerziteta u Beogradu, 2005. 7. Mandić, D.:Organizacija vuče vozova, Saobraćajni fakultet Univerziteta u Beogradu, Beograd, 2002. 8. Željeznički propis - PRAVILNIK 19 (Sl. glasnik BiH br. 73/13) (Pravilnik o postupcima pri ozbiljnim nesrećama i incidentima) 9. Uputstvo o sigurnosnim istragama nesreća i incidenata u željezničkom sistemu BiH, (Sl. glasnik BiH br. 37/15) 10. Buklјaš, Z.: Tehnički elementi sigurnosti željezničkog prometa, Fakultet prometnih znanosti Zagreb, 1989. 11. Badanjak, D., Bogović B., Jenić V.: Organizacija željezničkog prometa, Fakultet prometnih znanosti Zagreb, 2006 12. Milošević, B.:Železničke pruge, Saobraćajni fakultet u Beogradu, Beograd, 1979. Dopunska: 1. Čabrić N., Puzić N. - „Uloge i odgovornosti NOBOs, DEBOs, CSM procjene rizika i ECM sertifikacionog tijela“, Drugi BiH kongres o željeznicama Sarajevo, 26.-27. septembar 2013. godine, ISSN 2233-0100, 9 772233 010002 Zbornik radova strana 345-354. 2. Čabrić N., Đuričić R. „Metode analize i procjene rizika“, Treći BiH kongres o željeznicama Sarajevo, 15.-16. oktobar 2015. godine, ISSN 2233-0100, 9 772233 010002 Zbornik radova strana 315-327. 3. Čabrić N. „Model procjene rizika intermodalnog transporta opasnih materija“, V Međunarodni simpozijum NOVI HORIZONTI 2015 saobraćaja i komunikacija 20.-21. novembar 2015. godine u Doboju, ISBN: 978-99955-36-57-2, strana 60 – 66. 4. Čabrić N., Đuričić R. „Upravljanje rizicima u željezničkom sistemu“, TIT - Transportna Infrastruktura i Transport, broj 7, godina 6, Sarajevo, decembar 2016, ISSN 2232-9676, strana 36. 5. Čabrić N., Đuričić R. „Sigurnost i bezbjednost željezničkog sistema“, Četvrti BiH kongres o željeznicama Sarajevo, 26.-27. oktobar 2017. godine, ISSN 2233-0100, 9 772233 010003 Zbornik radova strana 248-260. 6. Čabrić N., Tadić S., Zečević S. „Modelling security of intermodal transport by application of Petri nets“, International Conference on Traffic and Transport Engineering - ICTTE 2018, September 27-28th, 2018 Belgrade, Serbia ISBN 978-86-916153-4-5, p. 490-494. 7. Čabrić N., Đuričić R., Malčić V. „Evropski model kulture sigurnosti željeznica“, Deseti BiH kongres o transportnoj infrastrukturi i transportu, 24.-25. oktobar 2019. godine Sarajevo, ISSN 1840-2763, 9 771840 276009 Zbornik radova strana 111-120. 8. Regulativa (EU) No 402/2013 od 30 aprila 2013. o zajedničkim bezbjedonosnim metodama procjene i ocjene rizika i ukidanju Regulative 352/2009, Službeni list EU L 121, 3.5.2013. str.8.

	9. Direktiva (EU) 2016/798 Evropskog parlamenta i vijeća od 11. maja 2016. o sigurnosti željeznica, OJ L 138, 26.5.2016, p. 102–149.

Šifra predmeta: 09-10-1TRWES020102	**Naziv predmeta: TEHNIČKI ELEMENTI SIGURNOSTI ŽELJEZNIČKOG SISTEMA**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje edukacijskih oblika u realizaciji programa iz elemenata sigurnosti željeznica, te praktične analize, elaborati, ekspertize i projekti iz elemenata sigurnosti željeznica.		
Tematske jedinice:	1. Uvod – osnove elemenata sigurnosti željeznice; kolosijeka i vozila 2. Tehnički činioci kao elementi sigurnosti željezničkog saobraćaja. 3. Sigurnost i zaštita saobraćajnog sistema na otvorenim kolosijecima u tunelima i na mostovima 4. Tehnički parametri na željeznici (na kolosijecima, mobilnim kapacitetima, saobraćajnoj signalizaciji i opremi željeznice) 5. Vrsta i sadržaj projekata za građenje i rekonstrukciju kolosijeka 6. Pravilnik i upustvo sigurnosti za upotrebu kola i tovarnog pribora 7. EU i BH standardi (BASN) - saobacajna signalizacija i oprema 8. Revizija projekata saobraćajne signalizacije i opreme željeznica 9. Izrada i Tehnički prijem kolosijeka 10. Revizija i inspekcije sigurnosti na željeznici ., Postupak u slučaju nastanka željezničkog udesa 11. Euro norme za željeznicu 12. Brze željeznice IC vođenje 13. Kontrola saobraćaja na željeznici. Sigurnost pri prihvatanju i otpremi šinskih vozila 14. Analiza uzroka vanrednih događaja (terensko istraživanje) 15. Regulacija saobraćaja u zoni generalnog remonta na prugama kod izvođenja radova		
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti elemenata sigurnosti željezničkog saobraćaja . Kroz materiju predmeta potrebno je osigurati nivo znanja o pravilima, metodama i postupcima sigurnosti iz infrastrukture željeznice i mobilnih kapaciteta Vještine: Predmet omogućava sticanje vještina neophodnih za adekvatnu analizu, procjenu i upravljanje sigurnošću na željeznici. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima		
Cilj održivog razvoja (SDG):	SDG11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim, SDG 16 - Promicati mir, pravdu i snažne institucije		

Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova;

	b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Čabrić N. „Skripta „Tehnički elementi sigurnosti željezničkog saobraćaja“, Fakultet saobraćaja i komunikacija, Univerzitet u Sarajevu, Sarajevo, 2024. 2. Bukljaš Z.: Tehnički elementi sigurnosti željezničkog prometa, Univerzitetski udžbenik, Fakultet prometnih znanosti, Zagreb, 1989.; Dopunska: 1. Mundrey,J.S.; Railway Track Engineering , Tata McGraw-Hill Publishing Company Limited , 1993. 2. Čabrić N., Đuričić R. „Sigurnost i bezbjednost željezničkog sistema“, Četvrti BiH kongres o željeznicama Sarajevo, 26.-27. oktobar 2017. godine, ISSN 2233-0100, 9 772233 010003 Zbornik radova strana 248-260. 3. Čabrić N., Blagojević A. „Interoperabilnost i bezbjednost - glavni pokretači otvaranja tržišta“ Internatopnal Symposium Rail Transport in The Modern World (1; 2019 ; Beograd), ISBN 978-86-81101-33-9, Proceedings p. 102-107. 4. SIGNALNI PRAVILNIK („Službeni glasnik BiH“, broj 13/14) 5. SAOBRAĆAJNI PRAVILNIK („Službeni glasnik BiH“, broj 90/15) 6. Osman Lindov: Sigurnost u cestovnom saobraćaju, Univerzitetski udžbenik, Fakultet za saobraćaj i komunikacije, Sarajevo, 2008. 7. Toš, Z.:“Željeznička signalizacija“,Fakultet prometnih znanosti Zagreb, 2002. 8. Milićević, M.:“Tehnički sistemi za regulisanje i bezbjednost željezničkog saobraćaja“, Univerzitet u Beogradu, 1982. 9. Traffic Control Systems Handbook, Final Report, FHWA, 1996. 10. Begović, M.:“Održavanje tehničkih sustava“, Fakultet prometnih znanosti Zagreb, 2003 11. Uputstva i pravilnici, Regulatorni odbor željeznica BiH. 12. Instrukcije za sigurnost i interoperabilnost željezničkog sistema („Službeni glasnik BiH“, broj 11/12) 13. Upustvo za upotrebu kola i tovarnog pribora (ZJŽ)-prečišćen text- Beograd, 1990.

Šifra predmeta: 09-10-2TRWES020102	**Naziv predmeta: REDOVI VOŽNJE I PROPUSNA MOĆ ŽELJEZNIČKIH PRUGA**

Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima sticanje znanja iz oblasti projektovanja i elemenata izrade reda vožnje u željezničkom saobraćaju. Izračun i dimenzionisanje elemenata prevozne i propusne moći željezničkih pruga.		
Tematske jedinice:	1. Uvod - Utvrđivanje kapaciteta pruge 2. Prevozna i propusna moć željezničke pruge 3. Parametri za utvrđivanje iskorištenja tehničke moći pruga. 4. Mjere za povećenje tehničke moći pruga (organizacione, tehničke i rekonstruktivne mjere) 5. Općenito o redu vožnje, red vožnje kao tehnološki proces rada pruge, red vožnje kao dio poslovne politike željeznice 6. Elementi za izradu reda vožnje 7. Smjernice za izradu reda vožnje 8. Intervali u saobraćaju 9. Konstrukcija grafikona saobraćaja vozova 10. Opća organizacija prometa (putničkog i teretnog) 11. Dodjela kapaciteta za potrebe međunarodnog i domaćeg prijevoza od strane upravitelja infrastrukture željezničkim prijevoznicima 12. Određivanje potrebnog broja vozopratnog osoblja 13. Eksploatacioni pokazatelji reda vožnje 14. Zakonska obaveza željeznice sa aspekta izrade, objavljivanja i izvršenja reda vožnje 15. Softverska rješenja za izradu reda vožnje		
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, praktične vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti definisanja propusne i prevozne moći pruge i primjenu parametara u praksi. Propusna moć pruga kao temaljni element (alat) treba da im posluži pri projektovanju i izradi reda vožnje i crtanju grafikona saobraćaja vozova. Vještine: Očekuje se da studenti kroz projektovanje reda vožnje i praćenje njegove realizacije steknu kvalitetna znanja za modeliranje praćenje i kvalitetnu analizu dobijenih rezultata. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima		
Cilj održivog razvoja (SDG):	SDG 8 - Promicati održivi ekonomski rast, produktivnost i dostojanstven rad za sve, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim		
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti		

	i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74

	bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Salketić, S., Kudumović, Dž., Branković, N.:Osnove tehnologije željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 2016. 2. Beširević, S.:Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 1997. 3. Bogović, B.:Organizacija željezničkog prometa, Fakultet prometnih znanosti, Zagreb, 1987 5. Kovačević, P.:Eksploatacija železnica, Viša železnička škola, Beograd, 1998. 6. Čičak, M. Vesković, S. Mladenović, S.: Modeli za utvrđivanje kapaciteta železnice, Saobraćajni fakultet Univerziteta u Beogradu, 2009. 7. Čičak, M. Vesković, S.: Organizacija železničkog saobraćaja II, Saobraćajni fakultet Univerziteta u Beogradu, 2005. 8. Mandić, D.:Organizacija vuče vozova, Saobraćajni fakultet Univerziteta u Beogradu, Beograd, 2002. 9. Badanjak, D., Bogović B., Jenić V.: Organizacija željezničkog prometa, Fakultet prometnih znanosti Zagreb, 2006 Dopunska: 1. Branković, N.: Infrastruktura željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 2010. 4. Fejzić, E.: Pojava i razvoj željeznice i željezničkih putničkih terminala, IKD UNIVERSITY PRESS Sarajevo i Građevinska Knjiga, Beograd, 2011. 10. Milošević, B.:Železničke pruge, Saobraćajni fakultet u Beogradu, Beograd, 1979

Šifra predmeta: 09-10-3TRWES020102	**Naziv predmeta: STANDARDIZACIJA U ŽELJEZNIČKOM SAOBRAĆAJU**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Upoznavanje studenata sa općim pojmovima o standardima i standardizaciji, usvojenim definicijama, vrstama i tipičnoj strukturi standarda, te rastućem značaju upotrebe standarda u svim područjima ljudskog djelovanja, sa posebnim osvrtom na željeznički saobraćaj		

Tematske jedinice:	1. Osnove standardizacije. Nivoi standardizacije. Međunarodne, evropske i nacionalne organizacije za standardizaciju. 2. Nacionalni BAS standardi. Označavanje i datiranje BAS standarda. Metode preuzimanja međunarodnih i evropskih standarda. 3. Pregled BAS tehničkih komiteta. Korespodentni međunarodni i evropski tehnički komiteti. 4. Područja rada BAS tehničkih komiteta koji se odnose na željeznički saobraćaj i korespodentni međunarodni/evropski TC. 5. ICS klasifikacija. Područja, grupe i podgrupe. Područja, grupe i podgrupe koje se odnose na željeznički saobraćaj. 6. Osnovna podjela standarda sa primjerima generičkih standarda i specifičnih standarda koji se odnose na željeznički saobraćaj. 7. Sistematizacija BAS standarda iz područja željezničkog saobraćaja. 8. Primjeri standarda iz područja 45. ICS klasifikacije, grupa 45.020 - inžinjerstvo šinskog saobraćaja općenito, 45.040 – materijali i komponente za inžinjerstvo šinskog saobraćaja. Analiza područja primjene i strukture standarda. 9. Primjeri standarda iz grupa 45.060 ICS klasifikacije – šinska vozila, uključujući materijale, komponente, električnu i elektronsku opremu za šinska vozila. Analiza područja primjene i strukture standarda. 10. Primjeri standarda iz grupe 45.080 ICS klasifikacije - šine i komponente pruga. Analiza područja primjene i strukture standarda. 11. Primjeri standarda iz područja 45.120 ICS klasifikacije - oprema za gradnju i održavanje željeznica. Analiza područja primjene i strukture standarda. 12. Primjeri standarda iz ostalih područja ICS klasifikacije koja se odnose na željeznički saobraćaj. Analiza područja primjene i strukture standarda. 13. Direktive novog pristupa. Osnovni principi i ciljevi. 14. Harmonizirani evropski standardi iz područja željezničkog saobraćaja. 15. Primjeri harmoniziranih standarda koji se odnose na pojedine komponente željezničkih vozila. Analiza područja primjene i strukture standarda.
Ishodi učenja:	Znanja: Studenti će naučiti osnove standardizacije, ulogu međunarodnih, evropskih i nacionalnih organizacija, te primjenu BAS standarda u željezničkom saobraćaju. Također će razumjeti ICS klasifikaciju i direktive novog pristupa, kao i harmonizirane evropske standarde. Vještine: Studenti će razviti sposobnost analize, klasifikacije i primjene relevantnih standarda u željezničkom saobraćaju, uključujući sistematizaciju i interpretaciju strukture BAS i ICS standarda. Kompetencije:Studenti će biti osposobljeni za stručno korištenje i usklađivanje standarda u željezničkom saobraćaju, te za vođenje procesa evaluacije i primjene standarda u praksi.
Cilj održivog razvoja (SDG):	SDG 9: Industrija, inovacije i infrastruktura – kroz standardizaciju za održivu i kvalitetnu infrastrukturu. SDG 11: Održivi gradovi i zajednice – doprinos kroz standarde za održiv transport. SDG 12: Odgovorna potrošnja i proizvodnja – primjena standarda za

	efikasno korištenje resursa. SDG 13: Klimatska akcija – kroz implementaciju standarda za smanjenje ekološkog utjecaja transporta.
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja,

	vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Behmen, A.: Salihović, S.:"Materijali i robe u transportu-knjiga I – klasifikacija, standardizacija, identifikacija", Fakultet za saobraćaj i komunikacije Sarajevo i DES Sarajevo, 2007. 2. Behmen, A.: Salihović, S.:"Materijali i robe u transportu-knjiga II – kvalitet: osnove, principi, kontrola", Fakultet za saobraćaj i komunikacije Sarajevo i DES Sarajevo, 2008. Dopunska: 1. Međunarodni/evropski/nacionalni standardi

Šifra predmeta: 09-10-4TRWES020102	**Naziv predmeta: SIGNALNI SISTEMI I KONTROLA ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje edukacijskih oblika u realizaciji programa iz savremenih signalnih sistema i kontrole željezničkog saobraćaja, te praktične analize, elaborata, ekspertize i projekata izsavremenih signalnih sistema i kontrole željeznićkog saobraćaja.		
Tematske jedinice:	1. Uvod – osnove elemenata signalnih sistema i kontrole željezničkog saobraćaja 2. Zakoni vezani za saobraćaj na željeznici u FBiH i pravilnici i uputstva. Signalni pravilnik – ŽFBiH 3. Sigurnost i zaštita signalnim sistemima i kontrolom saobraćajnog sistema na otvorenim kolosijecima, u tunelima i na mostovima 4. Tehnički parametri na željeznici (na kolosijecima, mobilnim kapacitetima i saobraćajnoj signalizaciji i opremi željeznice) 5. Vrsta i sadržaj projekata za građenje i rekonstrukciju signalnih sistema za kontrolu željezničkog saobraćaja 6. ETCS sistem 7. GSM sistem 8. Video nadzor na otvorenim kolosijecima, u tunelima, na mostovima i podmorskim kolosijecima		

	9. Izrada i tehnički prijem signalnih sistema za kontrolu željezničkog saobraćaja 10. Kontrola i revizija signalnih sistema za regulisanje saobraćaja na željeznici 11. Euro norme za željeznicu 12. Kontrola saobraćaja brze željeznice - IC vođenje 13. EU i BH standardi (BASN) - saobraćajna signalizacija i oprema 14. Analiza uzroka vanrednih događaja (terensko istraživanje) 15. Signalizacija i regulacija saobraćaja u zoni generalnog remonta na prugama kod izvođenja radova
Ishodi učenja:	Znanja: Studenti će steći osnovna i napredna znanja o savremenim signalnim sistemima i kontroli željezničkog saobraćaja, uključujući tehničke parametre, standarde, zakone i pravilnike vezane za sigurnost saobraćaja na otvorenim kolosijecima, u tunelima i na mostovima. Također će se upoznati sa ETCS i GSM sistemima te evropskim i bh. normama za željeznicu. Vještine: Studenti će razviti vještine potrebne za analizu, projektovanje i implementaciju signalnih sistema, kontrolu i reviziju tih sistema, kao i sposobnost korištenja video nadzora i upravljanja saobraćajem u različitim infrastrukturnim uslovima. Također će biti obučeni za tehnički prijem i kontrolu signalnih sistema, te za analizu vanrednih događaja na terenu. Kompetencije: Studenti će biti kompetentni za primjenu stečenih znanja u praksi, posebno u oblastima sigurnosti i regulacije željezničkog saobraćaja. Bit će osposobljeni za procjenu rizika, upravljanje projektima signalizacije, kontrolu saobraćaja brze željeznice i provođenje analiza u skladu sa evropskim i bh. standardima.
Cilj održivog razvoja (SDG):	Cilj 4: Kvalitetno obrazovanje Cilj 9: Industrija, inovacije i infrastruktura Cilj 11: Održivi gradovi i zajednice Cilj 16: Mir, pravda i jake institucije
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao

	ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 3. Mundrey,J.S.; Railway TrackEngineering , Tata McGraw-HillPublishing Company Limited , 1993. 4. 2. Signalni pravilnik – ŽFBiH 5. 3. Gold, H i dr. Digitalno upravljanje modelom željeznice ,Fakultet prometnih znanosti , Zagreb , 1994. 6. 4.Bukljaš Z.: Tehnički elementi sigurnosti željezničkog prometa, Univerzitetski udžbenik, Fakultet prometnih znanosti, Zagreb, 1989.; 7. Toš, Z.:“Željeznička signalizacija“,Fakultet prometnih znanosti Zagreb, 2002.

	Dopunska 1. Milićević, M.:"Tehnički sistemi za regulisanje i bezbjednost željezničkog saobraćaja", Univerzitet u Beogradu, 1982. 2. Traffic Control Systems Handbook, FinalReport, FHWA, 1996. 3. Begović, M.:"Održavanje tehničkih sustava", Fakultet prometnih znanosti Zagreb, 2003 4. ZoBS i pravilnici, Ministarstvo transporta i komunikacija, BiH, 206.2008,2010. 2012. 5. Pravilnici i upustva na ŽFBIH

Šifra predmeta: 09-10-5TRWES020102	**Naziv predmeta: SIGURNOST ELEKTRIČNIH VOZILA**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj sati: 3+2+1** Opciono razraditi distribuciju sati po tipu: Predavanja:3 Vježbe:2 Laboratorijske vježbe:1	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Omogućiti studentima sticanje temeljnih stručnih znanja o osnovnim konceptima, principima i praksom vezanom uz sigurnost električnih vozila. Cilj predmeta je osposobiti studente za razumijevanje i analizu osnovnih komponenti i sistema električnih vozila, kao i razumijevanje i upravljanje potencijalnim rizicima i sigurnosnim izazovima.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod u sigurnost električnih vozila. 2. Regulatorni okvir, standardi, propisi u zemljama EU. 3. Inicijative za razvoj i promociju E mobilnosti. 4. Pogonski sistem E vozila. 5. Rizici i opasnosti prilikom korištenja i punjenja električnih vozila. 6. Edukacija o sigurnosti kretanja E vozila u saobraćaju. 7. Sigurnosni aspekti u slučaju saobraćajnih nezgoda sa električnim vozilima. 8. Sigurnosni aspekti infrastrukture za punjenje električnih vozila. 9. Sigurnosni elementi E vozila. 10. Sigurnost putnika u E vozilima. 11. Analiza parametara sigurnosti u saobraćaju E vozila. 12. Parametri izračuna sigurnosnih elemenata pri saobraćajnoj delikvenciji sa E vozilima. 13. E vozila i okoliš, sigurnosni aspekt održavanja i zbrinjavanje baterija.		

<table>
<tr><td></td><td>14. Sigurnosni aspekti prilikom servisiranja i održavanja električnih vozila.
15. E vozila u industrijskim pogonima.</td></tr>
<tr><td>Ishodi učenja:</td><td>• Sticanje znanja o primjeni sigurnosnih standarda i propisa.
• Sticanje znanja i vještina za sveobuhvatno razumijevanje koncepta sigurnosti električnih vozila.
• Sticanje znanja za identifikaciju i analizu saobraćajnih nezgoda sa učešćem električnih vozila.
• Sticanje znanja o upravljanju rizicima u praktičnoj primjeni.
• Sticanje znanja o sigurnosnim elmentima električnih vozila.</td></tr>
<tr><td>Metode izvođenja nastave:</td><td>Predavanja popraćena multimedijalnim prezentacijama
Auditorne vježbe sa analizom konkretnih primjera iz prakse</td></tr>
<tr><td>Metode provjere znanja sa strukturom ocjene[1]:</td><td>
<table>
<tr><td>Aktivnost u toku predavanja</td><td>-</td><td>Pismeni ispit</td><td>50</td></tr>
<tr><td>Praktična nastava</td><td>-</td><td>Usmeni ispit</td><td>-</td></tr>
<tr><td>Kolokvijumi</td><td>35</td><td></td><td></td></tr>
<tr><td>Seminarski rad</td><td>15</td><td></td><td></td></tr>
<tr><td>Ukupno</td><td></td><td>Ukupno</td><td>100</td></tr>
</table>
</td></tr>
<tr><td>Literatura:</td><td>

1. C. Qiu, G. Wang, M. Meng, and Y. Shen, “A novel control strategy of regenerative braking system for electric vehicles under safety critical driving situations,” Energy, vol. 149, pp. 329–340, Apr. 2018.
2. E. Karaaslan, M. Noori, J. Y. Lee, L. Wang, O. Tatari, and M. Abdel-Aty, “Modeling the effect of electric vehicle adoption on pedestrian traffic safety: An agent-based approach,” Transportation Research Part C: Emerging Technologies, vol. 93, pp. 198–210, Aug. 2018.
3. F. Gandoman, J. Van Mierlo, A. Ahmadi, S. Abdel Aleem, Chapter 15: Safety and reliability evaluation for electric vehicles in modern power system networks, Distributed Energy Resources in Microgrids, 2019, Pages 389-404
4. F. Michael Ashby, Case Study: Electric Cars, Materials and Sustainable Development, 2016
5. Gwilliam, K. (ed): Cities on the Move: A World Bank Urban Transport Strategy Review, Strategy Paper, Washington, DC: World Bank, 2001.
6. J. Dižo and M. Blatnický, “Investigation of ride properties of a three-wheeled electric vehicle in terms of driving safety,” Transportation Research Procedia, vol. 40, pp. 663–670, Jan. 2019.

</td></tr>
</table>

[1] **Struktura bodova i bodovni kriterij za svaki nastavni predmet utvrduje vijece organizacione jedinice prije pocetka studijske godine u kojoj se izvodi nastava iz nastavnog predmeta u skladu sa clanom 64. st.6 Zakona o visokom obrazovanju Kantona Sarajevo**

	7. Lindov O., Pikula B.: Electromobility models and sustainable urban development – Sarajevo case study, International Conference Towars a Human City, 2019. 8. Lah, O.: Sustainable Urban Mobility Pathways, Wuppertal Institute for Climate, Environment and Energy & Climate Action Implementation Facility, Berlin, Germany, 2019. 9. Mehinović H., Mujezin H., Lindov O.: Enhancing competitiveness and innovation in the green and smart mobility, International Conference Towars a Human City, 2019. 10. O. Lindov, Sigurnost u cestovnom saobraćaju, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2008 11. P. Van den Bossche, Safety considerations for electric vehicles, Citelec, Brussels Belgium 12. Q. Yu et al., "Evaluation of the safety standards system of power batteries for electric vehicles in China," Applied Energy, vol. 349, p. 121674, Nov. 2023. 13. Q. He, Y. Yang, C. Luo, J. Zhai, R. Luo, and C. Fu, "Energy recovery strategy optimization of dual-motor drive electric vehicle based on braking safety and efficient recovery," Energy, vol. 248, p. 123543, Jun. 2022. 14. W. Mitchell, R. Chin, A. Sevtsuk, Chapter 11 - The Media Laboratory City Car: A New Approach to Sustainable Urban Mobility, Urban Energy Transition, 2008 pp: 267-282 15. W. Li, J. Zhu, Y. Xia, M. B. Gorji, and T. Wierzbicki, "Data-Driven Safety Envelope of Lithium-Ion Batteries for Electric Vehicles," Joule, vol. 3, no. 11, pp. 2703–2715, Nov. 2019.

Šifra predmeta: 09-10-6TRWES020102	**Naziv predmeta: SIGURNOSNI RIZICI U TRANSPORTU OPASNIH MATERIJA**		
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj sati: 3+2+1** Predavanja:3 Vježbe:2 Laboratorijske vježbe:1	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje znanja o osnovama procesa, procedurama i tehnikama za procjenu rizika prilikom prevoza opasnih materija.		

<table>
<tr><td>Tematske jedinice:

(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)</td><td>1. Osnove procesa transporta opasnih materija i terminologija u oblasti rizika prilikom prevoza opasnih materija
2. Pravni i institucionalni okvir kojim je uređen proces transporta opasnih materija
3. Stručna osposobljenost osoba uključenih u pripremu, izvršenje i praćenje izvršenja transportnog zadatka opasnih materija
4. Značaj i obaveze savjetnika za sigurnost u procesu planiranja i izvršenja transportnog zadatka
5. Tehničko-tehnološke karakteristike transportnih sredstava za transport opasnih materija
6. Potrebna dokumentacija za transportna sredstva i vozno osoblje za transport opasnih materija
7. Potrebna dokumentacija o teretu koji se transportuje i način manipulisanja
8. Procedura planiranja i pripreme za izvršenje transportnog zadatka prevoza opasnih materija
9. Kontrolne liste za pregled transportnih sredstava pred realizaciju transportnog zadatka
10. Procjena i stepenovanje vrste rizika u izvršenju transportnog zadatka i modeliranje posljedica
11. Preventivne mjere za uklanjanje rizika u izvršenju transportnog zadatka
12. Postupci u slučaju nastanka incidentne situacije pri izvršenju transportnog zadatka
13. Praćenje izvršenja i analiza transportnog zadatka prevoza opasnih materija
14. Kalkulacija rizika u prevoza opasnih materija
15. Analiza primjera iz prakse</td></tr>
<tr><td>Ishodi učenja:</td><td>▪ Sticanje znanja o osnovama procesa, procedurama i tehnikama za procjenu rizika prilikom prevoza opasnih materija,
▪ Sticanje znanja o pravnim okvirom kojim je uređena oblast TOM,
▪ Sticanje znanja o ključnim fazama i načinima realizacije transportnog zadatka, u
▪ Sticanje znanja o odgovornostima ključnih subjekata u procesu izvršenja transportnog zadatka.
▪ Sposobnosti samostalnog razumijevanja, prepoznavanja problema,
▪ Sposobnost učešća u svim fazama organizacije i implementacije procesa TOM
▪ Sposobnost primjene teorijskih i praktičnih znanja iz predmetne oblasti u praksi.</td></tr>
<tr><td>Metode izvođenja nastave:</td><td>– Predavanja popraćena multimedijalnim prezentacijama
– Rješavanje praktičnih problema i konkretnih projektnih zadataka</td></tr>
<tr><td>Metode provjere znanja sa strukturom ocjene:</td><td><table><tr><td colspan="4">Ocjena znanja (maksimalni broj poena: 100)</td></tr><tr><td>Predispitne obaveze</td><td>poena</td><td>Završni ispit</td><td>poena</td></tr></table></td></tr>
</table>

	Aktivnost u toku predavanja	-	Pismeni ispit	50
	Praktična nastava	-	Usmeni ispit	-
	Kolokvijumi	35		
	Seminarski rad	15		
	Ukupno		Ukupno	**100**
Literatura:	1. Bukljaš Skočibušić, M., Bukljaš Z., Zaštita u prometu: Fakultet prometnih znanosti, Zagreb, 2015., 2. Cassini, P., Hall, R. and Pons, P. Transport of Dangerous Goods through Road Tunnels. Quantitative Risk Assessment Model (Version 3.60), Reference Manual. OECD/PIARC/EU (CDROM), February 2003. 3. Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances, Official Journal L 010, P. 0013 – 0033, 14 January 1997 4. D. Knežević: Intervencije u nesrećama pri prijevozu opasnih tvari, Hrvatska vatrogasna zajednica, Zagreb, 2014. 5. Directive 2004/54/EC of the European Parliament and of the Council of 29 April 2004 on minimum safety requirements for tunnels in the Trans-European Road Network, Official Journal of the European Union L 167 of 30 April 2004 6. Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods (Text with EEA relevance), 2008 7. General Guideline for the Calculation of Risks in the Transport of Dangerous Goods by Road, 84th and 85th sessions of the Working Party on the Transport of Dangerous Goods (WP.15) in May and October 2008. 8. Lindov, O, Sigurnost cestovnog saobraćaja, Fakultet za saobraćaj i komunikacije, Univerzitet u Sarajevu, 2008. 9. Lindov, O., Kiso, F., Kosovac, A., Čolaković, A., Memić, B., Hasković, A., Begović, M., Omerhodžić, Adnan, & Berković, Mirza. (2022). Inovativne tehnologije u sigurnosti saobraćaja i transporta (p. 467). Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu 10. Priručnik za prijevoznike i vozače vozila za prijevoz opasnih materija, IPI-Institut za privredni ižinjering, Zenica, 2009., 11. Risk Management Framework (https://transport.ec.europa.eu/transport-themes/transport-dangerous-goods/risk-management-framework_en)			

	12. Sporazum o prevozu opasnih materija u cestovnom saobraćaju (ADR)

Šifra predmeta: 13-14-15-1TRWES020203	**Naziv predmeta: METODE VREDNOVANJA I ODLUČIVANJA U SAOBRAĆAJNOM PROJEKTOVANJU**		
Ciklus: II (drugi)	**Godina:** II (druga)	**Semestar:** III (treći)	**Broj ECTS kredita:** 6 (šest)
Status: izborni predmet		**Ukupan broj kontakt sati:** 90 Predavanja 45 Vježbe 30 Seminar 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima upoznavanje sa osnovama planiranja i projektovanja saobraćajne infrastrukture, vrstama vrednovanja u postupku planiranja i projektovanja. Cilj predmeta je također izučavanje najznačajnijih i najčešće primjenjivanih metoda vrednovanja u procesu saobraćajnog planiranja i projektovanja. Nastavna materija obuhvata metode invensticionog, ekološkog i društveno-ekonomskog vrednovanja kao i metode višekriterijumske analize sa aplikativnim primjerima i smjernicama za upoznavanje procesa odlučivanja u saobraćajnom projektovanju.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Saobraćajni sistem kao faktor prostorne organizacije i razmještaja 2. Metodološki pristup saobraćajnom planiranju 3. Osnove procesa planiranja saobraćajnica 4. Osnove projektovanja saobraćajnica 5. Teorijske pretpostavke planiranja i projektovanja saobraćajne infrastrukture 6. Studija opravdanosti – CB analiza 7. Funkcionalno vrednovanje projektnih rješenja 8. Funkcionalno vrednovanje cestovnih dionica 9. Finansijska i ekonomska analiza projekata 10. Analiza troškova i koristi kod saobraćajnih projekata 11. Višekriterijumsko vrednovanje i metode odlučivanja 12. Ekološko vrednovanje utjecaja infrastrukture na životnu sredinu 13. Upravljanje projektima saobraćajne infrastrukture 14. Tehnike upravljanja projektom 15. Priprema projekata finansiranih iz EU fondova		
Ishodi učenja:	Studenti kroz nastavni proces predavanja, vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti planiranja i projektovanja saobraćajne infrastrukture. Također predmet omogućava stjecanje znanja i vještina neophodnih za vrednovanje planskih i projektnih rješenja i na osnovu toga donošenje adekvatnih odluka.		

Cilj održivog razvoja (SDG):	Svaka od navedenih tematskih jedinica doprinosi različitim aspektima održivog razvoja kroz poboljšanje infrastrukture, efikasno upravljanje projektima, primjenu metoda vrednovanja i odlučivanja koje mogu doprinijeti izboru rješenja koje će uticati na ekonomski rast, zaštitu okoline i održivo upravljanje resursima. Specifični ciljevi održivog razvoja koji se mogu povezati sa silabusom predmeta su: – SDG 8: Dostojanstven rad i ekonomski rast – SDG 9: Industrija, inovacije i infrastruktura – SDG 11: Održivi gradovi i zajednice – SDG 13: Klimatske promjene – SDG 17: Partnerstva za ciljeve Povezanost tematskih jedinica sa navedenim ciljevima održivog razvoja objašnjena je detaljnije u nastavku. "SDG 8": Analiza opravdanosti i "Cost-benefit" analiza pomažu u odabiru učinkovitih i inovativnih rješenja u domenu saobraćajne infrastrukture. (podcilj "SDG 8.1": Održavati visoke stope rasta BDP-a uz održivost) "SDG 9": Metodološki pristup saobraćajnom planiranju i razumijevanje teorijskih pretpostavki doprinosi poboljšanju infrastrukture i inovacija u saobraćaju. Projektovanje saobraćajnica i metode vrednovanja cestovnih dionica su ključni za razvoj kvalitetne i funkcionalne infrastrukture. Učinkovito upravljanje projektima ključno je za uspješnu realizaciju i održivost saobraćajne infrastrukture. (podcilj "SDG 9.1": Održavati visoke stope rasta BDP-a uz održivost; podcilj "SDG 9.a": Podržati istraživanje i inovacije za izgradnju održive infrastrukture) "SDG 11": Povezanost sa ovim ciljem zasniva se na važnosti održivog urbanog planiranja i upravljanja razvojem, uključujući i saobraćajnu infrastrukturu kao ključni segment. Takođe, zahvaljujući funkcionalnom vrednovanju teži se ka tome da projektna rješenja zadovolje potrebe zajednice i doprinesu održivosti. (podcilj "SDG 11.2": Osigurati da cestovne dionice doprinose sigurnom i efikasnom saobraćaju) "SDG 13": Ekološko vrednovanje doprinosi razumijevanju i minimizaciji negativnih uticaja saobraćajne infrastrukture na okolinu. (podcilj "SDG 13.2": Integrirati mjere za ublažavanje klimatskih promjena u nacionalne politike i strategije) "SDG 17": Priprema projekata za finansiranje iz EU fondova uključuje saradnju i partnerstva koja doprinose postizanju ciljeva održivog razvoja. (podcilj "SDG 17.16": Ojačati globalna partnerstva i suradnje za održivi razvoj; podcilj "SDG 17.3": Mobilizirati dodatne resurse za razvoj u zemljama u razvoju kroz međunarodne financijske institucije)
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi i praktičnog dijela nastave koja uključuje izradu projektnih zadataka. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom i prikazom primjera iz prakse. Inicira diskusija o problemima u oblasti planiranja i projektovanja saobraćajne infrastrukture. Studenti će biti obavezni izraditi i prezentirati seminarske radove i/ili projektne zadatake. U realizaciji nastave se koriste različite metode koje uključuju: usmeno izlaganje i diskusije, demonstracije primjera, metoda grafičkih i video prikaza i potenciranje rada u grupama primjenom odgovarajućih

	metodoloških pristupa.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Prisustvo nastavi i vježbama će se voditi, prisustvo nastavi obavezno kao uslov za polaganje ispita uz max. 10% izostanaka bez opravdanja. Redovno prisustvo se neće dodatno bodovati. Potpis nije uslovljen prisustvom na nastavi. Domaća zadaća/seminarski rad/praktični rad/ od 0 do 15 bodova, a ocijeniti će se samo oni studenti koji su zadovoljili preko 50 % od navedenih obaveza; U toku nastave će se organizovati samo jedna provjera znanja - Parcijalni ispit u 7 ili 8 sedmici nastave sa vrednovanjem od 35 bodova, s tim da će se bodovati samo oni studenti koji su položili preko 50 % od navedenog parcijalnog ispita. Završni ispit iznosi maksimalno 50 bodova.
Literatura:	Obavezna: 1. Jovanović, N.:"Planiranje saobraćaja", Saobraćajni fakultet Univerziteta u Beogradu, 1990. 2. Kuzović, Lj.:"Vrednovanje u upravljanju i razvojem i eksploatacijom putne mreže", Saobraćajni fakultet Univerziteta u Beogradu, 1994. 3. Milosavljević, N.:"Elementi za tehnološko projektovanje objekata u cestovnom saobraćaju i transportu", Univerzitet u Beogradu, 1998. 4. Kuzović, Lj.:"Utvrđivanje potreba i opravdanosti izdvajanja tranzitnog saobraćaja sa gradskih arterija izgradnjom obilaznica", Univerzitet u Beogradu, 1997. 5. Highway Capacity Manual – HCM 1994 / HCM 2000 6. Kiso, F., Deljanin,A.: "Metode vrednovanja u planiranju i projektovanju saobraćajne infrastrukture", Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, 2017.

Šifra predmeta: 13-14-15-2TRWES020203	**Naziv predmeta: TEHNOLOŠKE ANALIZE ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima da ovladavaju znanjima, disciplinama i alatima iz oblasti analize pokazatelja relevantnih za željeznički saobraćaj zatim za izračun i dimenzionisanje kapaciteta koji su u funkciji izvršenja reda vožnje i realizacije planiranog obima prevoza.		
Tematske jedinice:	1. Uvod – Tehnološke analize kao metodologija rada 2. Organizacija i tehnologija rada stanica općenito 3. Analiza tehnologije rada ranžirnih i rasporednih stanica		

	4. Organizacija kolskih tokova i parametri za njhovu analizu 5. Organizacija rada železničkih čvorova 6. Organizacija i tehnologija rada kapaciteta za održavanje šinskih vozila 7. Tehnologija i organizacija rada vuče vozova 8. Organizacija i tehnologija putničkog saobraćaja 9. Tehnologija manevarskog rada 10. Analiza kvalitativnih pokazatelja u železničkom saobraćaju 11. Tehnologija i organizacija rada službi koje pokrivaju oblast železničke infrastrukture 12. Organizacija i tehnologija rada u industrijskim kompleksima i lukama 13. Tehnologija i organizacija rada na industrijskim železnicama 14. Tehnološki kapaciteti drugih šinskih sistema 15. Kvalitet transportne usluge kao konačan proizvod železnice
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za tehnologije rada ranžirnih i rasporednih stanica i formiranje kolskih tokova. Za očekivati je da studenti i posjetu privrednim sistemima koji rade sa željeznicom steknu uvid i jasnu sliku privrednih događanja u kojima železnica funkcioniše. Kroz analize rada železničkih servisa radionica i tehničkih službi očekuje se da studenti staknu kvalitetna znanja za modeliranje praćenje i kvalitetnu analizu dobijenih rezultata u cilju unapređenja tih procesa. Vještine: Kvalitetne tehnološke analize u pobrojanim oblastima garantuju studentima sticanje određenih stručnih kompetencija. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 3 - Osigurati zdravlje i blagostanje za sve ljude u svim uzrastima, SDG 7 - Osigurati pristupačnu, pouzdanu, održivu i modernu energiju za sve, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim
Metode izvođenja nastave:	Tokom izvođenja programa nastavnik izlaže pojedine tematske jedinice (ex katedra), omogućava studentima praćenje video zapisa sa edukativnim sadržajem (DVD, video prezentacije) iz predmetne oblasti i organizuje diskusije na zadanu temu (interaktivna nastava). U okviru vježbi provodi se razmatranje i rješavanje primjera i zadataka sukladno teoretskoj tematici, pomaže se studentima u samostalnom rješavanju zadataka, u izradi programa, projekata i seminarskih radova.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje

	svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%) Završni ispit (II parcijalni ispit):.... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Salketić, S., Kudumović, Dž., Branković, N.:Osnove tehnologije željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 2016. 2. Beširević, S.:Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 1997. 3. Branković, N.: Infrastruktura željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije Sarajevo, 2010. 4. Bogović, B.:Organizacija željezničkog prometa, Fakultet prometnih znanosti, Zagreb, 1987

	5. Kovačević, P.:Eksploatacija železnica, Viša železnička škola, Beograd, 1998. 6. Čičak, M. Vesković, S. Mladenović, S.: Modeli za utvrđivanje kapaciteta železnice, Saobraćajni fakultet Univerziteta u Beogradu, 2009. 7. Čičak, M. Vesković, S.: Organizacija železničkog saobraćaja II, Saobraćajni fakultet Univerziteta u Beogradu, 2005. 8. Mandić, D.:Organizacija vuče vozova, Saobraćajni fakultet Univerziteta u Beogradu, Beograd, 2002. Dopunska: 1. Fejzić, E.: Pojava i razvoj željeznice i željezničkih putničkih terminala, IKD UNIVERSITY PRESS Sarajevo i Građevinska Knjiga, Beograd, 2011. 2. Milošević, B.:Železničke pruge, Saobraćajni fakultet u Beogradu, Beograd, 1979 3. Bukljaš, Z.: Tehnički elementi sigurnosti željezničkog prometa, Fakultet prometnih znanosti Zagreb, 1989.

Šifra predmeta: 13-14-15-3TRWES020203	**Naziv predmeta:**	**ŠINSKI SISTEMI U JAVNOM GRADSKOM PREVOZU**	
Ciklus: II	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja 45 Vježbe 30 Laboratorijske vježbe 15	
Učesnici u nastavi:	Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Sticanje edukacijskih oblika u realizaciji programa iz šinskih sistema u javnom gradskom prevozu. Sticanje znanja i vještina iz šinskih sistema u javnom gradskom prevozu.		

Tematske jedinice:
(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)

R.b.	Nastavne cjeline	Broj sati (P+V+L+S+ Sr)
1.	Sistemi u javnom gradskom prevozu putnika	2 x (3+2+1+2+2)
2.	Tehnologija šinskih vozaila gradskog prevoza putnika	3 x (3+2+1+2+2)
3.	Infrastruktura šinskih sistema u javnom gradskom prevozu	2 x (3+2+1+2+2)
4.	Organizacija linijskog prevoz putnika šinskim sistemima	3 x (3+2+1+2+2)
5.	Eksploatacioni pokazatelji, organizacija i ekonomika šinskih sistema u javnom gradskom prevozu	3 x (3+2+1+2+2)
6.	Kvalitet usluge šinskih sistema u javnom	2 x

	gradskom prevozu (3+2+1+2+2)
Ishodi učenja: (Znanje; vještine; kompetencije)	Osposobljavanje studenata za racionalnu organizaciju i upravljanje šinskim sistemima u javnom gradskom putničkom prevozu u skladu sa saobraćajnim potrebama korisnika, interesima društvene zajednice i davaoca usluga. Osposobiti studente za pravilno tretiranje, planiranje i rješavanje problematike šinskih sistema javnog gradskog putničkog prevoza.
Cilj održivog razvoja (SDG):	Za predmet "Šinski sistemi u javnom gradskom prevozu," ciljevi i podciljevi održivog razvoja (SDG) su: Cilj 4: Osigurati inkluzivno i kvalitetno obrazovanje, te promovirati mogućnosti cjeloživotnog učenja za sve ljude, svih životnih dobi Podciljevi: • 4.3: Osigurati jednak pristup kvalitetnom tehničkom, stručnom i tercijarnom obrazovanju, uključujući univerzitetsko obrazovanje, za sve, uključujući osobe sa invaliditetom, pripadnike marginaliziranih grupa i ranjive kategorije. • 4.4: Povećati broj mladih i odraslih koji posjeduju relevantne vještine, uključujući tehničke i profesionalne vještine, za zapošljavanje, dostojanstven rad i preduzetništvo. • 4.7: Osigurati da svi učenici stiču znanja i vještine potrebne za promicanje održivog razvoja, uključujući, između ostalog, putem obrazovanja za održivi razvoj i održive stilove života, ljudska prava, rodnu ravnopravnost, promociju kulture mira i nenasilja, globalnog građanstva, i uvažavanje kulturne raznolikosti. Cilj 9: Industrija, inovacije i infrastruktura Podciljevi: • 9.1 Razviti kvalitetnu, pouzdanu, održivu i otpornu infrastrukturu, s fokusom na šinske sisteme u gradskom prevozu putnika, koji podržavaju ekonomski razvoj i poboljšanje kvaliteta života. • 9.4 Do 2030. godine unaprijediti infrastrukturu šinskih sistema da postanu održive, s povećanom učinkovitošću resursa i korištenjem ekološki prihvatljivih tehnologija. Cilj 11: Održivi gradovi i zajednice Podciljevi: • 11.2 Do 2030. godine osigurati pristup sigurnim, pristupačnim i održivim šinskim transportnim sistemima za sve, s posebnim naglaskom na ranjive grupe u urbanim sredinama. • 11.6 Smanjiti negativan utjecaj gradova na okoliš, uključujući kvalitet zraka, s fokusom na smanjenje emisija kroz efikasan javni prevoz. Cilj 12: Održiva potrošnja i proizvodnja Podciljevi:

	• 12.2 Do 2030. godine postići održivo upravljanje i učinkovito korištenje prirodnih resursa u razvoju i održavanju šinskih sistema. Cilj 13: Klimatska akcija Podciljevi: • 13.2 Integrirati mjere klimatskih promjena u politike, strategije i planiranje javnog gradskog prevoza, s posebnim fokusom na smanjenje emisija kroz korištenje šinskih sistema. Povezanost s nastavnim cjelinama: • Sistemi u javnom gradskom prevozu putnika (1) i infrastruktura šinskih sistema (3) direktno doprinose razvoju održive transportne infrastrukture u gradovima. • Tehnologija šinskih vozila (2) i organizacija linijskog prevoza (4) povezuju se sa inovacijama i povećanjem efikasnosti u javnom gradskom prevozu. • Eksploatacioni pokazatelji, organizacija i ekonomika šinskih sistema (5) pomažu u optimizaciji resursa i smanjenju troškova, što je u skladu s ciljevima održive potrošnje. • Kvalitet usluge šinskih sistema (6) osigurava da šinski sistemi pružaju visok nivo usluge uz minimalan uticaj na životnu sredinu, doprinoseći ciljevima održivih gradova i klimatske akcije.
Metode izvođenja nastave:	Predavanja, vježbe i izrada seminraskog rada sa praktični osvrtom. Analitički i demonstracioni pristup.
Metode provjere znanja sa strukturom ocjene:	Praćenje rada studenta se vrši dodjeljivanjem bodova za svaki oblik aktivnosti i provjere znanja u toku semestra, kao i na završnom ispitu nakon završetka semestra prema sljedećim elementima praćenja: • Domaća zadaća/seminarski rad/praktični rad/ 15 bodova (%), vrednuje se ako je položeno preko 50 % • I Parcijalni ispit/I test/I provjera znanja/35 bodova (%), vrednuje se ako je položeno preko 50 % • Završni ispit (II Parcijalni) 50 bodova (%), vrednuje se ako je položeno preko 50%. • Završni ispit (Integralni) 85 bodova (%), vrednuje se ako je položeno preko 50%. Ukupan broj bodova (%) koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova (%), što sa Završnim (II parcijalnim) čini 100 bodova (%). Za studente koji nisu položili I Parcijalni ispit, Završni ispit (Integralni) se organizuje iz cjelokupnog pređenog gradiva u toku nastave i vježbi vrednuje se sa 85 bodova (%), što sa seminarskim radom/praktičnim radom čini 100 bodova (%). Konačan uspjeh studenata nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 (A) - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova;

	b) 9 (B) - iznad prosjeka, sa ponekom greškom, nosi 85-94.99 boda; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84,99 boda; d) 7 (D) - općenito dobar, ali sa značajnim nedostacima, nosi 65-74,99 boda; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64,99 boda; f) 5 (F, FX) - ne zadovoljava minimalne uslove, manje od 55 bodova.
Literatura:	Obavezna: 1. Mehanović, M., 2011. „Planiranje ponude usluga u gradskom prometu putnika“. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo. 2. Mehanović, M.: “Zadaci i primjeri iz teorije i prakse u javnom gradskom prevozu putnika”, Fakultet za saobraćaj i komunikacije, Sarajevo, 2005. Dopunska: 1. Vučić, V.: Urban Public Transportation, Sistems and Technology, Prentice Hall International England, 1981. 2. Županović, I.: Tehnologija cestovnog prijevoza, Fakultet prometnih znanosti, Zagreb, 2002.g. 3. Hounsel N. B., Dalla Chiara B., i drugi, Innovation in urban public transport, Politecnico di Torino, Universiti of Sarajevo, Universiti of Southampton, 2002.g.

Šifra predmeta: 13-14-15-4TRWES020203	**Naziv predmeta: METODOLOGIJA ISTRAŽIVAČKOG I NAUČNOG RADA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju kako je naznačena u ovoj rubrici]		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Studenti kroz nastavni proces predavanja, vježbe, seminarski rad i praktičan rad trebaju steći odgovarajuća osnovna i dodatna znanja iz oblasti metodologije naučnog i stručnog rada. Predmet „Metodologija istraživačkog i naučnog rada“ treba da osigura nivo znanja o svim načelima, metodama, ciljevima, instrumentima istraživačkog i naučnog rada kao i način definisanja i implementacije izrade naučnih i stručnih radova.		
Tematske jedinice: *(po potrebi plan izvođenja*	1. Uvod u metodologiju istraživačkog rada. Funkcija istraživačkog rada.		

po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)	2. Znanost o naukama. Definicija znanosti. 3. Osnovna obilježja znanosti. 4. Funkcije znanosti – istraživački rad: Funamentalna istraživanja 5. Primjenjena istraživanja. Razvojna istraživanja. Individualna i timska istraživanja. 6. Osnovne metode istraživanja. 7. Klasifikacija i selekcija metoda. 8. Tehnologija istraživačkog rada, uočavanje istraživačkog problema i njegova funkcija. 9. Izbor i analiza teme. 10. Sastavljanje radne biografije: priručnici, enciklopedije, rječnici, monografije. 11. Kako se definira predmet i cilj istraživanja? 12. Šta je istraživački rezultat i kako se verificira? 13. Pisanje i prezentacija izvještaja istraživačkog rada. 14. Koncept, uvod, izlaganje problema, argumentacija i diskusija rezultata. 15. Pisanje izbora metode istraživanja. 16. Pisanje magistarskih radova
Ishodi učenja:	Teorijska i praktična znanja iz oblasti naučne i istraživačke djelatnosti. Predmet proučavanja treba da osigura nivo kompetencija i znanja potrebnih za rješavanje svakodnevnih problema u navedenoj oblasti. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti naučne i istraživačke djelatnosti. Kompetencije: Sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti naučne i istraživačke djelatnosti.
Cilj održivog razvoja (SDG):	SDG4 – „Osigurati uključivo i kvalitetno obrazovanje te promovirati mogućnosti cjeloživotnog učenja“; SDG5 – “Postići rodnu ravnopravnost i osnažiti sve žene i djevojke”; SDG9 – “Izgraditi prilagodljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost”.
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi, laboratorijskih vježbi/terenskog rada/prakse. Zastupljene su sljedeće metode: metoda usmenog izlaganja, metoda razgovora, metoda demonstracije, metoda grafičkih radova, metoda crtanja i metoda rada u skupini. Na predavanima se obrađuju teorijski koncepti i principi uz prikaz opisnih primjera i rješavanje određenih zadataka. Dodatni primjeri se razmatraju i rješavaju kroz vježbe, laboratorijske vježbe/terenski rad/praksu, što omogućava kontinuiran rad i pripremu za samostalno rješavanje problema. Na laboratorijskim vježbama/terenskom radu/praksi razvijat će se

	vještine potrebne za individualni i timski rad u cilju izvršavanja zadataka iz zadane oblasti.
Metode provjere znanja sa strukturom ocjene:	Ocjena kreativnosti na nastavi i vježbama uz izradu samostalnih radova, ocjena parcijalnog testa u toku nastave kao i ocjena završnog ispita. Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: • Domaća zadaća/seminarski rad/praktični rad/ 15 bodova (%), položeno ako se osvoji preko 50 %. • I Parcijalni ispit/test/I provjera znanja/35 bodova (%), položen je ako se osvoji preko 50 %. • Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji preko 50 %. • Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji preko 50 %. Ukupan broj bodova (%) koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova (%), što sa Završnim (II parcijalnim) čini 100 bodova (%). Za studente koji nisu položili I Parcijalni ispit, Završni ispit (Integralni) se organizuje iz cjelokupnog pređenog gradiva u toku nastave i vježbi, i vrednuje se sa 85 bodova (%), što sa seminarskim radom/praktičnim radom čini 100 bodova (%). Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 (A) - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 (B) - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, manje od 55 bodova. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza i polaganjem parcijalnog i završnog ispita, a prema kvalitetu stečenih znanja i vještina, i sadrži maksimalno 100 bodova, te se utvrđuje prema sljedećoj skali: Obaveze studenta Bodovi (%) Prisutnost na predavanjima i vježbama. - Zadaća/Seminarski/Praksa/.....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni) .....50 bodova (%)

	Završni ispit (Integralni) .....85 bodova (%)
Literatura:	Obavezna: 1. Š. Čekić: Osnovi metodologije i tehnologije izrade znanstvenog istručnog djela, Fakultet za saobraćaj i komunikacije, Sarajevo,1999 2. S. Dubić: Uvođenje u naučni rad, Zavod za izdavanje udžbenika,Sarajevo 1970. 3. M.Šamić: Kako nastaje naučno djelo, Svjetlost, Sarajevo,1980. 4. M.Vujović: Uvođenje u znanstveni rad, Informator, Zagreb, 1983 5. M. Filipović: Metodologija znanosti i znanstvenog rada,Svjetlost,Sarajevo 2004. 6. V. Silubrčić: Kako sastaviti, obajaviti i ocjeniti znanstveno djelo,Zagreb, 2003. 7. L. Kuba – Dž. Koking: Metodologija izrade naučnog teksta, CID;Podgorica,2004. 8. S. Kukić: Metodologija znanstveno istraživačkog rada,Ekonomski Fakultet, Mostar 2005.

Šifra predmeta: 13-14-15-5TRWES020203	**Naziv predmeta: SAOBRAĆAJNA POLITIKA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita: 6**
Status: Izborni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi		**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** Predmetni nastavnik: **Prof.dr. Nedžad Branković** Predmetni asistent: mr.sc. Esad Jalovčić, dipl.ing.saob.	
Preduslov za upis:		NE	
Cilj (ciljevi) predmeta:		Studenti stiču osnovna teorijska znanja potrebna za izučavanje prometne politike: nacionalni značaj transportnog sistema i integracija u europske prometne tokove, alokacija pozitivnih i negativnih učinaka integracije saobraćajne politike. Piramidalna struktura i ingerencija prilikom definisanja i realizacije saobraćajnih prioriteta na nacionalnom i međunardonom nivou.	
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje*		– Pristupne osnove nacionlanoj prometnoj politici: pojam politike, vrste politike, funkcija politike kao pristupna osnova nacionalne prometne politike,	

uvažavajući specifičnosti organizacionih jedinica)	– Komponente nacionalne prometne politike: Nositelji prometne politike, ciljevi prometne politike, instrumenti prometne politike, odnos ciljeva i instrumenata prometne politike, – Načela nacionalne prometne politike – I dio: povezanosti prometa i ekonomije, usklađivanja djelovanja prometnog sustava i društvene rentabilnosti. – Načela nacionalne prometne politike – II dio: Načela jedinstvenog prometnog sustava, alokacije resursa, vlasništva i jednakih mogućnosti rada, izbora prometne politike i ostvarivosti prometne politike – Formuliranje prometne politike: Formuliranje, vrednovanje, efikasnost nacionalne prometne politike. Pojam i značenje determinanata prometne politike. – Usklađenost prometne politike – I dio: Ciljevi zajedničke prometne politike. Opće političke smjernice zajedničke prometne politike. – Usklađenost prometne politike – II dio: Primjena i rasprave o budućnosti prometa u okviru zajedničke prometne politike. – Transeuropska prometne mreža – I dio: Smjernice iz 1996. i revizija smjernica za transeuropsku prometnu mrežu iz 2004. godine. – Transeuropska prometne mreža – II dio: Revizija smjernica iz 2013. godine: integrirana mreža, dvoslojna struktura i koridori transeuropske prometne mreže. – Transeuropska prometne mreža – III dio: Dodatne mogućnosti financiranja projekata transeuropskih mreža. Utvrđivanje općih uvjeta za financiranje projekata transeuropskih mreža. – Transeuropska prometne mreža – IV dio: Instrument i opći ciljevi za povezivanje europe transeuropskom mrežom. Proračun Instrumenta za povezivanje Europe transeuropskom mrežom – Sektorske politike EU – I dio: Cilj i područje primjene Direktive 97/67/EZ europskog Parlamenta i Vijeća. Univerzalne poštanske usluge. – Sektorske politike EU – II dio: Usklađenje poštanskih usluga koje se mogu rezervirati. Uvjeti pružanja nerezerviranih poštanskih usluga i pristupa u mrežu. – Sektorske politike EU – III dio: Kvaliteta poštanskih usluga. Usklađenje tehničkih normi prema interesima korisnika. Odbor i nacionalno regulatorno tijelo – Sektorske politike EU – IV dio: Tržišna pravila poštanskog prometa i europska postignuća u oblasti poštanskog prometa.
Ishodi učenja:	**Znanje:** Sposobnost za kreiranje i primjenu saobraćajne politike uvažavajući postavljene predmetne ciljeve. **Vještine:** Identifikacija saobraćajnih i transportnih prioriteta potrebnih za strategijsko planirnje i kreiranje saobraćajne politike u mikro i makro okruženju. Defisnisati ciljeve saobraćajne politike i prihvatljive modele realizacije. Identifikuje prioritete u oblasti planiranja, izgradnje,

	revitalizacije prometnih tokova, izvrši procjenu potrebe za integracijom i liberalizacijom unutrašnjih prometnih tokova prateći europsku I međunarodnu prometnu politiku, direktive i smjernice kao i prometne tokove, ali i prometne tokove i politike zemalja u okruženju. **Kompetencije:** Krairanje unutrašnjeg efikasnog i efektivnog transportnoog sistema i integracija u međunarodne i EU transportne sisteme
Cilj održivog razvoja (SDG):	Ciljevi održivog razvoja i uticaj na saobraćajnu politiku: 1. SDG 1 - Svijet bez siromaštva 2. SDG 2 - Svijet bez gladi 3. SDG 5 – Rodna ravnopravnost 4. SDG 6 – Čista voda i sanitarni uvjeti 5. SDG 7 – Pristupačna energija iz čistih izvora 6. SDG 8 - Dostojanstven rad i ekonomski rast 7. SDG 9 – Industrija, inovacije i infrastruktura 8. SDG 10 – Smanjenje nejednakosti 9. SDG 11 – Održivi gradovi i zajednice 10. SDG 12 - Održiva ppotrošnja i proizvodnja 11. SDG 13 – Zaštita klime 12. SDG 14 – Očuvanje vodenog svijeta 13. SDG 15 – Očuvanje života na zemlji 14. SDG 16 – Mir, pravda i snažne institucije 15. SDG 17 – Partnerstvom do cilja
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi i praktičnog dijela nastave koja uključuje izradu projektnih zadataka. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom i prikazom primjera iz prakse. Inicira diskusija o problemima planiranja, modeliranja i analize informacijskih sistema. Studenti će biti obavezni izraditi i prezentirati seminarske radove i/ili projektne zadatake. U realizaciji nastave se koriste različite metode koje uključuju: usmeno izlaganje i diskusije, demonstracije primjera, metoda grafičkih i video prikaza i potenciranje rada u grupama primjenom odgovarajućih metodoloških pristupa.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Aktivnost (seminarski rad / projektni zadatak): od 0 do 15 bodova; I test / I provjera znanja / I parcijalni ispit: od 0 do 35 bodova. Ukupan broj bodova koji studenta može ostvariti u toku nastave može iznosi maksimalno 50 bodova. Završni / popravni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva (II parcijalni) koji se vrednuje sa 50 bodova ili se sastoji od kompletnog gradiva, tj. I i II parcijalnog ispita. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu zasnovana je na ukupnom broju bodova (%) koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminarski / Projektni zadatak:..... 15 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 35 bodova (%)

	Završni ili popravni ispit (II parcijalni ispit):..... 50 bodova (%) Potreban uslov za uspješno okončan ispit je postignut rezultat od 55 bodova pri čemu na svakom dijelu ispita treba ostvariti minimalno 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit mora ostvariti sljedeće uslove: - Aktivnost (seminarski rad / projektni zadatak): 9 bodova - I test / I provjera znanja / parcijalni ispit: 19 bodova - Završni ili popravni ispit (II parcijalni ispit): 27 bodova Studenti koji su položili parcijalni ispit, na završnom / popravnom ispitu polažu samo drugi dio gradiva (dio koji nije obuhvaćen parcijalnim ispitom). Studenti koji nisu položili parcijalni ispit, u okviru završnog / popravnog ispita polažu kompletno gradivo, pri čemu kriteriji za polaganje ispita ostaje identični. Završni / popravni ispit se organizuje kao pismeni i/ili usmeni. Aktivnost se može pratiti kroz izradu zadaće, seminarskih radova, projektnih zadataka ili polaganje kvizova. Konačan uspjeh studenta nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom ocjenjivanja kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama, nosi 95-100 bodova; b) 9 - iznad prosjeka, sa ponekom greškom, nosi 85-94 bodova; c) 8 - prosječan, sa primjetnim greškama, nosi 75-84 bodova; d) 7 - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74 bodova; e) 6 - zadovoljava minimalne uslove, nosi 55-64 bodova; f) 5 - ne zadovoljava minimalne uslove, manje od 55 bodova. Navedena skala se može korigovati prema Pravilima studiranja na Univerzitetu u Sarajevu (Član 45).
Literatura:	Obavezna: 1. Juraj Padjen, Prometne politikaHrvatske, Masmedia, Zagreb 2003. godina. 2. Piero Soave, „Kratak vodić o Europskoj uniji“, Eurospki parlament, oktobar 2016. godine. 3. Marc Thomas, „Kratak vodić o Europskoj uniji“, Eurospki parlament, septembar 2016. godina. 4. Beata Tuszynska i Frederic Gouarderes, „Kratak vodić o Europskoj uniji“, Eurospki parlament, oktobar 2016. Godine. Dopunska: 1. Direktiva 97/67/EZ EUROPSKOG PARLAMENTA I VIJEĆA OD 15.12.1997. godine, „Službeni list Europskih zajednica“ br. 6/Sv. 9 od 21.01.1998. godine.

	2. Direktiva 2002/39/EZ EUROPSKOG PARLAMENTA I VIJEĆA OD 10.06.2002. godine, „Službeni list Europskih zajednica“ br. 6/Sv. 1 od 05.07.2002. godine. 3. Direktiva 2008/6/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 20.02.2008. godine o izmjeni i Direktiva 97/67/EZ u pogledu potpunog postizanja unutarnjeg tržišta poštanskih usluga u Zajednici, „Službeni list Europskih zajednica“ br. 06/Sv. 9 od 27.02.2008. godine. 4. Direktiva 2008-68-EZ EUROPSKOG PARLAMENTA I VIJEĆA od 24.09.2008. godine “Službeni list EU 7/Sv.7” Kopneni prijevoz opsanih tvari. 5. Direktiva 2010/40EU EUROPSKOG PARLAMENTA I VIJEĆA od 07.07.2010. “Službeni list EU 7/Sv.8” Okvir za uvođenje inteligentnih prometnih sustava u cestovnom prometu I za veze sa ostalim vrstama prevoza. 6. DIREKTIVA 2004/54/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 29. travnja 2004. o minimalnim sigurnosnim zahtjevima za tunele u transeuropskoj cestovnoj mreži 7. „DIREKTIVA 2008/96/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 19. studenoga 2008. o upravljanju sigurnošću cestovne infrastrukture 8. DIREKTIVA 2009/33/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 23. travnja 2009. o promicanju čistih i energetski učinkovitih vozila u cestovnom prijevozu 9. DIREKTIVA 1999/62/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 17. lipnja 1999. o naknadama koje se naplaćuju za korištenje određenih infrastruktura za teška teretna vozila 10. DIREKTIVA 2004/52/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 29. travnja 2004. o interoperabilnosti elektroničkih sustava za naplatu cestarine u Zajednici 11. DIREKTIVA (EU) 2019/520 EUROPSKOG PARLAMENTA I VIJEĆA od 19. ožujka 2019. o interoperabilnosti elektroničkih sustava za naplatu cestarine i olakőavanju prekogranične razmjene informacija o neplaćanju cestarina u Uniji 12. UREDBA (EZ) br. 1072/2009 EUROPSKOG PARLAMENTA I VIJEĆA od 21. listopada 2009. o zajedničkim pravilima za pristup tržištu međunarodnog cestovnog prijevoza teret 13. UREDBA (EZ) br. 561/2006 EUROPSKOG PARLAMENTA I VIJEĆA od 15. ožujka 2006. o usklađivanju određenog socijalnog zakonodavstva koje se odnosi na cestovni promet i o izmjeni uredbi Vijeća (EEZ) br. 3821/85 i (EZ) br. 2135/98 te o stavljanju izvan snage Uredbe Vijeća (EEZ) br. 3820/85 14. DIREKTIVA 2002/39/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 10. lipnja 2002. o izmjeni Direktive 97/67/EZ u vezi s daljnjim otvaranjem tržišta poštanskih usluga u Zajednice 15. DIREKTIVA 2008/6/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 20. veljače 2008. o izmjeni Direktive 97/67/EZ u pogledu potpunog postizanja unutarnjeg tržišta poštanskih usluga u Zajednici.

	16. UREDBA (EU) br. 952/2013 EUROPSKOG PARLAMENTA I VIJEĆA od 9. listopada 2013. o Carinskom zakoniku Unije. 17. UREDBA (EU) 2018/644 EUROPSKOG PARLAMENTA I VIJEĆA od 18. travnja 2018. o uslugama prekogranične dostave paketa 18. DIREKTIVA (EU) 2019/789 EUROPSKOG PARLAMENTA I VIJEĆA od 17. travnja 2019. o utvrđivanju pravila o ostvarivanju autorskog prava i srodnih prava koja se primjenjuju na određene internetske prijenose organizacija za radiodifuziju i reemitiranja televizijskih i radijskih programa te o izmjeni Direktive Vijeća 93/83/EEZ 19. UREDBA (EU) 2015/2120 EUROPSKOG PARLAMENTA I VIJEĆA od 25. studenoga 2015. o utvrđivanju mjera u vezi s pristupom otvorenom internetu te o izmjeni Direktive 2002/22/EZ o univerzalnoj usluzi i pravima korisnika u vezi s elektroničkim komunikacijskim mrežama i uslugama i Uredbe (EU) br. 531/2012 o roamingu u javnim pokretnim komunikacijskim mrežama u Uniji. 20. UREDBA (EU) 2018/1971 EUROPSKOG PARLAMENTA I VIJEĆA od 11. prosinca 2018. o osnivanju Tijela europskih regulatora za elektroničke komunikacije (BEREC) i Agencije za potporu BEREC-u (Ured BEREC-a), izmjeni Uredbe (EU) 2015/2120 i stavljanju izvan snage Uredbe (EZ) br. 1211/2009 21. UREDBA (EU) 2019/1150 EUROPSKOG PARLAMENTA I VIJEĆA od 20. lipnja 2019. o promicanju pravednosti i transparentnosti za poslovne korisnike usluga internetskog posredovanja 22. UREDBA (EZ) br. 549/2004 EUROPSKOG PARLAMENTA I VIJEĆA od 10. ožujka 2004. o utvrđivanju okvira za stvaranje jedinstvenog europskog neba 23. UREDBA (EZ) br. 550/2004 EUROPSKOG PARLAMENTA I VIJEĆA od 10. ožujka 2004. o pružanju usluga u zračnoj plovidbi u jedinstvenom europskom nebu 24. UREDBA (EZ) br. 552/2004 EUROPSKOG PARLAMENTA I VIJEĆA od 10. ožujka 2004. o interoperabilnosti Europske mreže za upravljanje zračnim prometom 25. UREDBA (EU) 2019/712 EUROPSKOG PARLAMENTA I VIJEĆA od 17. travnja 2019. o zaštiti tržišnog natjecanja u zračnom prijevozu i stavljanju izvan snage Uredbe (EZ) br. 868/2004 26. DIREKTIVA 2012/34/EU EUROPSKOG PARLAMENTA I VIJEĆA od 21. studenoga 2012. o uspostavi jedinstvenog Europskog željezničkog proctora 27. DIREKTIVA (EU) 2016/797 EUROPSKOG PARLAMENTA I VIJEĆA od 11. svibnja 2016. o interoperabilnosti željezničkog sustava u Europskoj uniji 28. DIREKTIVA (EU) 2016/798 EUROPSKOG PARLAMENTA I VIJEĆA od 11. svibnja 2016. o sigurnosti željeznica, 29. UREDBA (EU) 2016/796 EUROPSKOG PARLAMENTA I VIJEĆA od 11. svibnja 2016. o Agenciji Europske unije za željeznice I stavljanju izvan snage Uredbe (EZ) br. 881/2004

	30. UREDBA (EZ) br. 1371/2007 EUROPSKOG PARLAMENTA I VIJEĆA 31. od 23. listopada 2007. o pravima i obvezama putnika u željezničkom prometu 32. Bilješke i slajdovi s predavanja (mogu se preuzeti sa službene internet stranice Fakulteta za saobraćaj i komunikacije i elektronska distribucija svakom pojedinačnom studentu)

Šifra predmeta: 13-14-15-6TRWES020203	**Naziv predmeta: GEOINFORMACIJSKI SISTEMI**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj sati: 90** Predavanja: 45 Vježbe: 30 Seminari i projektni zadaci: 15	
Učesnici u nastavi			
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Upoznavanje studenata sa osnovnim konceptima GIS sistema, načinom rada ovih sistema, planiranjem, implementacijom i mogućim primjenama.		
Tematske jedinice:	1. Pojam geoinformacijskih sistema (GIS) 2. Komponente GIS-a 3. Proces prikupljanja i manipulacije GIS podacima 4. Struktura i modeli prostornih podataka 5. Upravljanje bazom podataka 6. Koordinatni sistemi, projekcije, georeferenciranje 7. Baze geografskih podataka 8. Standardizacija u GIS-u 9. Izlazni podaci i kartografija 10. Tehnike grafičkog prikaza 11. Principi slojevitog prikaza prostornih podataka 12. Oblasti primjene i osnovne GIS funkcije 13. Web i mobilni GIS 14. Primjena GIS-a u planiranju telekomunikacijske infrastrukture 15. Primjena GIS-a u planiranju saobraćajne infrastrukture		
Ishodi učenja:	**Znanje:** Studenti će biti upoznati sa osnovnim konceptima razvoja i standardizacijom u oblasti GIS-a, principima web i mobilnih GIS sistema kao i konkretnoj primjeni sa posebnim fokusom na oblast saobraćaja i komunikacija. Studenti će se upoznati sa procesom razvoja GIS sistema, od trenutka javljanja ideje i potrebe za GIS-om,		

	prikupljanja podataka i formiranja GIS baze podataka, georeferenciranja, grafičkog prikaza i korištenja GIS sistema. **Vještine:** Studenti će savladati određene softverske alate potrebne za projektovanje i razvoj GIS sistema. **Kompetencije:** Nakon položenog ispita student će biti u mogućnosti planirati, projektovati i razvijati GIS sisteme i izvršiti odabir odgovarajućih tehnologija za razvoj specifičnih rješenja.
Ciljevi održivog razvoja (SDG)	SDG9 – Industrija, inovacije i infrastruktura SDG11 – Održivi gradovi i zajednice
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi i praktičnog dijela nastave koji uključuje laboratorijske vježbe. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom i prikazom primjera iz prakse. Vježbe i laboratorijske vježbe održavaju se uz upotrebu softverskih alata za rješavanje konkretnih problemskih i praktičnih zadataka. Studenti će biti obavezni izraditi i prezentirati seminarske radove i/ili projektne zadatake. U toku nastave se koriste različite metode koje uključuju: usmeno izlaganje, razgovori diskusije, demonstracije, individualni i grupni rad, itd.
Metode provjere znanja sa strukturom ocjene:	Ukupan broj bodova koji student može ostvariti u toku nastave je 50 i na završnom ispitu 50. Bodovi u toku nastave su raspoređeni na zadaće i aktivnost i/ili seminar i/ili projektni zadatak i na parcijalni ispit. Završni/popravni ispit uključuje gradivo koje student nije položio na parcijalnom ispitu što znači da obuhvata drugi dio gradiva koji se vrednuje sa 50 bodova za studente koji su položili parcijalni ispit. Studenti koji nisu položili gradivo sa parcijalnog ispita polažu gradivo sa parcijalnog i završnog ispita. Završni / popravni ispit se organizuje kao pismeni i/ili usmeni ispit uz polaganje praktičnog dijela. Ukupno vrednovanje svih obaveza studenta u toku semestra, odnosno ocjena na ispitu, zasnovana je na ukupnom broju bodova koje je student stekao ispunjavanjem predispitnih obaveza, polaganjem parcijalnog i završnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali: Struktura bodovanja Bodovi (%) Seminar / Aktivnost na nastavi / Projektni zadatak:..... 20 bodova (%) I test / I provjera znanja (I parcijalni ispit):..... 30 bodova (%) Završni ili popravni ispit (II parcijalni ispit):..... 50 bodova (%) Potreban uslov za polaganje ispita je 55 bodova u sumi uz ostvarenih najmanje 55% bodova na provjerama znanja (parcijalni ispit i završni/popravni ispit). Konačan uspjeh studenta, nakon svih predviđenih oblika provjere znanja, vrednuje se i ocjenjuje sistemom kako slijedi: a) 10 - izuzetan uspjeh bez grešaka ili sa neznatnim greškama (95-100 bodova); b) 9 - iznad prosjeka, sa ponekom greškom (85-94 bodova); c) 8 - prosječan, sa primjetnim greškama (75-84 bodova); d) 7 - općenito dobar, ali sa

	značajnijim nedostacima (65-74 bodova); e) 6 - zadovoljava minimalne uslove (55-64 bodova); f) 5 - ne zadovoljava minimalne uslove (manje od 55 bodova).
Literatura:	Obavezna: 1. Nastavni materijal dostupan na Intranet portalu Fakulteta za saobraćaj i komunikacije. Dopunska: 1. Kang Tsung Chang, „*Introduction to Geographic Information Systems*“, McGraw-Hill Education, 2019. 2. Paul Bolstad, „*GIS Fundamentals A First Text on Geographic Information Systems,*“ Eider Press, 2016. 3. Ian Heywood, Sarah Cornelius, „*An introduction to geographical information systems*“, Pearson Education Limited, 2006. 4. Kurt Menke, Richard Smith Jr., Luigi Pirelli, John Van Hoesen, „*Mastering QGIS*“,“ Packt Publishing Ltd., 2016. 5. Gábor Farkas, „Practical GIS,“ Packt Publishing Ltd., 2017. 6. Anita Graser, „*Learning QGIS*,“ Packt Publishing Ltd., 2016. 7. Ralph M. Stair, George W. Reynolds, „*Fundamentals of Information Systems*,“ Cengage Learning, 2016. 8. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, „*Systems analysis and design*,“ Wiley, 2015. 9. Patricia Wallace, „*Introduction to Information Systems*,“ Pearson Education, 2015. 10. Arthur M. Langer, „*Analysis and Design of Information Systems, Springer-Verlag*,“ 2008. 11. John Wang, „*Innovations in Supply Chain Management for Information Systems*,“ Business Science Reference, 2010. 12. Christos Kalloniatis: “*Modern Information Systems*,“ InTech Croatia, 2012.

Šifra predmeta: 13-14-15-7TRWES020203	**Naziv predmeta: E LOGISTIKA I EV INFRASTRUKTURA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: IZBORNI PREDMET		**Ukupan broj sati: 3+2+1** Opciono razraditi distribuciju sati po tipu: Predavanja:3 Vježbe:2 Laboratorijske vježbe:1	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet** [u ovu rubriku ne unositi imena. Ostaviti formulaciju		

<table>
<tr><td></td><td>kako je naznačena u ovoj rubrici]</td></tr>
<tr><td>Preduslov za upis:</td><td>NE</td></tr>
<tr><td>Cilj (ciljevi) predmeta:</td><td>Sticanje znanja o osnovama procesa, tehnologijama, planiranju i upravljanju logističkim operacijama u gradskoj logistici (City Logistics) u cilju ekološki održivog razvoja gradske logistike.</td></tr>
<tr><td>Tematske jedinice:
(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)</td><td>1. Koncept gradske logistike.
2. Budućnost gradske logistike – Pametan sustav s nultom emisijom.
3. E-trgovina.
4. Gradska logistika i transport tereta.
5. Električna vozila.
6. Električni kamioni.
7. Razvoj infrastrukture za punjenje električnih vozila.
8. Održiva urbana distribucija.
9. Učinci politika korištenja zemljišta na gradsku logistiku.
10. Smanjenje ugljičnog otiska gradske logistike.
11. Trendovi i razvoj u gradskoj logistici.
12. Pritisak za smanjenje emisija stakleničkih plinova.
13. Korištenje električnih vozila za logističku e-trgovinu.
14. Dugoročni učinci inovativnih mjera gradske logistike.
15. Vizija za energetski učinkovitu gradsku logistiku bez CO2.</td></tr>
<tr><td>Ishodi učenja:</td><td>▪ Sticanje znanja iz područja gradske logistike, planiranja i organizacije logističkih operacija gradske logistike.
▪ Sticanje znanja o održivom razvoju gradske logistike i utjecaju gradske logistike na okoliš, Sticanje znanja o primjeni novih tehnologijama pametne logistike.
▪ Sposobnosti samostalnog razumijevanja, prepoznavanja problema.
▪ Sposobnost učešća u svim fazama planiranja, organizacije logističkih operacija u gradskoj logistici. Sposobnost primjene teorijskih i praktičnih znanja u izvršavanju logističkih operacija u gradskoj logistici.
▪ Sticanje znanja iz optimizacije logističkih procesa i primjene digitalnih tehnologija i ekološki prihvatljivih vozila u logističkim operacijama.</td></tr>
<tr><td>Metode izvođenja nastave:</td><td>Predavanja popraćena multimedijalnim prezentacijama
Auditorne vježbe sa analizom konkretnih primjera iz prakse</td></tr>
<tr><td>Metode provjere znanja sa strukturom ocjene:</td><td>
<table>
<tr><td>Aktivnost u toku predavanja</td><td>-</td><td>Pismeni ispit</td><td>50</td></tr>
<tr><td>Praktična nastava</td><td>-</td><td>Usmeni ispit</td><td>-</td></tr>
<tr><td>Kolokvijumi</td><td>35</td><td></td><td></td></tr>
<tr><td>Seminarski rad</td><td>15</td><td></td><td></td></tr>
</table>
</td></tr>
</table>

	Ukupno		Ukupno	100
Literatura:	1. Taniguchi E., Thompson, R., : *City Logistics 1-New Opportunities and Challenges*, London, ISTE Ltd, 2018. 2. Denton,T., *Electric and Hybrid Vehicles*, Routledge, London, 2020 3. Mckinnon A., Browne M., Whiteing A. *et al*. (eds), *Green Logistics: Improving the Environmental Sustainability of Logistics*, 3rd Edition, Kogan Page, 2015. 4. SUGAR – Sustainable Urban Goods Logistics Achieved by Regional and Local Policies, *City Logistics Best Practices: A Handbook for Authorities*, Bologna, 2011. http://www.sugarlogistics.eu/ 5. Ehrler, V. C., Schöder, D., & Seidel, S. (2021). Challenges and perspectives for the use of electric vehicles for last mile logistics of grocery e-commerce – Findings from case studies in Germany. Research in Transportation Economics, 87, 100757. https://doi.org/10.1016/j.retrec.2019.100757 6. Iwan, S., Nürnberg, M., Jedliński, M., & Kijewska, K. (2021). Efficiency of light electric vehicles in last mile deliveries – Szczecin case study. Sustainable Cities and Society, 74, 103167, https://doi.org/10.1016/j.scs.2021.103167			

Šifra predmeta: 13-13-14-15-8TRWES020203	**Naziv predmeta: OBUKA I OPREMA ZA TRANSPORT OPASNIH MATERIJA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj sati: 3+2+1** Predavanja:3 Vježbe:2 Laboratorijske vježbe:1	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje znanja o naučno-stručnim procesima, procedurama i tehnikama treninga i upotreba mjerne opreme prilikom pripreme i transporta opasnih materija.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti*	Teorijska nastava: 1. Pregled međunarodnih sporazuma iz oblasti TDG. 2. Pravni okvir kojim je uređena oblast TDG.		

<table>
<tr><td>organizacionih jedinica)</td><td>3. Uslovi, sadržaj i načini izvođenja obuke za vozače koji prevoze TDG.
4. Uslovi, sadržaj i načini izvođenja obuke za druge osobe uključene u TDG.
5. Certificiranje uspješnih treninga u TDG.
6. Načini obavljanja treninga vezanih za TDG u razvijenim zemljama.
7. Pregled opreme koja se koristi za TDG.
8. Oprema za osoblje i za vozilo pri TDG.
9. Softver za planiranje rada vozača i plana ruta za TDG.
10. Oprema za praćenje vozila koja prevoze TDG.
11. Oprema za analizu tahografa.
12. Oprema za ispitivanje isparavanja opasnih gasova i drugih opasnih materija, kao i mjerenje statičkog elektriciteta.
13. Procedura za postupanje prilikom nastanka incidentne situacije pri TDG.
14. Arduino oprema za potrebe TDG.
15. Zaključna razmatranja i buduća djelovanja na TDG.</td></tr>
<tr><td>Ishodi učenja:</td><td>▪ Sticanje znanja o osnovama procesa, procedurama i tehnikama treninga za TOM
▪ Sticanje znanja o osnovama procesa, procedurama i tehnikama upotrebe mjerne opreme prilikom pripreme i transporta opasnih materija.
▪ Sticanje znanja o pravnim okviroma kojim je uređena predmetna oblast,
▪ Sticanje znanja o ključnim fazama i načinima realizacije transportnog zadatka, ulogama i odgovornostima
▪ Sticanje znanja o ključnim subjekatima u procesu izvršenja transportnog zadatka.
▪ Sposobnosti samostalnog razumijevanja, prepoznavanja i preveniranja nastanka potencijalno incidentnih situacija u TOM
▪ Sposobnost učešća u svim fazama organizacije i implementacije procesa TOM
▪ Sposobnost primjene teorijskih i praktičnih znanja iz TOM u praksi.</td></tr>
<tr><td>Metode izvođenja nastave:</td><td>– Predavanja popraćena multimedijalnim prezentacijama
– Rješavanje praktičnih problema i konkretnih projektnih zadataka
– Upotreba i mjerenje pojedinih veličina na terenskom radu.</td></tr>
<tr><td>Metode provjere znanja sa strukturom ocjene:</td><td>
<table>
<tr><th colspan="4">Ocjena znanja (maksimalni broj poena: 100)</th></tr>
<tr><th>Predispitne obaveze</th><th>poena</th><th>Završni ispit</th><th>poena</th></tr>
<tr><td>Aktivnost u toku predavanja</td><td>-</td><td>Pismeni ispit</td><td>50</td></tr>
<tr><td>Praktična nastava</td><td>-</td><td>Usmeni ispit</td><td>-</td></tr>
</table>
</td></tr>
</table>

	Kolokvijumi	35		
	Seminarski rad	15		
	Ukupno		Ukupno	**100**
Literatura:	1. ADR: European Agreement Concerning the International Carriage of Dangerous Goods by Road, United Nations Economic Commission for Europe (UNECE), 2023 2. Transportation of Dangerous Goods Regulations, Minister of Justice Canada, 2023 3. Transportation of Dangerous Goods by ground, Worksite Safety 4. Legal regulation of national and lower levels 5. Guidelines on transport of dangerous goods, Transport Community, 2021			

Šifra predmeta: 13-13-14-15-9TRWES020203	**Naziv predmeta: LOGISTIKA TRANSPORTA OPASNIH MATERIJA**		
Ciklus: II	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj sati: 3+2+1** Predavanja:3 Vježbe:2 Laboratorijske vježbe:1	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje znanja o osnovama logistike opasnih materija, transportu, rukovanju i skladištenju. Sticanje znanja o pakovanju, označavanju i prepoznavanju opasne robe, te procedurama i pravilima.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	Teorijska nastava: 1. Uvod u logistiku opasnih materija 2. Klasifikacija opasnih materija i identifikacija 3. Određivanje klase opasnosti opasnog tereta 4. Rizici u prijevozu opasnih materija		

<table>
<tr><td></td><td>5. Transport i distribucija opasnih materija
6. Uređaji i oprema vozila za prijevoz opasnih materija
7. Označavanje vozila za prijevoz opasnih materija
8. Skladištenje opasnih materija
9. Odabir pakovanja opasne robe
10. Označavanje paketa koji sadrže opasne materije
11. Prepoznavanje skrivenih opasnih materija
12. Procedure skladištenja i utovara opasnih materija
13. Procedure u hitnim slučajevima
14. Pravilnici i zakoni o prijevozu opasnih materija
15. Autonomna vozila za prijevoz opasnih materija

Praktična nastava: Praktični dio nastave biće organizovan u laboratorijama i terenskim obilascima kroz korištenje odgovarajuće opreme i evenualnih softverskih paketa za primjenu znanja stečenih na teorijskom dijelu nastave.</td></tr>
<tr><td>Ishodi učenja:</td><td>▪ Sticanje znanja o logistici opasnih materija, klasfikaciji i određivanju klase opasnog tereta,
▪ Sticanje znanja o rizicima kod rukovanja TOM.
▪ Sticanje znanja o potrebnoj opremi u vozilima za prijevoz opasnih materija,
▪ Sticanje znanja o transportu i distribuciji pojedinih klasa opasnih materija,
▪ Sticanje znanja o načinu označavanja vozila koja prevoze opasne materije.
▪ Sticanje znanja o skladištenju i odabiru pakovanja opasnih materija.
▪ Sticanje znanja o načinima i metodama prepozvanja robe koja je skrivena u različitim transportnim pakovanjima,
▪ Sticanje znanja o upoznavanje sa procedurama, pravilnicima i zakonima koji regulišu TOM.
▪ Sticanje sposobnosti primjene teorijskih i praktičnih znanja u iz logistike opasnih materija u praksi.</td></tr>
<tr><td>Metode izvođenja nastave:</td><td>– Predavanja popraćena multimedijalnim prezentacijama
– Rješavanje praktičnih problema i konkretnih projektnih zadataka</td></tr>
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<tr><td>Aktivnost u toku predavanja</td><td>-</td><td>Pismeni ispit</td><td>50</td></tr>
<tr><td>Praktična nastava</td><td>-</td><td>Usmeni ispit</td><td>-</td></tr>
<tr><td>Kolokvijumi</td><td>35</td><td></td><td></td></tr>
<tr><td>Seminarski rad/projekat i</td><td>15</td><td></td><td></td></tr>
</table>
</td></tr>
</table>

	dr.			
	Ukupno		Ukupno	**100**
Literatura:	1. Pfohl, H. C.: Logistiksysteme. Betriebswirtschaftliche Grundlagen, Berlin et al, 2010. 2. Mekovec, I.: Osnove prijevoza opasnih tvari cestom, Zagreb, 2003. 3. I. Tanackov et al., "Risk distribution of dangerous goods in logistics subsystems," J. Loss Prev. Process Ind., vol. 54, pp. 373–383, Jul. 2018, doi: 10.1016/j.jlp.2018.03.013. 4. A. Deljanin, Sigurnost i zaštita poštanskog prometa. Sarajevo: Fakultet za saobraćaj i komunikacije, 2011. 5. Babin, M., M. Kendra, and M. Fazekaš. "Dangerous Goods Logistics." 2013. 6. Klimecka-Tatar, Dorota. "Safety restrictions in the logistics of dangerous and toxic substances." Production Engineering Archives 7.2 (2015): 45-48. 7. Rajkumar, Thiraviam Vemburaj. Analysis of dangerous goods logistics in Singapore. Diss. 2006. 8. Barysienė, Jurgita, et al. "Analysis of the current logistics and transport challenges in the context of the changing environment." Transport 30.2 (2015): 233-241. 9. Liu, Yan, et al. "The Application of RFID Technology in the Dangerous Goods Logistics." Applied Mechanics and Materials 195 (2012): 904-907. 10. Lindström, Elias, and Victoria Otterström. "Managing dangerous goods in reverse logistics Addressing the challenges of transporting parcels of dangerous goods in the reverse flow." (2018). 11. Sun, Jing, et al. "Optimized modeling and opportunity cost analysis for overloaded interconnected dangerous goods in warehouse operations." Applied Mathematical Modelling 90 (2021): 151-164. 12. Li, Jiaru, et al. "Design of an optimized forklift routes for a four-door dangerous goods monolayer warehouse through genetic particle swarm optimization algorithm." International Journal of Industrial Engineering 27.2 (2020). 13. Su, Miao, et al. "Dangerous goods warehouse storage accident and safety management: evidence from Chinese data analysis." 46.4 (2021): 149-166. 14. United Nations: Transport Of Dangerous Goods, Model Regulations, VOLUME 1, 2015. 15. Zakon o prijevozu opasnih materija, BiH, FBiH, nacrt, mart 2016. 16. Pravilnik o načinu prevoza opasnih materija u ministarstvu odbrane i oružanim snagama BiH. 17. Pravilniku o međunarodnom prijevozu opasnih materija željeznicom (Pravilnik RID od 01. 01. 2009) 18. Direktiva (EZ) br. 1907/2006			

	19. Barut, M., Prcanović., H., et all.:Priručnik za prijevoznike i vozače za prijevoz opasnih materija i osoblje na stanicama za tehničke preglede vozila, IPI, Zenica, 2009. 20. Srinivas, Sharan, Surya Ramachandiran, and Suchithra Rajendran. "Autonomous robot-driven deliveries: A review of recent developments and future directions." Transportation research part E: logistics and transportation review 165 (2022): 102834. 21. Europski sporazum o međunarodnom prijevozu opasnih tvari unutarnjim vodnim putovima ADN 2021.

Opis silabusa na studijskom programu Željeznički saobraćaj na engleskom jeziku

U nastavku su navedeni silabusi predmeta na Engleskom jeziku.

Course code: 01ATCOS020101	**Course title: MANAGEMENT IN TRANSPORT AND COMMUNICATIONS**		
Level: II	**Year: I**	**Semester: I**	**Number of ECTS credits: 6**
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures: 45 Tutorials: 45 Seminars Fieldwork: Laboratory Tutorials: Practice Concert activies …	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	None		
Course goal (goals):	The goal of the course is to familiarize students with the functioning of transport systems in market conditions and international standards to ensure effective and efficient operations. The course aims to equip		

	students with knowledge about standards and standardization, as well as the interconnections between various parts of production and economic processes affected by technical standardization.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Basics of Management: Concept, management process, and interdependence with the organization. The concept of management and the management process. Characteristics of a modern manager. Managerial functions. 2. General and Specific Characteristics of Management in the Transport System: Issues of organization and management in the transport system. Definitions and content of management. Management and entrepreneurship in transport and telecommunications companies. 3. General and Specific Characteristics of Management in the Transport System: Managerial tasks in administrations, institutes, and agencies. Development of logistics management. Relationships between transport policy and management. Development of the transport system and spatial-economic structuring. 4. Managerial Concepts for Improving and/or Innovating Business Processes: Process-oriented management. Innovation and/or reengineering of business processes. 5. Planning as a Function and Activity of Management: Planning in a transport company. Policies and strategies of a transport company. Process approach to strategic planning. 6. Planning as a Function and Activity of Management; Strategic analysis of competitive structure in the transport sector. Scenario methods for selecting effective business strategies. 7. Organizational Structure and Processes: Concept and broader understanding of organization. Organizational structure. 8. Organizational Structure and Processes: Organizing relationships within the organization. 9. Organizational Structure and Processes: Process-based and knowledge-based organization. Examples of organizational structures in some transport and telecommunications companies. 10. Business Management and Motivation: Business management and leadership. 11. Business Management and Motivation: Influences on human behavior and motivation. 12. Human Resource Management: Human resource management as a function of management. 13. Human Resource Management: Activities in the human resource management process. Personal development of managers. 14. Managerial Control and Quality Management: Basics of modern standardization. Methods of adopting and labeling standards, levels of conformity, and terminology related to standard adoption. Quality infrastructure. 15. Managerial Control and Quality Management: Management system standards (MSS). Integrated management systems (IMS).
Learning outcomes:	**Knowledge**: Acquired knowledge will be used to recognize key

	technological processes and management models specific to transport systems. **Skills**: Ability to apply theoretical and practical knowledge in transport management. **Competencies**: A systematic approach to understanding standardization, mastering modern business terminology, and practical examples from the field of transport and communications will assist students in their integration into technical and other activities upon graduation and employment.
Sustainable Development Goal (SDG):	• SDG4 – Quality Education • SDG8 – Decent Work and Economic Growth • SDG9 – Industry, Innovation, and Infrastructure • SDG11 – Sustainable Cities and Communities • SDG 12 - Responsible Consumption and Production • SDG 16 - Peace, Justice, and Strong Institutions
Teaching methods:	Oral presentation, discussion, demonstration, group work.
Assessment methods with grading structure:	Assessment includes creativity in lectures and exercises through independent work, partial tests during the course, and the final exam. The criteria for monitoring and evaluating student performance are as follows: • Homework/Seminar/Practical Work: 15 points (%), passed if at least 55% is achieved. • First Partial Exam/Test/Knowledge Check: 35 points (%), passed if at least 55% is achieved. • Final Exam (Second Partial): 50 points (%), passed if at least 55% is achieved. • Final Exam (Comprehensive): 85 points (%), passed if at least 55% is achieved. The final exam is organized as written/oral. The student may take the material that was not covered and/or successfully completed during the semester. The required condition for a successful exam is achieving at least 55% of the total points on the partial and final exam parts. A sufficient condition is that the sum of points earned (through homework, attendance, partial, and final exams) is 55. Homework is organized through writing assignments and projects, with no option for

	resubmission. For students who did not successfully complete the partial exam, the final exam consists of the entire material covered during the course. The make-up exam is organized similarly to the final exam. Student performance after all forms of assessment is graded as follows: a) 10 (A) – Outstanding success with no or minor errors, 95-100 points; b) 9 (B) – Above average, with some errors, 85-94 points; c) 8 (C) – Average, with noticeable errors, 75-84 points; d) 7 (D) – Generally good, but with significant deficiencies, 65-74 points; e) 6 (E) – Meets minimal conditions, 55-64 points; f) 5 (F, FX) – Does not meet minimal conditions, less than 55 points. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) earned through fulfilling pre-exam obligations and taking partial and final exams, with a maximum of 100 points, determined by the following scale: **Student Obligations** • Attendance in lectures and exercises: - • Homework/Seminar/Practical Work: 15 points (%) • First Partial Exam/Test/Knowledge Check: 35 points (%) • Final Exam (Second Partial): 50 points (%) • Final Exam (Comprehensive): 85 points (%)
Literature:	**Mandatory**: 1. Vujadin B. Vešović, „MENADŽMENT U SAOBRAĆAJU“, Univerzitet u Beogradu, Saobraćajni fakultet, 1997. 2. Šefkija Čekić, Ivan Bošnjak, „MENADŽMENT U TRANSPORTU I KOMUNIKACIJAMA“, Fakultet za saobraćaj i komunikacije UNSA, Fakultet prometnih znanosti UNIZG, Sarajevo, Zagreb, 2000. **Supplementary**: 1. Alija Behmen, Sabira Salihović: MATERIJALI I ROBE U TRANSPORTU - Knjiga I, klasifikacija, standardizacija, identifikacija, Fakultet za saobraćaj i komunikacije Sarajevo i DES-

	Sarajevo, Sarajevo, 2007. 2. Alija Behmen, Sabira Salihović: MATERIJALI I ROBE U TRANSPORTU - Knjiga II, kvalitet: osnove, principi, kontrola, Fakultet za saobraćaj i komunikacije Sarajevo i DES-Sarajevo, Sarajevo, 2008. 3. International/Regional/National Standards

Course code: 02TRWOS020101	**Course title: SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL ENGINEERING**		
Level: II	**Year: I**	**Semester: I**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 30 Tutorials 20 Seminars 10 Fieldwork 10 Laboratory Tutorials 10 Practice 10	
Course participants:	**PhD Osman Lindov, Traff.Eng, Full professor**		
Prerequisite for enrollment:	No		
Course goal (goals):	Acquisition of educational forms in the implementation of programs in the elements of sustainable development and environmental engineering, as well as practical analyses, studies and projects in the field of sustainable development and environmental engineering.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – basics of sustainable development and environmental engineering 2. Legal Framework in the Field of Sustainable Development and Environmental Engineering 3. Air Pollution from Traffic - Air Quality Monitoring 4. Contaminant Detection Methods 5. CORINAIR/ COPERT 6. Elements and Method of Making Noise Maps 7. Elements of Preparing an Environmental Impact Study 8. Public urban passenger transport, mobility and sustainable development 9. Energy efficiency, eco test and eco driving 10. NEAP, KEAP, LEAP, traffic and transportation 11. SEAP, Traffic & Transportation 12. SUMP_ Traffic & Transportation 13. SECAP_ Traffic & Transportation 14. Low-carbon and zero-emission transport 15. Examples of field research in the field of sustainable development and environmental engineering		
Learning outcomes:	Knowledge: Theoretical and practical knowledge in the field of the impact of sustainable development and environmental engineering. Basic regulations,		

	rules, methods and procedures in the field of assessment and analysis of the state of sustainable development. Skills: Ability to apply theoretical and practical knowledge in the field of sustainable development and environmental engineering in the function of preserving and protecting the economic and other development of society on the one hand and improving and developing sustainable transport on the other. Competencies: Ability to independently understand and use regulations, use professional literature, apply methods and procedures, measure and research, prepare analyses, assessments and practical solutions, preventive action, and procedures necessary for the analysis, assessment and management of the field of sustainable development and environmental engineering.
Sustainable Development Goal (SDG):	SDG4 – Quality Education – To ensure inclusive and quality education, and to promote lifelong learning opportunities for all people, of all ages. SDG5 - Gender Equality - Achieve gender equality and empower all women and girls. SDG8 - Decent Work and Economic Growth - Promote inclusive and sustainable economic growth, employment and decent work for all. SDG9- Industry, Innovation and Infrastructure -Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG11 - Sustainable Cities and Local Communities - Make cities and settlements inclusive, safe, resilient and sustainable. SDG12-Sustainable consumption and production - Ensure sustainable forms of consumption and production. COR13-Climate Action - Take urgent action to combat climate change and its consequences SDG17- Partnerships for the Goals- Incorporating a Global Partnership for Sustainable Development
Teaching methods:	Oral presentation with presentation and presentation of various analyses, studies, models and methods in the field of environmental engineering with the use of video and audio recordings, software, measuring equipment, and independent presentation of individual specific research, Initiating discussions and discussions on practical problems, individual observations from different environments, making independent analyses, research, measurements and modelling in the field of environmental engineering and sustainable development.
Assessment methods with grading structure:	Assessment of creativity in classes and exercises with the preparation of independent papers, evaluation of the partial test during the class as well as the evaluation of the final exam. The criterion for monitoring the work and evaluation of the student during the course is as follows: ✓ Seminar 15 points (%), passed if won over 50%. ✓ I Partial exam/test/knowledge test/35 points (%), is passed if more than 50% is scored. ✓ Final exam (II Partial) 50 points (%), passed if won over 50%. ✓ Final exam (Integral) 85 points (%), passed if won over 50%. The total number of points (%) that a student can achieve during the course is a maximum of 50 points (%), which together with the Final (II partial) makes 100 points (%). For students who have not passed the I Partial Exam, the Final Exam (Integral) is organized from the entire material covered during classes and exercises, and is evaluated with 85 points (%), which with the seminar

paper/practical work makes 100 points (%).

The final success of the student after all the foreseen forms of examination is evaluated and evaluated by the grading system as follows: a) 10 (A) - exceptional success without errors or with minor errors, carries 95-100 points; b) 9 (B) - above average, with some error, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with more significant drawbacks, carries 65-74 points; e) 6 (E) - meets the minimum requirements, carries 55-64 points; f) 5 (F, FX) - does not meet the minimum requirements, less than 55 points.
The total evaluation of all student obligations during the semester, i.e. the grade on the exam, is based on the total number of points (%) that the student has acquired by fulfilling the pre-exam obligations and passing the partial and final exam, according to the quality of the acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale:

The Student's Responsibilities	Score (%)
Attendance at lectures and exercises (attendance at all forms of teaching is mandatory at least 80% and this is a condition for the certification/signature of regular attendance)	0 points
Seminar	15 points (%)
I Partial Exam / Test / Knowledge Assessment /	35 points (%)
Final exam (II partial)	50 points (%)
Final exam (Integral)	85 points (%)

Literature:

Mandatory:

1. Lindov, O.: Transport i okoliš, univerzitetski udžbenik Fakultet za saobraćaj i komunikacije Sarajevo, 2011.
2. Lindov, O.: Uticaj cestovnih vozila i cestovne infrastrukture na ekološke parametre. Međunarodni naučni skup "Ekološki problemi savremenog saobraćaja", Sarajevo, 2003.
3. Lindov, O., Omerhodžić A.: Održivi razvoj i okolišni inžinjering. Skripta vježbi i testova, Fakultet za saobraćaj i komunikacije, Sarajevo, 2020.

Supplementary:

1. EC (EvropeanCommission), Directorate General Transport, 1996, Transport Research APAS Road Transport: Assessment of road transport models and systems architectures, VII-31,. ECSCEEC- EAEC, Brussels – Luxembourg.
2. EC (Evropean Commission), Directorate General Transport, 1996, Transport RTD Programme, Summary of Projects resulting from the First Call for Proposals, p.29.
3. Prascevic M.R., Cvetkovic D.S., Stojanovic V.O., (1997), "Mathematical models for describing road traffic noise », Proceedings Inter-Noise 97, Budapest.
4. Pronello C., Iannelli F., 2002. Modelli di previsione del rumore da trafficoincontesti operativi e territorialidifferenti, inCollanaTrasporti, Editore Franco Angeli

	5. Pronello C., André M., Pollutant emissions estimation in road transport models, Report INRETSLTE n° 2007, March 2000, BRON Cedex – France, 113 pp. 6. Pronello C., André M., Estimation tool of traffic pollutant emissions in function of macroscopic driving Promjenljive, Report INRETS-LTE, n° 2006, March 2000, BRON Cedex – France, 91 pp.

Course code: 03TRWOS020101	**Course title:** **LOGISTICS AND INTELLIGENT TRANSPORT SYSTEMS**		
Level: II	**Year: I**	**Semester: I**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 45 Tutorials 30 Seminars 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	no		
Course goal (goals):	The goal of the course is to acquire knowledge from the field of application of intelligent transport systems in logistics systems, which enables the digitization of logistics processes.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Basic assumptions for the development and concept of smart logistics 2. Technological stages of logistics development 3. Digital transformation of logistics 4. Organization, planning and management in intelligent logistics systems 5. Intelligent cargo and transport equipment 6. Redesigning transport and logistics processes with ITS systems 7. Smart warehouses in logistics 8. Advanced ethnology in logistics 9. Augmented reality technology in logistics 10. Blockchain technology in logistics 11. Logistics software systems 12. Logistics platforms 13. City logistics and ITS 14. Artificial intelligence and automatic technologies identification in intelligent logistics 15. Future challenges of the digital transformation of logistics		
Learning outcomes:	Knowledge: The subject Intelligent transport systems and logistics should provide the necessary level of knowledge about technologies, functions and students of ITS in logistics systems, which will enable planning, development and implementation of intelligent logistics systems and the implementation of digitization processes in logistics systems.		

	Skills: The subject intelligent transport systems and logistics enables the acquisition of skills necessary for measuring, analyzing and evaluating efficiency, safety, environmental impact and economic benefits from the implementation of ITS in logistics systems. Competences: Through the teaching process of lectures, exercises, and seminar work, students should acquire appropriate competencies for designing, developing and managing logistics processes using intelligent transport systems.
Sustainable Development Goal (SDG):	(in this section, reference to SDG is entered, e.g., „SDG3 – Good Health and Well-being"; „SDG4 – Quality Education", if applicable to the course)
Teaching methods:	Lectures, exercises and seminar work.
Assessment methods with grading structure:	1. Attendance at classes and semester work 15 points 2. First knowledge test 35 points 3. Final knowledge test 50 points
Literature:	Mandatory: 1. Teaching material available on the online platform for study of the Faculty of Traffic and Communications Supplementary: 1. Mac Sullivan, Johannes Kern: The Digital Transformation of Logistics, IEEE Press, New Jersey, 2021 2. Rosanna Fornasiero: Next Generation Supply Chains, Springer, Cham, 2021. 3. Albert Tan, Sameer Shukkla : Title: Digital transformation of the supply chain : a practical guide for executives, World Scientific Publishing, London, 2021. 4. John M. Longshore and Angela L.: Managing Logistics Systems, Routledge, New York, 2022. 5. - Anthony M. Pagano, Matthew Liotine: Technology in Supply Chain Management and Logistics, elsevier, Amsterdam, 2020,

Course code: 04TRWOS020101	**Course title: PLANNING TRAFFIC AND TRANSPORT SYSTEMS IN RAILWAY TRAFFIC**		
Level: II	**Year: I**	**Semester: I**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project task: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Acquiring educational forms in the implementation of the course on traffic and transport systems planning.		
Topics covered (Units of	1. Introduction to the planning and design of transport systems		

study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	2. Traffic and transport systems 3. Elements and characteristics as the basis for planning and designing transport systems 4. Flows of passengers and goods in the network of transport routes and terminals 5. Defining railway demand. Researching demand and supply in transport 6. Analysis of the state of traffic and transport 7. Methods for planning demand and supply of services in traffic and transport 8. New technologies in planning demand and supply in traffic and transport 9. Planning and designing systems in urban traffic and transport 10. Project planning in traffic and transport 11. Models for forecasting railway demand 12. Trend extrapolation models and growth factor models 13. Regression model for forecasting railway demand 14. Gravitational model for forecasting railway demand 15. Four-step model in forecasting railway demand
Learning outcomes:	Knowledge: Students should acquire relevant knowledge and skills related to planning systems in traffic and transportation of goods and passengers through lectures, exercises, laboratory work, and practical experience. Skills: Study and practical application should ensure that students achieve the necessary level of knowledge to successfully plan and design traffic and transport systems. Competencies: Application of acquired knowledge in concrete models.
Sustainable Development Goal (SDG):	SDG 9: Industry, Innovation, and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 11: Sustainable Cities and Communities - Make cities and human settlements inclusive, safe, resilient, and sustainable. SDG 13: Climate Action - Take urgent action to combat climate change and its impacts.
Teaching methods:	During the program execution, the instructor presents individual thematic units (ex cathedra), allows students to watch educational video content (DVDs, video presentations) related to the subject, and organizes discussions on a given topic (interactive teaching). In the exercises, examples and tasks are analyzed and solved according to the theoretical topics, helping students with independent problem-solving, program development, projects, and seminar papers.
Assessment methods with grading structure:	criteria for evaluating student work and assessment during the course: • Seminar Paper / Project Task: 0 to 15 points • First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the course is a maximum of 50 points. The final / remedial exam includes material that the student did not pass in the partial exam, meaning it covers the second part of the material (second partial exam) which is valued at 50 points or

	consists of the complete material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, and the exam grade, is based on the total number of points (%) the student has earned by fulfilling pre-exam obligations, taking partial exams, and final exams. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Scoring Structure Points (%) • Seminar Paper / Project Task: ..... 15 points (%) • First Test / First Knowledge Check (First Partial Exam): 35 points (%) • Final Exam (Second Partial Exam): ..... 50 points (%) The required condition for successfully completing the exam is achieving a score of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). In other words, for a student to pass the exam, they must achieve the following conditions: • Activity (seminar paper / project task): 8 points • First Test / First Knowledge Check / Partial Exam: 19 points • Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered in the partial exam) in the final exam. Students who have not passed the partial exam will take the complete material in the final exam, with the criteria for passing the exam remaining the same. The final exam is organized as a written and/or oral exam. Activity can be tracked through the completion of assignments, seminar papers, project tasks, or quizzes. Note**:** Students are required to attend all forms of classes at least 80% of the total number of hours, and attendance is a condition for the confirmation of regular class attendance. A student may be absent from classes for justified reasons (illness) and must provide a medical excuse. Seminar papers and assignments will only be graded if submitted according to the defined deadlines. Late submissions will not be graded. The final success of the student after all the planned forms of knowledge checks is evaluated and graded as follows: a) 10 - Outstanding success with no errors or with minor errors, carries 95-100 points; b) 9 - Above average, with some errors, carries 85-94 points; c) 8 - Average, with noticeable errors, carries 75-84 points; d) 7 - Generally good but with significant shortcomings, carries 65-74 points; e) 6 - Meets the minimum requirements, carries 55-64 points; f) 5 - Does not meet the minimum requirements, less than 55 points.

Literature:	**Mandatory:** 1. Pađen, J.: Fundamentals of Traffic Planning, Zagreb, 1986. 2. Pađen, J.: Methods of Spatial-Traffic Planning, Economic Institute, Zagreb, 1978. 3. Jovanović, N.: Traffic Planning, Faculty of Transport, Belgrade, 1990. 4. Jović, J.: Traffic Planning in Cities - Practicum, Faculty of Transport, Belgrade, 1996. 5. Kiso, Fahrudin: Traffic Planning, Faculty of Transport and Communications, Sarajevo, 1994. 6. Mehanović, M: Planning Services in Urban Passenger Transport, Faculty of Transport and Communications, Sarajevo, 2011. 7. Mehanović, M: Networks in Transport, Transportation, and Communications, Faculty of Transport and Communications, Sarajevo, 2015. 8. Mehanović, M: Public Urban Transport – Examples from Theory and Practice, Faculty of Transport and Communications, Sarajevo, 2005. 9. Bublin, M.: Spatial Planning and Environmental Protection, University Book Sarajevo, 2010. **Supplementary:** 1. Meyer, M.D.; Miller, E.J.: Urban Transportation Planning, McGraw-Hill, 1984. 2. Steierwald, G.; Kűnne, H.D.: Urban Traffic Planning, Stuttgart, 1993. 3. HCM2000: Capacity Manual, Special Report 209, Transportation Research Board, Washington D.C., 1994.

Course code: 05TRWOS020101	**Course title: RAILWAY TRAFFIC MODELLING**		
Level: II	**Year: I**	**Semester: I**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project task: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The primary objective of the course is to equip students with the skills to apply and develop various analytical and simulation models in railway transportation, with the aim of optimizing the organization, technology, and		

	capacity within railway operations.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction 2. Theoretical assumptions of traffic modeling 3. Development of traffic and transport models. Model detail. Informal and formal model description. 4. Examples of modeling and simulation in traffic and transport technology 5. Classification and types of traffic models, development and evaluation of traffic models. 6. Elements and components of traffic modeling 7. Simulations in traffic modeling. Advantages and disadvantages of simulations in traffic and transport 8. Analytical modeling of SMO in railway traffic 9. Simulation modeling in railway traffic and transport 10. Modeling railway systems using linear and dynamic programming 11. Multi-criteria analysis models. Application of multi-criteria analysis in railway traffic 12. Modern methods for modeling in railway traffic 13. Procedures for analyzing and verifying the results of modeling and simulation of real railway traffic problems 14. Modeling and simulation program in railway traffic OpenTrack 15. Modeling and simulation program in railway traffic RailSys
Learning outcomes:	Knowledge: Students will acquire knowledge about the methods for creating railway system models and the criteria for selecting optimization models in railway transportation. Skills: Understanding, analyzing problems, and describing the reasons and methods for solving problems related to the organization and technology of railway transportation. Competencies: Using specialized computer programs for modeling and testing railway technical subsystems as well as simulating railway operations needed for learning and thorough understanding of the railway system as a whole.
Sustainable Development Goal (SDG):	SDG 4: Quality Education - Ensure inclusive and quality education, and promote lifelong learning opportunities for all. SDG 9: Industry, Innovation, and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 13: Climate Action - Urgently take action to reduce climate change and its impacts. SDG 11: Sustainable Cities and Communities - Make cities and human settlements inclusive, safe, resilient, and sustainable.
Teaching methods:	During the program execution, the instructor presents individual thematic units (ex cathedra), allows students to watch educational video content (DVDs, video presentations) related to the subject, and organizes discussions on a given topic (interactive teaching). In the exercises, examples and tasks are analyzed and solved according to the theoretical topics, helping students with independent problem-solving, program development, projects, and seminar papers.
Assessment methods	criteria for evaluating student work and assessment during the course:

with grading structure:	• Seminar Paper / Project Task: 0 to 15 points • First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the course is a maximum of 50 points. The final / remedial exam includes material that the student did not pass in the partial exam, meaning it covers the second part of the material (second partial exam) which is valued at 50 points or consists of the complete material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, and the exam grade, is based on the total number of points (%) the student has earned by fulfilling pre-exam obligations, taking partial exams, and final exams. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: **Scoring Structure** Points (%) • Seminar Paper / Project Task: ..... 15 points (%) • First Test / First Knowledge Check (First Partial Exam): 35 points (%) • Final Exam (Second Partial Exam): ..... 50 points (%) The required condition for successfully completing the exam is achieving a score of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). In other words, for a student to pass the exam, they must achieve the following conditions: • Activity (seminar paper / project task): 8 points • First Test / First Knowledge Check / Partial Exam: 19 points • Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered in the partial exam) in the final exam. Students who have not passed the partial exam will take the complete material in the final exam, with the criteria for passing the exam remaining the same. The final exam is organized as a written and/or oral exam. Activity can be tracked through the completion of assignments, seminar papers, project tasks, or quizzes. Note**:** Students are required to attend all forms of classes at least 80% of the total number of hours, and attendance is a condition for the confirmation of regular class attendance. A student may be absent from classes for justified reasons (illness) and must provide a medical excuse. Seminar papers and assignments will only be graded if submitted according to the defined deadlines. Late submissions will not be graded. The final success of the student after all the planned forms of knowledge checks is evaluated and graded as follows: a) 10 - Outstanding success with no errors or with minor errors, carries 95-100 points; b) 9 - Above average, with some errors, carries 85-94 points; c) 8 - Average, with noticeable errors, carries 75-84 points;

	d) 7 - Generally good but with significant shortcomings, carries 65-74 points; e) 6 - Meets the minimum requirements, carries 55-64 points; f) 5 - Does not meet the minimum requirements, less than 55 points.
Literature:	**Mandatory:** 1. Mirko J. Čičak: Modeling in Railway Traffic, Faculty of Transport and ŽELNID, Belgrade, 2003. 2. Radanović, R. Theory of Modeling and Simulation, University of Novi Sad, Faculty of Technical Sciences, Novi Sad, 2005. **Supplementary:** 1. Algers S., Review of Micro-Simulation Models. Institute for Transport Studies, University of Leeds. 1998. doi: http://www.its.leeds.ac.uk/projects/smartest/Deliv3.PDF 2. Fellendorf M., Vortisch P. Microscopic Traffic Flow Simulator VISSIM (Ch. 2 in: Fundamentals of Traffic Simulation, International Series in Operations Research & Management Science, edited by Jaume Barcelo), Vol. 145, pp. 63-93. 2010. 3. Hansen, I. A.; Pachl, J. (eds.): Railway Timetable & Traffic: Analysis - Modeling - Simulation. Eurailpress 2008. **Journals:** • Transportation Research • Yujor • Transportation Science • Operations Research Journal • Research Record

Course code: 06TRWOS020102	**Course title: INTERMODAL TRANSPORT**		
Level: II	**Year: II**	**Semester: II**	**Number of ECTS credits: 6**
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures: 45 Tutorials: 30 Seminars: 15 Fieldwork: Laboratory Tutorials: Practice	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course** [Do not enter names in this section. Use the formulation as indicated in this section]		

Prerequisite for enrollment:	No
Course goal (goals):	The curriculum covered by the content should enable students to become familiar with modern transport chains, the basics of technological design and optimization of transport processes, as well as contemporary technological solutions offered within various technologies of intermodal transport. This includes the application of logistics principles and the opportunities provided by new information and telecommunications technologies.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Technological Changes; Classical Transport Chain; Rationalization; Modern Transport Chain 2. Systematic Approach to Analyzing the Transport Process as a Complex Technological System 3. Goods Flows; Industrial Transport; Load Units 4. Pallet Transport System, Pallet Chain 5. Container Transport System, Typical Technologies for Implementing Container Transport Chains 6. Vehicle-to-Vehicle System 7. RO-RO Transport System, Barge Transport System for River Traffic 8. Storage, Inventory, Warehouse Capacity, Warehouse System Design 9. Logistics and Logistical Principles 10. EU Transport Policy, European Concept of Intermodality 11. Land Terminals, Evaluation of Terminal Performance, Queueing Theory 12. Port Container Terminals – Storage Yards in Terminals 13. Components of Logistical Services – RTC 14. Elements of Modern Intermodal Transport 15. ITS and the Application of Telematics in Modern Intermodal Transport
Learning outcomes:	**Knowledge:** Students will gain a fundamental understanding of the basics of intermodal transport, including technological changes, organization of transport chains, and integration of different transport modes. They will understand key principles of storage, logistics, container and pallet systems, as well as European transport policy with a focus on intermodality. **Skills:** Students will develop practical skills in analyzing and optimizing transport processes, with an emphasis on using modern technologies such as ITS and telematics. They will acquire knowledge on how to efficiently organize goods flows, manage terminals, and utilize various transport systems. **Competencies:** Students will be capable of applying the acquired knowledge and skills to manage complex transport chains, optimize logistical operations, and integrate different transport modes in modern industrial and commercial environments.
Sustainable Development Goal (SDG):	"SDG7 – Affordable and Clean Energy"; "SDG9 – Industry, Innovation, and Infrastructure"; ""SDG12 – Responsible Consumption and Production"; "SDG17 – Partnership for the Goals".
Teaching methods:	During the implementation of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to

	educational video recordings (video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). In the exercises, the instructor reviews and solves examples and tasks in accordance with the theoretical material, assists students in independently solving tasks, and in preparing programs and seminar papers.
Assessment methods with grading structure:	Evaluation of activities in lectures and exercises, along with the preparation of independent work, assessment of the mid-term test during the course, and the final exam. The criteria for monitoring and assessing student performance during the course are as follows: – Seminar/Fieldwork/Lab Exercises/Practice (written and oral assessment) – 15 points (%), passed if over 50% is achieved. – Mid-term exam/test/knowledge check (written assessment) – 35 points (%), passed if over 50% is achieved. – Final exam (Second Mid-term) (written assessment) – 50 points (%), passed if over 50% is achieved. – Final exam (Comprehensive) (written assessment) – 85 points (%), passed if over 50% is achieved. The total number of points (%) a student can achieve through this monitoring system during the course is a maximum of 50 points (%), which combined with the Final (Second Mid-term) totals 100 points (%). For students who did not pass the First Mid-term exam, the Final (Comprehensive) exam is organized covering all the material taught during lectures and exercises and is worth 85 points (%), combined with the seminar/practical work to make a total of 100 points (%). To pass the course, students must pass each of the following parts: the seminar paper, the first mid-term exam (test), and the final exam (second mid-term or comprehensive). The evaluation of the seminar paper and the first mid-term exam (test) is conducted during the course. Students who pass the first mid-term exam only take the second mid-term exam in the final exam, while those who do not pass the first mid-term exam will take the comprehensive final exam, which consists of both the first and second mid-term exams. Students who did not pass the exam in the previous academic year but fulfilled certain obligations and earned points can carry them over to the current academic year. Students who wish to carry over points must inform the course instructor at the start of the semester, by the end of the first week of lectures. Points may be carried over only once. The final student grade after all forms of knowledge assessment will be evaluated and graded according to the following system: a) 10 (A) – exceptional performance with no or minimal errors, 95-100 points; b) 9 (B) – above average, with some errors, 85-94 points; c) 8 (C) – average, with noticeable errors, 75-84 points; d) 7 (D) – generally good, but with significant deficiencies, 65-74 points; e) 6 (E) – meets minimum requirements, 55-64 points; f) 5 (F, FX) – does not meet minimum requirements, less than 55 points. The total assessment of all student obligations during the semester, i.e., the exam grade, is based on the total number of points (%) the student has achieved by fulfilling pre-exam obligations and passing the mid-term and final exams. This totals a maximum of 100 points, and is

	determined according to the following scale: Student Obligations Points (%) Attendance in lectures and exercises ……..... 0 points Minimum 80% attendance at all forms of classes is mandatory, and this is a condition for course certification/signing off on proper attendance. Seminar Paper/Fieldwork/Lab Exercises/Practice (written and oral assessment).....15 points (%) First Mid-term Exam (written).....35 points (%) Final Exam (Second Mid-term) (written).....50 points (%) Final Exam (Comprehensive) (written).....85 points (%)
Literature:	Mandatory: 1. Dalla Chiara B., Ercolani F., Gačanin E., Kiso F.: Intermodal Transport, Education and Culture TEMPUS, Sarajevo 2004. 2. Perišić R.: Modern Strategies and Technologies for Transport Development, SANU, Belgrade, 2002. 3. Perišić R.: Quality Service Systems, Logistics, and Informatics, SANU, Belgrade, 2002. 4. Terminology in Combined Transport: UN/ECE, Translation by Kiso F., Education and Culture TEMPUS, Sarajevo, 2004. 5. Kiso, F., Karičić, S., Omerhodžić, A.: Multimodal Transport, Faculty of Traffic and Communications, Sarajevo, 2023. Supplementary: 1. Marković I.: New Transport Technologies, Faculty of Transport Sciences Zagreb, 1985. 2. Kiso, F.: "Logistics - Fundamental Concepts," Lecture Notes, FSK Sarajevo, 2019. 3. Kiso, F.: "Storage and Inventory Theory," Lecture Notes, FSK Sarajevo, 2016.

Course code: 07TRWOS020102	**Course title:** **INFORMATION TECHNOLOGIES AND FREIGHT FORWARDING**		
Level: II	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project task: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Familiarization with modern information and communication technologies applied in the field of logistics and freight forwarding, specific software tools, and the methods and effects of their application.		
Topics covered (Units of	1. Introduction		

study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	2. Identification of technological processes in logistics forwarding 3. Identification of key stakeholders in the logistics forwarding chain 4. Theoretical foundations of current information technology solutions applied in forwarding 5. Importance and possibilities of applying application software in managing logistics forwarding systems and implementing best practices 6. Methodological approaches to designing information technology solutions in logistics forwarding 7. CRM (Customer Relationship Management) in logistics forwarding companies 8. Planning and optimizing forwarding services - maximizing utility and reducing costs of order, booking, and shipping processes 9. Management of import, export, and global foreign trade exchange processes (harmonized tariffs, foreign trade contracts, INCOTERMS) 10. Software applications for Business-to-Business SCM (Supply Chain Management) 11. Software applications for managing customs procedures based on EU legislation 12. Software applications for managing warehousing operations 13. Software applications for managing the transport chain 14. Web applications and online services for foreign trade compliance, tariff classifications, import-export documentation, electronic reporting, verification 15. Connecting segmented software applications into a holistic logistics-forwarding information system (End-to-End Management)
Learning outcomes:	Knowledge: Through lectures, exercises, laboratory work, and practical activities, students should acquire the necessary knowledge and skills for practical application through: the development of IT and evaluation of its effects in logistics forwarding, as well as the independent formulation of research objectives and the application of appropriate methods and models for their realization. Skills: A systemic approach to designing IT business processes in logistics forwarding and understanding algorithms as the basis for forwarding software solutions; identifying and using relevant IT solutions in the field of logistics forwarding, critical analysis, evaluation, and synthesis of available knowledge; developing and applying forwarding software management models, and presenting acquired knowledge to professional and scientific audiences. Competencies: Application of acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 4: Quality Education - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. SDG 8: Decent Work and Economic Growth - Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. SDG 9: Industry, Innovation, and Infrastructure - Build resilient

	infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Responsible Consumption and Production - Ensure sustainable consumption and production patterns. SDG 16: Peace, Justice, and Strong Institutions - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
Teaching methods:	During the course delivery, the instructor presents individual thematic units (ex cathedra), allows students to follow educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on a given topic (interactive teaching). In practical classes, the discussion and resolution of examples and tasks related to theoretical topics are conducted, and assistance is provided to students in independently solving tasks, and in the preparation of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for assessing and grading students' work during the course are as follows: Seminar Paper / Project Task: 0 to 15 points, passed if over 50% is achieved First Test / First Knowledge Check / First Partial Exam: 0 to 35 points, passed if over 50% is achieved Final Exam – Written exam: 20 points Final Exam – Oral exam: 30 points Final Exam (Integral) – Written exam: 40 points Final Exam (Integral) – Oral exam: 45 points To pass the exam, the student must pass the oral part of exam. The total number of points a student can achieve during the course is a maximum of 50 points. The final exam includes the material that the student did not pass in the partial exam, which means it covers the second part of the material (second partial exam) which is valued at 50 points or consists of the entire material, i.e., both the first and second partial exams. The total evaluation of all student obligations during the semester, i.e., the exam grade, is based on the total number of points (%) that the student has earned by fulfilling pre-exam obligations, passing the partial and final exams. Based on the quality of the acquired knowledge and skills, the student can achieve a maximum of 100 points, according to the following scale: Grading Structure: Points (%) Seminar Paper / Project Task: 15 points (%) First Test / First Knowledge Check (First Partial Exam): 35 points (%) Final Exam (Second Partial Exam): 50 points (%) The necessary condition for successfully completing the exam is a result of 55 points, with a minimum of 50% required on each part of the exam (activity, partial exam, final written exam). This means that to pass the exam, the student must meet the following conditions:

	Activity (Seminar Paper / Project Task): 7,5 points First Test / First Knowledge Check / Partial Exam: 17.5 points Final Exam (Second Partial Exam) – Written Part: 10 points Students who pass the partial exam only need to take the second part of the material (the part not covered in the partial exam) during the final exam. Students who do not pass the partial exam will take the entire material during the final exam, with the criteria for passing the exam remaining identical. The final exam is organized as a written and/or oral exam. Activity can be tracked through homework, seminar papers, project tasks, or quizzes. Note: Students are required to attend at least 80% of the total class hours, and attendance is a condition for verifying proper class participation. In justified cases (illness), a student may be excused from classes, for which they must provide a medical excuse. Seminar papers and homework will be graded only if submitted by the defined deadlines. Late submissions will not be graded. Final student performance after all forms of knowledge assessment is evaluated and graded according to the following system: a) 10 - Exceptional performance with no errors or only minor errors, 95-100 points; b) 9 - Above average, with some errors, 85-94 points; c) 8 - Average, with noticeable errors, 75-84 points; d) 7 - Generally good, but with significant shortcomings, 65-74 points; e) 6 - Meets minimum requirements, 55-64 points; f) 5 - Does not meet minimum requirements, less than 55 points.
Literature:	Mandatory: 1. R. Zelenika: Logistics Forwarding, Faculty of Economics, Zagreb, 2000. 2. Zelenika, R.: Logistics Systems, Faculty of Economics in Rijeka, 2005. 3. Gordana M. Radivojević, Information Management in Logistics. Belgrade 2023. 4. Ivanković, Č.: Forwarding and Logistics, Faculty of Transport Sciences, Zagreb, 2005. 5. R. Zelenika: International Forwarding, Faculty of Economics, Zagreb, 1996. 6. Deljanin: Logistics in Transport and Communications, Script, FSK, 2013. 7. Deljanin: Logistics Systems, Script, FSK, 2014. Supplementary: 1. Andrijanić I., Aržek Z., Prebežac D., Zelenika R.: Transport and Forwarding Business, Zagreb, 2001.

	2. Z. Aržek, G. Badovinac: Transport and Insurance, Publishing and Instruction Bureau, Zagreb, 1986. 3. J. Mađarić: International Forwarding, Faculty of Transport Sciences, Zagreb, 1991. 4. Grabovac: Responsibility of Multimodal Transport Entrepreneurs, Traffic Faculty, Split, 1986. 5. Shipping and Logistics Management, Y H V Lun; Kee-hung Lai; T C E Cheng, Publisher: New York; London: Springer, 2010. 6. International Logistics Supply Chain Outsourcing: From Local to Global, Alan Rushton; Steve Walker, Publisher: London: Kogan Page, 2007. 7. Transportation Management with SAP TM, Bernd Lauterbach, Stefan Sauer, Jens Kappauf, Jens Gottlieb, Dominik Metzger, Christopher Sürie, 2nd, updated and revised edition, 2016. 8. Warehouse Management with SAP EWM, Balaji Kannapan, Hari Tripathy, Vinay Krishna, 2nd, updated and revised edition, 2016. Journals: • International Journal of Physical Distribution • Computers and Operations Research • International Journal of Information Management • European Journal of Operational Research • Journal of Business Logistics

Course code: 08TRWOS020102	**Course title: TECHNOLOGY AND ORGANIZATION OF RAILWAY STATIONS AND NODES**		
Level: II	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures:45 Exercises: 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The teaching material that is included in the content should enable students to master the technological knowledge of the railway installations. Adoption of procedures and models for dimensioning railway capacities.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is*	1. Technology and organization of station work 2. Technology of maneuver work 3. Calculation and dimensioning of cell capacities 4. Throughput and processing power of railway stations		

established taking into account the specificities of organizational units)	5. Required number of tracks for the execution of the technological task and coordination of work with connecting and separating tracks 6. Dimensioning of station buildings and platforms 7. Dimensioning of underpasses, footbridges and level crossings 8. Dimensioning of warehouses, loading-unloading and transshipment ramps 9. Capacity planning with facilities for commodity operations 10. Capacities for serving passenger terminals 11. Capacities of plants and devices for maintenance of locomotives and passenger sets 12. Optimization and introduction of modern technical and technological solutions in the operation of stations 13. Technology and organization of node work 14. Organization of passenger traffic and technological process of operation of passenger stations 15. Quality of service in railway traffic
Learning outcomes:	Knowledge: Through the teaching process of lectures, exercises, laboratory exercises and practical work, students should acquire appropriate knowledge and experience in order to be able to offer certain technological solutions in the dimensioning of capacities in railway transport. Skills: High-quality technological analyzes guarantee students the acquisition of certain professional competencies. Competences: Application of acquired knowledge in concrete models
Sustainable Development Goal (SDG):	SDG 8: Promote sustained, inclusive, and sustainable economic growth, productivity, and decent work for all. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned

	through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: a) 10 – Outstanding performance with no errors or with minor errors: 95-100 points b) 9 – Above average, with some mistakes: 85-94 points c) 8 – Average, with noticeable mistakes: 75-84 points d) 7 – Generally good, but with significant deficiencies: 65-74 points e) 6 – Meets minimal requirements: 55-64 points f) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 1. Salketić, S., Kudumović, Dž., Branković, N.: Fundamentals of Railway Traffic Technology, Faculty of Traffic and Communications, Sarajevo, 2016. 2. Beširević, S.: Organization of railway traffic, Faculty of Traffic and Communications, Sarajevo, 1997. 3. Branković, N.: Railway traffic infrastructure, Faculty of Traffic and Communications, Sarajevo, 2010. 4. Bogović, B.: Organization of railway traffic, Faculty of Transport Sciences, Zagreb, 1987 5. Kovačević, P.: Railway exploitation, Higher Railway School, Belgrade, 1998.

	6. Čičak, M. Vesković, S. Mladenović, S.: Models for determining railway capacity, Faculty of Transportation, University of Belgrade, 2009. 7. Čičak, M. Vesković, S.: Organization of railway traffic II, Faculty of Transport, University of Belgrade, 2005. 8. Mandić, D.: Organization of train traction, Faculty of Transportation, University of Belgrade, Belgrade, 2002. Supplementary: 1. Fejzić, E.: Emergence and development of railways and railway passenger terminals, IKD UNIVERSITY PRESS Sarajevo and Građevska Knjiga, Belgrade, 2011. 2. Milošević, B.: Railway tracks, Faculty of Transportation in Belgrade, Belgrade, 1979 3. Bukljaš, Z.: Technical elements of railway traffic safety, Faculty of Transport Sciences Zagreb, 1989. 9. 4. Badanjak, D., Bogović B., Jenić V.: Organization of railway traffic, Faculty of Transport Sciences Zagreb, 2006

Course code: 11TRWOS020203;	**Course title: MANAGING PROJECTS AND INVESTMENTS IN TRAFFIC AND COMMUNICATIONS**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: mandatory course		Total number of contact hours: 90 Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project task: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The main objectives of the course are to acquire knowledge in the field of project and investment management, understand the methods and techniques used in project and investment management processes, and enable students to apply their knowledge practically in this area.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. General concepts of investment: Definition and explanation of investments. Types of investments in transportation. 2. Preparation of investment projects: Preliminary feasibility study. Feasibility study. 3. Evaluation of the feasibility study: Financial evaluation. National evaluation. Evaluation of investments under uncertainty. 4. Cost-benefit analysis: Principles of cost-benefit analysis. Determining costs and benefits. Valuation of costs and benefits. Criteria used in cost-benefit analysis. Applications of cost-benefit analysis. 5. Business plan: Definition of a business plan. Contents of a business plan.		

	6. UNIDO methodology: Preparation of industrial projects. Evaluation of industrial projects. 7. Evaluation of investment projects by the World Bank: Global procedures for reviewing and evaluating investment projects. Evaluation of project profitability. 8. Project management: Concept of project management. Project management organization. 9. Standard software for project management. 10. Application of project management concepts in transportation. 11. Project implementation: Planning project implementation. Scheduling. Planning costs and resources. 12. Monitoring and controlling project implementation: Monitoring and controlling project schedule. Monitoring and controlling project resources and costs. 13. Managing changes in a project. 14. Managing risks in a project. 15. Reporting: Project reporting system. Project closure.
Learning outcomes:	Knowledge: Students will gain knowledge in project and investment management, including methods and techniques used in project and investment management processes, and will be trained to apply this knowledge practically. Skills: Upon completion of the course, students will be able to understand project and investment management processes, evaluate appropriate methods in project management, evaluate appropriate methods in investment management, plan activities for both processes, apply project management concepts in real systems and business environments, apply investment management concepts in real systems and business environments, and plan, manage, and control the implementation of various types of projects in business systems. Competencies: Application of acquired knowledge in concrete models.
Sustainable Development Goal (SDG):	SDG 8: Decent Work and Economic Growth - Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. SDG 9: Industry, Innovation, and Infrastructure - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Responsible Consumption and Production - Ensure sustainable consumption and production patterns.
Teaching methods:	During the program execution, the instructor presents individual thematic units (ex cathedra), allows students to watch educational video content (DVDs, video presentations) related to the subject, and organizes discussions on a given topic (interactive teaching). In the exercises, examples and tasks are analyzed and solved according to the theoretical topics, helping students with independent problem-solving, program development, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating student work and assessment during the course: • Seminar Paper / Project Task: 0 to 15 points • First Test / First Knowledge Check / First Partial Exam: 0 to 35 points

	The total number of points a student can earn during the course is a maximum of 50 points. The final / remedial exam includes material that the student did not pass in the partial exam, meaning it covers the second part of the material (second partial exam) which is valued at 50 points or consists of the complete material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, and the exam grade, is based on the total number of points (%) the student has earned by fulfilling pre-exam obligations, taking partial exams, and final exams. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Scoring Structure Points (%) • Seminar Paper / Project Task: ..... 15 points (%) • First Test / First Knowledge Check (First Partial Exam): 35 points (%) • Final Exam (Second Partial Exam): ..... 50 points (%) The required condition for successfully completing the exam is achieving a score of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). In other words, for a student to pass the exam, they must achieve the following conditions: • Activity (seminar paper / project task): 8 points • First Test / First Knowledge Check / Partial Exam: 19 points • Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered in the partial exam) in the final exam. Students who have not passed the partial exam will take the complete material in the final exam, with the criteria for passing the exam remaining the same. The final exam is organized as a written and/or oral exam. Activity can be tracked through the completion of assignments, seminar papers, project tasks, or quizzes. Note**:** Students are required to attend all forms of classes at least 80% of the total number of hours, and attendance is a condition for the confirmation of regular class attendance. A student may be absent from classes for justified reasons (illness) and must provide a medical excuse. Seminar papers and assignments will only be graded if submitted according to the defined deadlines. Late submissions will not be graded. The final success of the student after all the planned forms of knowledge checks is evaluated and graded as follows: a) 10 - Outstanding success with no errors or with minor errors, carries 95-100 points; b) 9 - Above average, with some errors, carries 85-94 points; c) 8 - Average, with noticeable errors, carries 75-84 points; d) 7 - Generally good but with significant shortcomings, carries 65-74

	points; e) 6 - Meets the minimum requirements, carries 55-64 points; f) 5 - Does not meet the minimum requirements, less than 55 points.
Literature:	**Mandatory:** 1. Lecture notes and slides (available for download on the Faculty's website). 2. Vujadin Vešović, "Project Management", 9th Edition, Belgrade, 2010. 3. Vladimir B. Depolo, "Project Management in Traffic Engineering", Belgrade, 2010. **Supplementary:** 1. Petar Jovanović, "Investment Management", 8th Edition, Belgrade, 2013

Course code: 12TRWOS020203	**Course title: RISK MANAGEMENT IN RAILWAY TRAFFIC**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures:45 Exercises: 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The teaching material covered should enable students to acquire knowledge in the field of risk assessment in railway transport and the elements affecting it. The study and analysis of exceptional events in railway systems, as well as the factors influencing them, should be included.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Traffic risks in general 2. Basic concepts of traffic safety in general 3. Science in the function of providing assistance to traffic safety 4. Man as a participant in traffic risks and incidents and the impact of fatigue on traffic safety 5. Safety management system of infrastructure managers and railway carriers 6. Common safety indicators 7. Risks and incidents in railway traffic 8. Methods of risk analysis and assessment in railway traffic 9. Railway regulations and railway enforcement services 10. Control as a factor influencing the safety of railway traffic 11. Concept and classification of extraordinary events on the railway		

	12. Descriptive statistical methods for the analysis of extraordinary events on the railway 13. Contemporary EU regulation in the field of analysis of extraordinary events on the railway 14. Methodologies for calculating the economic impact of accidents. 15. Procedures for risk management in railway traffic
Learning outcomes:	Knowledge: Students should acquire knowledge in the area of risk assessment in railway traffic through lectures, exercises, laboratory work, and practical experience. They are expected to master the methodology for investigating extraordinary events on the railway and to conduct high-quality analyses of these events, defining causes and quantifying consequences. They should also master modern methodologies and analysis techniques for evaluating the state of safety in railway traffic and the disciplines of risk analysis and assessment. Skills: Students should become proficient in the methodology for investigating extraordinary events on the railway and performing quality analyses, defining causes, and quantifying consequences. They are expected to master modern methodologies and techniques for analyzing the safety status of railway traffic and be skilled in risk analysis and assessment. Competencies: Application of acquired knowledge in concrete models.
Sustainable Development Goal (SDG):	SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 11 - Make cities and human settlements inclusive, safe, resilient, and sustainable SDG 12 - Ensure sustainable consumption and production patterns
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following

	scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: g) 10 – Outstanding performance with no errors or with minor errors: 95-100 points h) 9 – Above average, with some mistakes: 85-94 points i) 8 – Average, with noticeable mistakes: 75-84 points j) 7 – Generally good, but with significant deficiencies: 65-74 points k) 6 – Meets minimal requirements: 55-64 points l) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 1. Salketić, S., Kudumović, Dž., Branković, N.: *Fundamentals of Railway Traffic Technology*, Faculty of Transport and Communications, Sarajevo, 2016. 2. Beširević, S.: *Organization of Railway Traffic*, Faculty of Transport and Communications, Sarajevo, 1997. 3. Branković, N.: *Railway Traffic Infrastructure*, Faculty of Transport and Communications, Sarajevo, 2010. 4. Bogović, B.: *Organization of Railway Traffic*, Faculty of Transport Sciences, Zagreb, 1987. 5. Čičak, M., Vesković, S., Mladenović, S.: *Models for Determining Railway Capacities*, Traffic Faculty, University of Belgrade, 2009. 6. Čičak, M., Vesković, S.: *Organization of Railway Traffic II*, Traffic Faculty, University of Belgrade, 2005.

	7. Mandić, D.: *Organization of Train Haulage*, Traffic Faculty, University of Belgrade, Belgrade, 2002. 8. Railway Regulation - REGULATION 19 (Official Gazette of BiH No. 73/13) (Regulation on Procedures for Serious Accidents and Incidents) 9. Instructions on Safety Investigations of Accidents and Incidents in the Railway System of BiH (Official Gazette of BiH No. 37/15) 10. Bukljaš, Z.: *Technical Elements of Railway Traffic Safety*, Faculty of Transport Sciences, Zagreb, 1989. 11. Badanjak, D., Bogović, B., Jenić, V.: *Organization of Railway Traffic*, Faculty of Transport Sciences, Zagreb, 2006. 12. Milošević, B.: *Railway Tracks*, Traffic Faculty, University of Belgrade, Belgrade, 1979. **Supplementary:** 1. Čabrić, N., Puzić, N.: *Roles and Responsibilities of NOBOs, DEBOs, CSM Risk Assessment, and ECM Certification Bodies*, Second BiH Congress on Railways Sarajevo, September 26-27, 2013, ISSN 2233-0100, 9 772233 010002, Proceedings p. 345-354. 2. Čabrić, N., Đuričić, R.: *Methods of Risk Analysis and Assessment*, Third BiH Congress on Railways Sarajevo, October 15-16, 2015, ISSN 2233-0100, 9 772233 010002, Proceedings p. 315-327. 3. Čabrić, N.: *Risk Assessment Model for Intermodal Transport of Dangerous Goods*, V International Symposium NOVI HORIZONTI 2015 on Transport and Communications, November 20-21, 2015, Doboj, ISBN: 978-99955-36-57-2, p. 60-66. 4. Čabrić, N., Đuričić, R.: *Risk Management in the Railway System*, TIT - Transport Infrastructure and Transport, No. 7, Year 6, Sarajevo, December 2016, ISSN 2232-9676, p. 36. 5. Čabrić, N., Đuričić, R.: *Safety and Security of the Railway System*, Fourth BiH Congress on Railways Sarajevo, October 26-27, 2017, ISSN 2233-0100, 9 772233 010003, Proceedings p. 248-260. 6. Čabrić, N., Tadić, S., Zečević, S.: *Modelling Security of Intermodal Transport by Application of Petri Nets*, International Conference on Traffic and Transport Engineering - ICTTE 2018, September 27-28, 2018, Belgrade, Serbia, ISBN 978-86-916153-4-5, p. 490-494. 7. Čabrić, N., Đuričić, R., Malčić, V.: *European Model of Railway Safety Culture*, Tenth BiH Congress on Transport Infrastructure and Transport, October 24-25, 2019, Sarajevo, ISSN 1840-2763, 9 771840 276009, Proceedings p. 111-120. 8. Regulation (EU) No 402/2013 of April 30, 2013, on Common Safety Methods for Risk Assessment and Evaluation and

	Repealing Regulation 352/2009, Official Journal of the EU L 121, 3.5.2013, p. 8. 9. Directive (EU) 2016/798 of the European Parliament and Council of May 11, 2016, on Railway Safety, OJ L 138, 26.5.2016, p. 102–149.

Course code: 09-10-1TRWES020102	**Course title: TECHNICAL ELEMENTS OF RAILWAY SYSTEM SAFETY**		
Level: II	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures:45 Exercises: 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Acquiring educational forms in the implementation of the program related to railway safety elements, including practical analysis, reports, expertise, and projects concerning railway safety elements		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – basics of railway safety elements; tracks and vehicles 2. Technical factors as elements of railway traffic safety. 3. Safety and protection of the traffic system on open tracks in tunnels and on bridges 4. Technical parameters on the railway (on tracks, mobile capacities, traffic signaling and railway equipment) 5. Type and content of track construction and reconstruction projects 6. Regulations and safety instructions for the use of cars and cargo accessories 7. EU and BH standards (BASN) - traffic signaling and equipment 8. Revision of traffic signaling and railway equipment projects 9. Development and technical acceptance of tracks 10. Revision and safety inspections on the railway., Procedure in the event of a railway accident 11. Euro standards for railways 12. High-speed rail IC guidance 13. Railway traffic control. Safety when accepting and shipping rail vehicles 14. Analysis of the causes of extraordinary events (field research) 15. Regulation of traffic in the zone of general overhaul on the tracks during the execution of works		
Learning outcomes:	Knowledge: Through lectures, exercises, laboratory work, and practical training, students should acquire the appropriate knowledge and		

	experience for practical application in the field of railway safety elements. The course material should ensure a level of understanding of the rules, methods, and procedures for safety related to railway infrastructure and rolling stock. Skills: The course provides the skills necessary for adequate analysis, assessment, and management of safety in railways. Competencies: Application of acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable SDG 16 - Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points

	Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: m) 10 – Outstanding performance with no errors or with minor errors: 95-100 points n) 9 – Above average, with some mistakes: 85-94 points o) 8 – Average, with noticeable mistakes: 75-84 points p) 7 – Generally good, but with significant deficiencies: 65-74 points q) 6 – Meets minimal requirements: 55-64 points r) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	**Mandatory:** 1. Čabrić, N. "Script: Technical Elements of Railway Safety," Faculty of Transport and Communications, University of Sarajevo, Sarajevo, 2024. 2. Bukljaš, Z. "Technical Elements of Railway Traffic Safety," University Textbook, Faculty of Traffic Sciences, Zagreb, 1989. **Supplementary:** 1. Mundrey, J.S. "Railway Track Engineering," Tata McGraw-Hill Publishing Company Limited, 1993. 2. Čabrić, N., Đuričić, R. "Safety and Security of the Railway System," Fourth BiH Congress on Railways Sarajevo, October 26-27, 2017, ISSN 2233-0100, 9 772233 010003 Proceedings pp. 248-260. 3. Čabrić, N., Blagojević, A. "Interoperability and Security - Main Drivers for Market Opening," International Symposium Rail Transport in The Modern World (1; 2019; Belgrade), ISBN 978-86-81101-33-9, Proceedings pp. 102-107. 4. SIGNAL REGULATIONS ("Official Gazette of BiH," No. 13/14) 5. TRAFFIC REGULATIONS ("Official Gazette of BiH," No. 90/15) 6. Osman Lindov: "Safety in Road Traffic," University Textbook, Faculty of Transport and Communications, Sarajevo, 2008. 7. Toš, Z. "Railway Signaling," Faculty of Traffic Sciences, Zagreb, 2002. 8. Milićević, M. "Technical Systems for Regulating and Safety of Railway Traffic," University of Belgrade, 1982. 9. "Traffic Control Systems Handbook," Final Report, FHWA, 1996.

	10. Begović, M. "Maintenance of Technical Systems," Faculty of Traffic Sciences, Zagreb, 2003. 11. Instructions and Regulations, Regulatory Board of Railways BiH. 12. Instructions for Safety and Interoperability of the Railway System ("Official Gazette of BiH," No. 11/12) 13. Instructions for the Use of Rolling Stock and Freight Accessories (ZJŽ) - Consolidated Text - Belgrade, 1990.

Course code: 09-10-2TRWES020102	**Course title: TRAIN SCHEDULES AND RAILWAY CAPACITY**		
Level: II	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The teaching material covered in the content should enable students to acquire knowledge in the areas of designing and elements of timetable creation in railway transportation. Calculation and dimensioning of elements of transport and throughput capacity of railway tracks.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction - Determining track capacity 2. Transport and throughput capacity of railway tracks 3. Parameters for determining the utilization of technical track capacity 4. Measures for increasing technical track capacity (organizational, technical, and reconstruction measures) 5. General overview of timetables, timetable as a technological process of track operation, timetable as a part of railway business policy 6. Elements for creating a timetable 7. Guidelines for creating a timetable 8. Traffic intervals 9. Construction of train traffic graphs 10. General organization of traffic (passenger and freight) 11. Allocation of capacity for international and domestic transport by infrastructure managers to railway operators 12. Determining the required number of train crew members 13. Operational indicators of the timetable 14. Legal obligations of railways regarding the creation, publication, and implementation of timetables 15. Software solutions for timetable creation		

Learning outcomes:	Knowledge: Students should acquire appropriate knowledge and experience through lectures, exercises, practical exercises, and practical work for practical application in defining the throughput and transport capacity of tracks and applying parameters in practice. The throughput capacity of tracks, as a fundamental tool, should assist them in designing and creating timetables and drawing train traffic graphs. Skills: Students are expected to gain high-quality knowledge in modeling, monitoring, and analyzing results through the design of timetables and monitoring their implementation. Competencies: Application of acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 8: Promote sustained, inclusive, and sustainable economic growth, productivity, and decent work for all. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions:

	Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: s) 10 – Outstanding performance with no errors or with minor errors: 95-100 points t) 9 – Above average, with some mistakes: 85-94 points u) 8 – Average, with noticeable mistakes: 75-84 points v) 7 – Generally good, but with significant deficiencies: 65-74 points w) 6 – Meets minimal requirements: 55-64 points x) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 1. Salketić, S., Kudumović, Dž., Branković, N.: *Basics of Railway Traffic Technology*, Faculty of Transport and Communications, Sarajevo, 2016. 2. Beširević, S.: *Organization of Railway Traffic*, Faculty of Transport and Communications Sarajevo, 1997. 3. Bogović, B.: *Organization of Railway Transport*, Faculty of Traffic Sciences, Zagreb, 1987. 4. Kovačević, P.: *Railway Operation*, Higher Railway School, Belgrade, 1998. 5. Čičak, M., Vesković, S., Mladenović, S.: *Models for Determining Railway Capacity*, Faculty of Traffic Engineering, University of Belgrade, 2009. 6. Čičak, M., Vesković, S.: *Organization of Railway Traffic II*, Faculty of Traffic Engineering, University of Belgrade, 2005. 7. Mandić, D.: *Organization of Train Haulage*, Faculty of Traffic Engineering, University of Belgrade, Belgrade, 2002. 8. Badanjak, D., Bogović, B., Jenić, V.: *Organization of Railway Traffic*, Faculty of Traffic Sciences, Zagreb, 2006. Supplementary: 1. Branković, N.: *Railway Traffic Infrastructure*, Faculty of Transport and Communications Sarajevo, 2010. 2. Fejzić, E.: *Appearance and Development of Railways and Railway Passenger Terminals*, IKD UNIVERSITY PRESS Sarajevo and Građevinska Knjiga, Belgrade, 2011.

	3. Milošević, B.: *Railway Tracks*, Faculty of Traffic Engineering, University of Belgrade, Belgrade, 1979.

Course code: 09-10-3TRWES020102	**Course title: STANDARDIZATION IN RAILWAY TRAFFIC**		
Level: II	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures 45 Exercises 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Introducing students to general concepts of standards and standardization, accepted definitions, types, and typical structures of standards, as well as the growing importance of using standards in all areas of human activity, with a particular focus on railway traffic.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Basics of standardization. Levels of standardization. International, European, and national standardization organizations. 2. National BAS standards. Marking and dating of BAS standards. Methods for adopting international and European standards. 3. Overview of BAS technical committees. Corresponding international and European technical committees. 4. Areas of work of BAS technical committees related to railway traffic and corresponding international/European TCs. 5. ICS classification. Areas, groups, and subgroups. Areas, groups, and subgroups related to railway traffic. 6. Basic division of standards with examples of generic and specific standards related to railway traffic. 7. Systematization of BAS standards in the field of railway traffic. 8. Examples of standards from area 45 of the ICS classification, group 45.020 - general railway engineering, 45.040 - materials and components for railway engineering. Analysis of the application area and structure of standards. 9. Examples of standards from group 45.060 of the ICS classification - rail vehicles, including materials, components, electrical and electronic equipment for rail vehicles. Analysis of the application area and structure of standards. 10. Examples of standards from group 45.080 of the ICS classification - rails and track components. Analysis of the application area and structure of standards. 11. Examples of standards from area 45.120 of the ICS classification - equipment for the construction and maintenance		

	of railways. Analysis of the application area and structure of standards. 12. Examples of standards from other areas of the ICS classification related to railway traffic. Analysis of the application area and structure of standards. 13. New approach directives. Basic principles and objectives. 14. Harmonized European standards in the field of railway traffic. 15. Examples of harmonized standards related to specific components of railway vehicles. Analysis of the application area and structure of standards.
Learning outcomes:	Knowledge: Students will learn the fundamentals of standardization, the role of international, European, and national organizations, and the application of BAS standards in railway traffic. They will also understand the ICS classification and new approach directives, as well as harmonized European standards. Skills: Students will develop the ability to analyze, classify, and apply relevant standards in railway traffic, including the systematization and interpretation of the structure of BAS and ICS standards. Competencies: Students will be trained for the professional use and alignment of standards in railway traffic, as well as for leading the evaluation and application processes of standards in practice.
Sustainable Development Goal (SDG):	SDG 9: Industry, Innovation, and Infrastructure – through standardization for sustainable and quality infrastructure. SDG 11: Sustainable Cities and Communities – contribution through standards for sustainable transport. SDG 12: Responsible Consumption and Production – application of standards for efficient resource use. SDG 13: Climate Action – through the implementation of standards to reduce the ecological impact of transport.
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the

	final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: y) 10 – Outstanding performance with no errors or with minor errors: 95-100 points z) 9 – Above average, with some mistakes: 85-94 points aa) 8 – Average, with noticeable mistakes: 75-84 points bb) 7 – Generally good, but with significant deficiencies: 65-74 points cc) 6 – Meets minimal requirements: 55-64 points dd) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 4. Behmen, A.; Salihović, S.: “Materials and Goods in Transport - Book I – Classification, Standardization, Identification,” Faculty of Transport and Communications Sarajevo and DES Sarajevo, 2007. 5. Behmen, A.; Salihović, S.: “Materials and Goods in Transport - Book II – Quality: Basics, Principles, Control,” Faculty of Transport and Communications Sarajevo and DES Sarajevo, 2008. Supplementary: 1. International/European/National Standards.

<table>
<tr><td>Course code:
09-10-4TRWES020102</td><td colspan="3">Course title: SIGNAL SYSTEMS AND CONTROL OF RAILWAY TRAFFIC</td></tr>
<tr><td>Level: II</td><td>Year: I</td><td>Semester: II</td><td>Number of ECTS credits: 6</td></tr>
<tr><td colspan="2">Status: elective course</td><td colspan="2">Total number of contact hours: 90
Optionally elaborate the distribution of hours by type:
Lectures 45
Exercises 30
Seminar and project tasks: 15</td></tr>
<tr><td colspan="2">Course participants:</td><td colspan="2">Academic staff and associates selected in the field to which the course belongs/course</td></tr>
<tr><td colspan="2">Prerequisite for enrollment:</td><td colspan="2">No</td></tr>
<tr><td colspan="2">Course goal (goals):</td><td colspan="2">Acquisition of educational forms in the implementation of programs on modern signal systems and control of railway traffic, as well as practical analyses, reports, expert evaluations, and projects related to modern signal systems and railway traffic control</td></tr>
<tr><td colspan="2">Topics covered (Units of study):
(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)</td><td colspan="2">1. Introduction – basics of signal system elements and railway traffic control
2. Laws related to railway traffic in FBiH and regulations and instructions. Signal regulation – ŽFBiH
3. Safety and protection by signal systems and control of traffic systems on open tracks, in tunnels, and on bridges
4. Technical parameters on railways (on tracks, mobile capacities, and traffic signaling and equipment)
5. Types and content of projects for the construction and reconstruction of signal systems for railway traffic control
6. ETCS system
7. GSM system
8. Video surveillance on open tracks, in tunnels, on bridges, and underwater tracks
9. Development and technical acceptance of signal systems for railway traffic control
10. Control and revision of signal systems for regulating railway traffic
11. European standards for railways
12. High-speed railway traffic control - IC management
13. EU and BH standards (BASN) - traffic signaling and equipment
14. Analysis of causes of extraordinary events (field research)
15. Signaling and traffic regulation in the general overhaul zone on tracks during construction works</td></tr>
<tr><td colspan="2">Learning outcomes:</td><td colspan="2">Knowledge: Students will acquire basic and advanced knowledge about modern signaling systems and railway traffic control, including technical parameters, standards, laws, and regulations related to traffic safety on open tracks, in tunnels, and on bridges. They will also become familiar with ETCS and GSM systems, as well as European and BH norms for railways.
Skills: Students will develop the skills necessary for analyzing,</td></tr>
</table>

	designing, and implementing signaling systems, controlling and revising these systems, as well as the ability to use video surveillance and manage traffic in various infrastructural conditions. They will also be trained for technical acceptance and control of signaling systems, as well as for analyzing extraordinary events in the field. Competencies: Students will be competent to apply the acquired knowledge in practice, especially in the areas of safety and regulation of railway traffic. They will be equipped to assess risks, manage signaling projects, control high-speed railway traffic, and conduct analyses in accordance with European and BH standards.
Sustainable Development Goal (SDG):	SDG 4: Quality Education SDG 9: Industry, Innovation, and Infrastructure SDG 11: Sustainable Cities and Communities SDG 16: Peace, Justice, and Strong Institutions
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points

	First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: ee) 10 – Outstanding performance with no errors or with minor errors: 95-100 points ff) 9 – Above average, with some mistakes: 85-94 points gg) 8 – Average, with noticeable mistakes: 75-84 points hh) 7 – Generally good, but with significant deficiencies: 65-74 points ii) 6 – Meets minimal requirements: 55-64 points jj) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 1. Mundrey, J.S.; Railway Track Engineering, Tata McGraw-Hill Publishing Company Limited, 1993. 2. Signal Regulations – ŽFBiH. 3. Gold, H. et al. Digital Management of Railway Models, Faculty of Transport Sciences, Zagreb, 1994. 4. Bukljaš, Z.: Technical Elements of Railway Traffic Safety, University Textbook, Faculty of Transport Sciences, Zagreb, 1989. 5. Toš, Z.: "Railway Signaling," Faculty of Transport Sciences, Zagreb, 2002. Supplementary: 6. Milićević, M.: "Technical Systems for Regulation and Safety of Railway Traffic," University of Belgrade, 1982. 7. Traffic Control Systems Handbook, Final Report, FHWA, 1996. 8. Begović, M.: "Maintenance of Technical Systems," Faculty of Transport Sciences, Zagreb, 2003. 9. ZoBS and Regulations, Ministry of Transport and Communications, BiH, 206.2008, 2010, 2012. 10. Regulations and Instructions at ŽFBiH.

Course code: 09-10-5TRWES020102	**Course title: ELECTRIC VEHICLE SAFETY**		
Level: II	**Year: II**	**Semester: II**	**Number of ECTS credits:** 6

Status: elective course	**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 30 Tutorials 20 Seminars 10 Fieldwork 10 Laboratory Tutorials 10 Practice 10
Course participants:	**PhD Osman Lindov, Traff.Eng, Full professor**
Prerequisite for enrollment:	No
Course goal (goals):	To enable students to acquire basic professional knowledge about basic concepts, principles and practices related to the safety of electric vehicles. The aim of the course is to train students to understand and analyze the basic components and systems of electric vehicles, as well as to understand and manage potential risks and safety challenges EV.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. An introduction to electric vehicle safety. 2. Regulatory framework, standards, regulations in EU countries. 3. Initiatives for the development and promotion of E-mobility. 4. Drive system of E vehicles. 5. Risks and dangers when using and charging electric vehicles. 6. Education on the safety of the movement of E vehicles in traffic. 7. Safety aspects in case of traffic accidents with electric vehicles. 8. Safety aspects of electric vehicle charging infrastructure. 9. Safety elements of E vehicles. 10. Safety of passengers in E vehicles. 11. Analysis of traffic safety parameters of E vehicles. 12. Parameters of calculation of safety elements in case of traffic delinquency with E vehicles. 13. E-vehicles and the environment, the safety aspect of maintenance and disposal of batteries. 14. Safety aspects when servicing and maintaining electric vehicles. 15. E vehicles in industrial plants.
Learning outcomes:	Knowledge: Theoretical relevant knowledge and experience for practical application in the field of safety standards and regulations, legal aspects, key stages and methods of implementation, roles and responsibilities of key entities in the process, and procedures and techniques for the safety of electric vehicles. Skills: Ability to apply the theoretical and practical knowledge necessary for a comprehensive understanding of the concept of electric vehicle safety. Competencies: Ability to independently understand and use regulations, use professional literature, apply methods and procedures, measure and research, make analyses, assessments and practical solutions, take preventive action, and procedures for a comprehensive understanding of the concept of electric vehicle safety.
Sustainable Development Goal (SDG):	SDG4 – Quality Education – To ensure inclusive and quality education, and to promote lifelong learning opportunities for all people, of all ages. SDG5 - Gender Equality - Achieve gender equality and empower all women and girls. SDG8 - Decent Work and Economic Growth - Promote inclusive and sustainable

<table>
<tr><td></td><td>economic growth, employment and decent work for all. SDG9- Industry, Innovation and Infrastructure -Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
SDG11 - Sustainable Cities and Local Communities - Make cities and settlements inclusive, safe, resilient and sustainable.
SDG12-Sustainable consumption and production - Ensure sustainable forms of consumption and production.
COR13-Climate Action - Take urgent action to combat climate change and its consequences
SDG17- Partnerships for the Goals- Incorporating a Global Partnership for Sustainable Development</td></tr>
<tr><td>Teaching methods:</td><td>Oral presentation with presentation and presentation of various analyses, studies, models and methods in the field of electric vehicle safety processes, with the use of video and audio recordings, software, measuring equipment, and independent presentation of individual specific research. Initiating discussions and discussions on practical problems, individual observations from different environments, making independent analyses, research, measurements and modelling in the field of electric vehicle safety processes.</td></tr>
<tr><td>Assessment methods with grading structure:</td><td>Assessment of creativity in classes and exercises with the preparation of independent papers, evaluation of the partial test during the class as well as the evaluation of the final exam. The criterion for monitoring the work and evaluation of the student during the course is as follows:
✓ Seminar 15 points (%), passed if won over 50%.
✓ I Partial exam/test/knowledge test/35 points (%), is passed if more than 50% is scored.
✓ Final exam (II Partial) 50 points (%), passed if won over 50%.
✓ Final exam (Integral) 85 points (%), passed if won over 50%.

The total number of points (%) that a student can achieve during the course is a maximum of 50 points (%), which together with the Final (II partial) makes 100 points (%). For students who have not passed the I Partial Exam, the Final Exam (Integral) is organized from the entire material covered during classes and exercises, and is evaluated with 85 points (%), which with the seminar paper/practical work makes 100 points (%).

The final success of the student after all the foreseen forms of examination is evaluated and evaluated by the grading system as follows: a) 10 (A) - exceptional success without errors or with minor errors, carries 95-100 points; b) 9 (B) - above average, with some error, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with more significant drawbacks, carries 65-74 points; e) 6 (E) - meets the minimum requirements, carries 55-64 points; f) 5 (F, FX) - does not meet the minimum requirements, less than 55 points.
The total evaluation of all student obligations during the semester, i.e. the grade on the exam, is based on the total number of points (%) that the student has acquired by fulfilling the pre-exam obligations and passing the partial and final exam, according to the quality of the acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale:

<table>
<tr><td>The Student's Responsibilities</td><td>Score (%)</td></tr>
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Attendance at lectures and exercises (attendance at all forms of teaching is mandatory at least 80% and this is a condition for the certification/signature of regular attendance)	0 points
Seminar	15 points (%)
I Partial Exam / Test / Knowledge Assessment /	35 points (%)
Final exam (II partial)	50 points (%)
Final exam (Integral)	85 points (%)

Literature:

Mandatory:

1. C. Qiu, G. Wang, M. Meng, and Y. Shen, "A novel control strategy of regenerative braking system for electric vehicles under safety critical driving situations," Energy, vol. 149, pp. 329–340, Apr. 2018.
2. E. Karaaslan, M. Noori, J. Y. Lee, L. Wang, O. Tatari, and M. Abdel-Aty, "Modeling the effect of electric vehicle adoption on pedestrian traffic safety: An agent-based approach," Transportation Research Part C: Emerging Technologies, vol. 93, pp. 198–210, Aug. 2018.
3. F. Gandoman, J. Van Mierlo, A. Ahmadi, S. Abdel Aleem, Chapter 15: Safety and reliability evaluation for electric vehicles in modern power system networks, Distributed Energy Resources in Microgrids, 2019, Pages 389-404.
4. F. Michael Ashby, Case Study: Electric Cars, Materials and Sustainable Development, 2016.
5. Gwilliam, K. (ed): Cities on the Move: A World Bank Urban Transport Strategy Review, Strategy Paper, Washington, DC: World Bank, 2001.
6. J. Dižo and M. Blatnický, "Investigation of ride properties of a three-wheeled electric vehicle in terms of driving safety," Transportation Research Procedia, vol. 40, pp. 663–670, Jan. 2019.
7. Lindov O., Pikula B.: Electromobility models and sustainable urban development – Sarajevo case study, International Conference Towards a Human City, 2019.
8. Lah, O.: Sustainable Urban Mobility Pathways, Wuppertal Institute for Climate, Environment and Energy & Climate Action Implementation Facility, Berlin, Germany, 2019.
9. Mehinović H., Mujezin H., Lindov O.: Enhancing competitiveness and innovation in the green and smart mobility, International Conference Towards a Human City, 2019.
10. O. Lindov, Sigurnost u cestovnom saobraćaju, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2008.
11. P. Van den Bossche, Safety considerations for electric vehicles, Citelec, Brussels Belgium
12. Q. Yu et al., "Evaluation of the safety standards system of power batteries for electric vehicles in China," Applied Energy, vol. 349, p. 121674, Nov. 2023.
13. Q. He, Y. Yang, C. Luo, J. Zhai, R. Luo, and C. Fu, "Energy recovery strategy optimization of dual-motor drive electric vehicle based on braking safety and efficient recovery," Energy, vol. 248, p. 123543, Jun. 2022.
14. W. Mitchell, R. Chin, A. Sevtsuk, Chapter 11 - The Media Laboratory City Car: A New Approach to Sustainable Urban Mobility, Urban Energy Transition, 2008 pp: 267-282.

Supplementary:

	1. W. Li, J. Zhu, Y. Xia, M. B. Gorji, and T. Wierzbicki, "Data-Driven Safety Envelope of Lithium-Ion Batteries for Electric Vehicles," Joule, vol. 3, no. 11, pp. 2703–2715, Nov. 2019. 2. W. Mitchell, R. Chin, A. Sevtsuk, Chapter 11 - The Media Laboratory City Car: A New Approach to Sustainable Urban Mobility, Urban Energy Transition, 2008 pp: 267-282.

Course code: 09-10-6TRWES020102	**Course title: SAFETY RISKS IN THE TRANSPORTATION OF DANGEROUS MATERIALS**		
Level: II	**Year: II**	**Semester: II**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 30 Tutorials 20 Seminars 10 Fieldwork 10 Laboratory Tutorials 10 Practice 10	
Course participants:	**PhD Osman Lindov, Traff.Eng, Full professor**		
Prerequisite for enrollment:	No		
Course goal (goals):	Acquiring knowledge of the fundamentals of processes, procedures, and techniques for risk assessment in the transportation of dangerous materials.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Fundamentals of the transportation processes of dangerous materials and terminology related to risks in the transportation of dangerous materials. 2. Legal and institutional framework governing the process of transporting dangerous materials. 3. Professional qualifications of individuals involved in the preparation, execution, and monitoring of the transportation task of dangerous materials. 4. Importance and responsibilities of safety advisors in the planning and execution of transportation tasks. 5. Technical and technological characteristics of transportation means for transporting dangerous materials. 6. Required documentation for transportation means and vehicle personnel for the transport of dangerous materials. 7. Required documentation about the cargo being transported and handling methods. 8. Procedure for planning and preparing for the execution of the transportation task for dangerous materials. 9. Checklists for inspecting transportation means prior to the execution of the transportation task. 10. Assessment and categorization of the type of risk in executing the transportation task and modeling consequences. 11. Preventive measures for eliminating risks in the execution of the		

<table>
<tr><td></td><td>transportation task.
12. Procedures in case of an incident occurring during the execution of the transportation task.
13. Monitoring execution and analysis of the transportation task for dangerous materials.
14. Risk calculation in the transportation of dangerous materials.
15. Analysis of practical examples.</td></tr>
<tr><td>Learning outcomes:</td><td>▪ Knowledge acquisition regarding the fundamentals of processes, procedures, and techniques for risk assessment during the transportation of dangerous materials.
▪ Knowledge acquisition regarding the legal framework governing the field of transport of dangerous materials (TOM).
▪ Knowledge acquisition regarding the key phases and methods for executing transportation tasks.
▪ Knowledge acquisition regarding the responsibilities of key stakeholders in the execution of transportation tasks.
▪ Ability to independently understand and recognize problems.
▪ Ability to participate in all phases of organizing and implementing the transport of dangerous materials process.
▪ Ability to apply theoretical and practical knowledge from the subject area in practice.</td></tr>
<tr><td>Teaching methods:</td><td>Lectures accompanied by multimedia presentations
Solving practical problems and specific project tasks</td></tr>
<tr><td>Assessment methods with grading structure:</td><td>
<table>
<tr><th colspan="4">Knowledge assessment (maximum number of points: 100)</th></tr>
<tr><th>Pre-examination obligations</th><th>points</th><th>Final exam</th><th>points</th></tr>
<tr><td>Activity during the lecture</td><td>-</td><td>Written exam</td><td>50</td></tr>
<tr><td>Practical teaching</td><td>-</td><td>Oral exam</td><td>-</td></tr>
<tr><td>Colloquiums</td><td>35</td><td></td><td></td></tr>
<tr><td>Seminar paper</td><td>15</td><td></td><td></td></tr>
<tr><td>In total</td><td></td><td>In total</td><td>100</td></tr>
</table>
</td></tr>
<tr><td>Literature:</td><td>1. Bukljaš Skočibušić, M., Bukljaš, Z. Protection in Traffic: Faculty of Transport Sciences, Zagreb, 2015.
2. Cassini, P., Hall, R., and Pons, P. Transport of Dangerous Goods through Road Tunnels. Quantitative Risk Assessment Model (Version 3.60), Reference Manual. OECD/PIARC/EU (CDROM), February 2003.
3. Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances, Official Journal L 010, P. 0013 – 0033, 14 January 1997.
4. D. Knežević: Interventions in Accidents during the Transport of Dangerous Substances, Croatian Firefighting Community, Zagreb, 2014.</td></tr>
</table>

	5. Directive 2004/54/EC of the European Parliament and of the Council of 29 April 2004 on minimum safety requirements for tunnels in the Trans-European Road Network, Official Journal of the European Union L 167 of 30 April 2004. 6. Directive 2008/68/EC of the European Parliament and of the Council of 24 September 2008 on the inland transport of dangerous goods (Text with EEA relevance), 2008. 7. General Guideline for the Calculation of Risks in the Transport of Dangerous Goods by Road, 84th and 85th sessions of the Working Party on the Transport of Dangerous Goods (WP.15) in May and October 2008. 8. Lindov, O. *Traffic Safety*, Faculty of Transport and Communications, University of Sarajevo, 2008. 9. Lindov, O., Kiso, F., Kosovac, A., Čolaković, A., Memić, B., Hasković, A., Begović, M., Omerhodžić, A., & Berković, M. (2022). *Innovative Technologies in Traffic and Transport Safety* (p. 467). Faculty of Transport and Communications, University of Sarajevo. 10. *Manual for Carriers and Drivers of Vehicles for Transporting Dangerous Goods*, IPI-Institute for Economic Engineering, Zenica, 2009. 11. Risk Management Framework (https://transport.ec.europa.eu/transport-themes/transport-dangerous-goods/risk-management-framework_en). 12. *Agreement on the Transport of Dangerous Goods in Road Traffic (ADR)*

Course code: 13-14-15-1TRWES020203	**Course title: EVALUATION AND DECISION-MAKING METHODS IN TRAFFIC ENGINEERING**		
Level: II (Second)	**Year: II (Second)**	**Semester: III (Third)**	**Number of ECTS credits: 6 (Six)**
Status: elective course		**Total number of contact hours: 90** **Lectures: 45** **Exercises: 30** **Seminar: 15**	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	None		
Course goal (goals):	The course content aims to familiarize students with the fundamentals of planning and designing traffic infrastructure and types of evaluation in the planning and design process. The course also studies the most significant and commonly applied evaluation methods in traffic planning and design. The course material includes investment, environmental, and socio-economic evaluation methods and multi-criteria analysis methods with practical examples and guidelines for understanding the decision-making process in traffic engineering.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into*	1. Traffic system as a factor of spatial organization and distribution 2. Methodological approach to traffic planning 3. Basics of traffic route planning 4. Basics of traffic route design		

account the specificities of organizational units)	5. Theoretical assumptions of traffic infrastructure planning and design 6. Feasibility Study – CB analysis 7. Functional evaluation of project solutions 8. Functional evaluation of road sections 9. Financial and economic project analysis 10. Cost-benefit analysis in traffic projects 11. Multi-criteria evaluation and decision-making methods 12. Environmental impact assessment of infrastructure 13. Traffic infrastructure project management 14. Project management techniques 15. Preparation of projects financed by EU funds
Learning outcomes:	Through lectures, exercises, and practical work, students should acquire the necessary knowledge and experience for practical application in traffic infrastructure planning and design. The course also enables the acquisition of knowledge and skills required for evaluating planning and design solutions and making appropriate decisions based on that evaluation.
Sustainable Development Goal (SDG):	Each of the thematic units contributes to different aspects of sustainable development through improved infrastructure, effective project management, and application of evaluation and decision-making methods that can contribute to economic growth, environmental protection, and sustainable resource management. Specific SDGs connected to the course syllabus include: – SDG 8: Decent Work and Economic Growth – SDG 9: Industry, Innovation, and Infrastructure – SDG 11: Sustainable Cities and Communities – SDG 13: Climate Action – SDG 17: Partnerships for the Goals The connection between thematic units and these SDGs is explained in more detail below: "SDG 8": Feasibility and cost-benefit analysis assist in selecting effective and innovative solutions in traffic infrastructure. (Subgoal "SDG 8.1": Sustain high economic growth rates with sustainability) "SDG 9": Methodological approach to traffic planning and understanding theoretical assumptions contribute to infrastructure improvement and innovation in transportation. Designing traffic routes and evaluating road sections are crucial for developing quality and functional infrastructure. Effective project management is key to successful implementation and sustainability of traffic infrastructure. (Subgoal "SDG 9.1": Sustain high economic growth rates with sustainability; Subgoal "SDG 9.a": Support research and innovation for building sustainable infrastructure) "SDG 11": The connection to this goal is based on the importance of sustainable urban planning and development management, including traffic infrastructure as a key segment. Additionally, functional evaluation aims to ensure that project solutions meet community needs

	and contribute to sustainability. (Subgoal "SDG 11.2": Ensure that road sections contribute to safe and efficient traffic) "SDG 13": Environmental evaluation contributes to understanding and minimizing the negative impacts of traffic infrastructure on the environment. (Subgoal "SDG 13.2": Integrate measures to mitigate climate change into national policies and strategies) "SDG 17": Preparing projects for EU funding involves collaboration and partnerships that contribute to achieving sustainable development goals. (Subgoal "SDG 17.16": Strengthen global partnerships and collaborations for sustainable development; Subgoal "SDG 17.3": Mobilize additional resources for development in developing countries through international financial institutions)
Teaching methods:	Teaching is conducted through lectures, exercises, and practical parts that include project assignments. Lectures are delivered through oral presentations with examples from practice. Discussions on issues in traffic infrastructure planning and design are encouraged. Students are required to complete and present seminar papers and/or project assignments. Various methods are used, including oral presentations and discussions, demonstrations, graphical and video presentations, and group work using appropriate methodological approaches.
Assessment methods with grading structure:	Evaluation criteria for student performance are as follows: Attendance in lectures and exercises will be recorded, with attendance being mandatory as a condition for taking the exam, with a maximum of 10% unexcused absences allowed. Regular attendance will not be additionally rewarded. The signature is not conditional on attendance. Homework/seminar paper/practical work: 0 to 15 points, with grading only for students who meet over 50% of the specified requirements. One knowledge check will be organized during the course - a partial exam in the 7th or 8th week with a value of 35 points, with grading only for students who pass over 50% of the partial exam. The final exam is worth a maximum of 50 points.
Literature:	Mandatory: 1. Jovanović, N.: "Traffic Planning", Faculty of Transport Engineering, University of Belgrade, 1990. 2. Kuzović, Lj.: "Evaluation in Management and Development and Exploitation of Road Networks", Faculty of Transport Engineering, University of Belgrade, 1994. 3. Milosavljević, N.: "Elements for Technological Design of Road Traffic and Transport Facilities", University of Belgrade, 1998. 4. Kuzović, Lj.: "Determining the Needs and Justification for Removing Transit Traffic from Urban Arteries by Building Bypasses", University of Belgrade, 1997. 5. Highway Capacity Manual – HCM 1994 / HCM 2000 6. Kiso, F., Deljanin, A.: "Evaluation Methods in Traffic Infrastructure Planning and Design", Faculty of Transport and Communications, University of Sarajevo, 2017.

Course code:	**Course title: TECHNOLOGICAL ANALYSES OF RAILWAY**

13-14-15-2TRWES020203	**TRANSPORT**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optionally elaborate the distribution of hours by type: Lectures:45 Exercises: 30 Seminar and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The course content aims to equip students with knowledge, disciplines, and tools in the field of analyzing indicators relevant to railway traffic, as well as in the calculation and dimensioning of capacities that are essential for the execution of timetables and the realization of the planned volume of transport.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – Technological analyses as a work methodology 2. Organization and technology of station operations in general 3. Analysis of technology in shunting and marshalling yards 4. Organization of freight flows and parameters for their analysis 5. Organization of railway junctions 6. Organization and technology of maintenance facilities for rail vehicles 7. Technology and organization of train haulage 8. Organization and technology of passenger transport 9. Technology of shunting operations 10. Analysis of qualitative indicators in railway transport 11. Technology and organization of services covering railway infrastructure 12. Organization and technology of operations in industrial complexes and ports 13. Technology and organization of operations on industrial railways 14. Technological capacities of other rail systems 15. Quality of transport service as the final product of railways		
Learning outcomes:	Knowledge: Through the teaching process, including lectures, exercises, and practical work, students should acquire the appropriate knowledge and experience in the technologies of shunting and marshalling yards and the formation of freight flows. It is expected that students will also gain insight into economic activities involving railways through visits to industrial systems that work with railways. By analyzing the work of railway services, workshops, and technical services, students are expected to gain quality knowledge for modeling, monitoring, and analyzing results to improve these processes. Skills: High-quality technological analyses in the mentioned areas guarantee that students will acquire specific professional competencies. Competencies: Application of acquired knowledge in specific models.		

Sustainable Development Goal (SDG):	SDG 3 - Ensure healthy lives and promote well-being for all at all ages. SDG 7 - Ensure access to affordable, reliable, sustainable, and modern energy for all. SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 11 - Make cities and human settlements inclusive, safe, resilient, and sustainable
Teaching methods:	During the execution of the program, the instructor presents individual thematic units (ex cathedra), provides students with access to educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). Within the exercises, the instructor conducts discussions and problem-solving activities according to the theoretical topics, assists students in independently solving tasks, and in the development of programs, projects, and seminar papers.
Assessment methods with grading structure:	Criteria for evaluating and grading student work during classes: Activity (Seminar Paper / Project Task): 0 to 15 points First Test / First Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the semester is a maximum of 50 points. The final exam includes material not covered in the partial exam, which means it covers the second part of the material (Second Partial Exam) valued at 50 points or it consists of the entire material, i.e., both the first and second partial exams. The overall evaluation of all student obligations during the semester, or the exam grade, is based on the total number of points (%) the student has earned through fulfilling pre-exam obligations, taking partial exams, and the final exam. According to the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: Points Structure: Seminar / Project Task: 15 points (15%) First Test / First Knowledge Check (First Partial Exam): 35 points (35%) Final Exam (Second Partial Exam): 50 points (50%) Required condition for successfully passing the exam is to achieve a result of 55 points, with a minimum of 55% on each part of the exam (activity, partial exam, final exam). To pass, a student must achieve the following conditions: Activity (Seminar Paper / Project Task): 9 points First Test / First Knowledge Check / Partial Exam: 19 points Final Exam (Second Partial Exam): 27 points Students who have passed the partial exam will only take the second part of the material (the part not covered by the partial exam) in the final exam. Students who have not passed the partial exam will cover the entire material in the final exam, with the same criteria for passing the

	exam. The final exam is organized as a written and/or oral exam. Activity can be monitored through the completion of assignments, seminar papers, project tasks, or quizzes. Final student success after all forms of knowledge checks is evaluated and graded as follows: kk) 10 – Outstanding performance with no errors or with minor errors: 95-100 points ll) 9 – Above average, with some mistakes: 85-94 points mm) 8 – Average, with noticeable mistakes: 75-84 points nn) 7 – Generally good, but with significant deficiencies: 65-74 points oo) 6 – Meets minimal requirements: 55-64 points pp) 5 – Does not meet minimal requirements: Less than 55 points
Literature:	Mandatory: 1. Salketić, S., Kudumović, Dž., Branković, N.: Basics of Railway Transport Technology, Faculty of Transport and Communications, Sarajevo, 2016. 2. Beširević, S.: Organization of Railway Traffic, Faculty of Transport and Communications, Sarajevo, 1997. 3. Branković, N.: Railway Transport Infrastructure, Faculty of Transport and Communications, Sarajevo, 2010. 4. Bogović, B.: Organization of Railway Traffic, Faculty of Transport Sciences, Zagreb, 1987. 5. Kovačević, P.: Exploitation of Railways, Higher Railway School, Belgrade, 1998. 6. Čičak, M., Vesković, S., Mladenović, S.: Models for Determining Railway Capacity, Traffic Faculty, University of Belgrade, 2009. 7. Čičak, M., Vesković, S.: Organization of Railway Traffic II, Traffic Faculty, University of Belgrade, 2005. 8. Mandić, D.: Organization of Train Traction, Traffic Faculty, University of Belgrade, Belgrade, 2002. Supplementary: 1. Fejzić, E.: Appearance and Development of Railways and Railway Passenger Terminals, IKD UNIVERSITY PRESS Sarajevo and Građevinska Knjiga, Belgrade, 2011. 2. Milošević, B.: Railway Tracks, Traffic Faculty, Belgrade, 1979. 3. Bukljaš, Z.: Technical Elements of Railway Traffic Safety, Faculty of Transport Sciences, Zagreb, 1989.

Course code: 13-14-15-3TRWES020203	**Course title: RAIL SYSTEMS IN URBAN PUBLIC TRANSPORT**		
Level: II	**Year:** I	**Semester: II**	**Number of ECTS credites:** 6
Status: elective course		**Total number of contact hours: 90**	

	Optional breakdown of hours by type: Lectures 45 Tutorials 30 Laboratory tutorials 15
Course participants:	Academic staff and associates selected in the field to which the course belongs/course
Prerequisite for enrollment:	No
Course goal (goals):	Acquisition of educational forms in the implementation of programs related to rail systems in urban public transport. Gaining knowledge and skills in rail systems for urban public transport.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Urban Public Transport Systems 2. Rail Vehicle Technology for Urban Passenger Transport 3. Infrastructure of Rail Systems in Urban Public Transport 4. Organization of Line-Based Passenger Transport using Rail Systems 5. Operational Indicators, Organization and Economics of Rail Systems in Urban Public Transport 6. Quality of Service in Rail Systems for Urban Public Transport
Learning outcomes: (Knowledge; Skills; Competencies)	Preparing students to effectively organize and manage rail system sin urban public transport, aligning with the traffic needs of users, community interests and service providers. Training students to accurately address, plan and resolve challenges related to rail systems in urban public transport.
Sustainable Development Goal (SDG):	Sustainable Development Goals (SDGs) and Targets that can be linked are: Goal 4: Ensure inclusive and quality education, and promote lifelong learning opportunities for all people, of all ages *Sub-goals*: • 4.3: Ensure equal access to quality technical, vocational, and tertiary education, including higher education, for all, including persons with disabilities, members of marginalized groups, and vulnerable categories. • 4.4: Increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent work, and entrepreneurship. • 4.7: Ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and respect for cultural diversity. Goal 9: Industry, Innovation, and Infrastructure *Sub-goals:* • 9.1 Develop quality, reliable, sustainable, and resilient infrastructure, including urban infrastructure, with a focus on improving the accessibility and efficiency of urban transport systems.

	• 9.4 By 2030, upgrade infrastructure and industries to make them sustainable, with increased resource efficiency and greater use of clean and environmentally friendly technologies in urban public transport. Goal 11: Sustainable Cities and Communities *Sub-goals:* • 11.2 By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, with special emphasis on public urban transport and the needs of vulnerable groups such as women, children, persons with disabilities, and the elderly. • 11.3 By 2030, enhance inclusive and sustainable urbanization, focusing on integrating urban public transport into urban planning and policies. Goal 12: Responsible Consumption and Production *Sub-goals:* • 12.2 By 2030, achieve sustainable management and efficient use of resources, particularly in the context of energy and material consumption in urban public transport. • 12.7 Promote sustainable public procurement practices, including the procurement of environmentally friendly vehicles and technologies for urban public transport. Goal 13: Climate Action *Sub-goals:* • 13.2 Integrate climate change measures into national and local policies, strategies, and planning, focusing on reducing greenhouse gas emissions from urban public transport. Connection with Teaching Units: • Urban Public Transport Systems (1) and Infrastructure of Rail Systems (3) directly contribute to the development of sustainable transport infrastructure in cities. • Rail Vehicle Technology (2) and Organization of Line-Based Transport (4) are linked with innovations and increasing efficiency in urban public transport. • Operational Indicators, Organization, and Economics of Rail Systems (5) aid in resource optimization and cost reduction, aligning with goals of sustainable consumption. • Quality of Service in Rail Systems (6) ensures that rail systems provide a high level of service with minimal environmental impact, contributing to the goals of sustainable cities and climate action.
Teaching methods:	Lectures, tutorials and preparation of seminars with a practical focus. Analytical and demonstrative approach.
Assessment methods with grading structure:	Student performance is monitored by assigning points for each form of activity and knowledge assessment during the semester, as well

	as on the final exam after the end of the semester according to the following monitoring elements: • Homework/Seminar Paper/Practical Work: 15 points (%), evaluated if more than 50% is achieved • First Partial Exam/First Test/First Knowledge Check: 35 points (%), evaluated if more than 50% is achieved • Final Exam (Second Partial): 50 points (%), evaluated if more than 50% is achieved • Final Exam (Comprehensive): 85 points (%), evaluated if more than 50% is achieved The total number of points (%) that a student can achieve through the aforementioned monitoring during classes is a maximum of 50 points (%), which, combined with the Final (Second Partial) Exam, totals 100 points (%). For students who did not pass the First Partial Exam, the Final Exam (Comprehensive) covers all the material covered during classes and exercises and is worth 85 points (%), which, combined with the seminar paper/practical work, totals 100 points (%). The final success of students after all the prescribed forms of knowledge assessment is evaluated and graded according to the following grading system: a) 10 (A) - Outstanding performance with no errors or only minor errors, earns 95-100 points b) 9 (B) - Above average, with some errors, earns 85-94.99 points c) 8 (C) - Average, with noticeable errors, earns 75-84.99 points d) 7 (D) - Generally good, but with significant shortcomings, earns 65-74.99 points e) 6 (E) - Meets the minimum requirements, earns 55-64.99 points f) 5 (F, FX) - Does not meet the minimum requirements, less than 55 points.
Literature:	Mandatory: 1. Mehanović, M., 2011. „Planiranje ponude usluga u gradskom prometu putnika“. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo. 2. Mehanović, M.: “Zadaci i primjeri iz teorije i prakse u javnom gradskom prevozu putnika”, Fakultet za saobraćaj i komunikacije, Sarajevo, 2005. Supplementary: 1. Vučić, V.: Urban Public Transportation, Sistems and Technology, Prentice Hall International England, 1981. 2. Županović, I.: Tehnologija cestovnog prijevoza, Fakultet prometnih znanosti, Zagreb, 2002.g. 3. Hounsel N. B., Dalla Chiara B., i drugi, Innovation in urban public transport, Politecnico di Torino, Universiti of Sarajevo, Universiti of Southampton, 2002.g.

Course code: 13-14-15-4TRWES020203	**Course title: RESEARCH AND SCIENTIFIC METHODOLOGY**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: Elective Course		**Total number of contact hours: 90** Lectures: 45 hours Exercises: 30 hours Seminars and Project Tasks: 15 hours	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course** [Do not enter names in this section. Use the formulation as indicated in this section]		
Prerequisite for enrollment:	No		
Course goal (goals):	Through lectures, exercises, seminar work, and practical assignments, students should acquire the necessary basic and additional knowledge in the field of scientific and professional research methodology. The course "Methodology of Research and Scientific Work" aims to provide a comprehensive understanding of all principles, methods, objectives, and instruments of research and scientific work, as well as the process of defining and implementing the creation of scientific and professional papers.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction to the Methodology of Research Work. The function of research work. 2. Science of Sciences. Definition of science. 3. Basic characteristics of science. 4. Functions of science – research work: Fundamental research. 5. Applied research. Developmental research. Individual and team research. 6. Basic research methods. 7. Classification and selection of methods. 8. Technology of research work, identifying the research problem, and its function. 9. Selection and analysis of the topic. 10. Compiling a working bibliography: manuals, encyclopedias, dictionaries, monographs. 11. How to define the subject and objective of research? 12. What is a research result, and how is it verified? 13. Writing and presenting research work reports. 14. Concept, introduction, problem statement, argumentation, and discussion of results. 15. Writing the choice of research method.		

	16. Writing master's theses.
Learning outcomes:	Knowledge: Theoretical and practical knowledge in the field of scientific and research activities. The course should ensure a level of competence and knowledge necessary to address everyday problems in this field. Skills: Ability to apply theoretical and practical knowledge in the field of scientific and research activities. Competencies: Ability to independently understand and utilize knowledge needed to solve specific problems in the field of scientific and research activities.
Sustainable Development Goal (SDG):	SDG4 – "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"; SDG5 – "Achieve gender equality and empower all women and girls"; SDG9 – "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation."
Teaching methods:	The course is delivered through lectures, exercises, laboratory exercises/fieldwork/practice. The following methods are employed: oral presentation, discussion, demonstration, graphic work, drawing, and group work. Lectures cover theoretical concepts and principles, including descriptive examples and the resolution of specific tasks. Additional examples are discussed and solved through exercises, laboratory work/fieldwork/practice, facilitating continuous work and preparation for independent problem-solving. In laboratory exercises/fieldwork/practice, skills needed for both individual and team tasks are developed to address assignments within the given field.
Assessment methods with grading structure:	Evaluation of Creativity in Class and Exercises, Including Independent Work, Partial Test Assessment During Classes, and Final Exam Assessment. The criteria for tracking student performance and grading during classes are as follows: • Homework/Seminar Paper/Practical Work: 15 points (%), passed if more than 50% is achieved. • First Partial Exam/Test/Knowledge Check: 35 points (%), passed if more than 50% is achieved. • Final Exam (Second Partial Exam): 50 points (%), passed if more than 50% is achieved. • Final Exam (Comprehensive): 85 points (%), passed if more than 50% is achieved. The total number of points (%) a student can achieve through class participation and assessments is a maximum of 50 points (%), which, combined with the Final Exam (Second Partial), totals 100 points (%). For students who did not pass the First Partial Exam,

	the Final Exam (Comprehensive) is organized for all covered material during classes and exercises and is valued at 85 points (%), combined with the seminar paper/practical work for a total of 100 points (%). The final student success, after all the foreseen forms of knowledge assessment, is evaluated and graded according to the following system: • 10 (A) - Outstanding performance with no or minor errors, worth 95-100 points. • 9 (B) - Above average, with some errors, worth 85-94 points. • 8 (C) - Average, with noticeable errors, worth 75-84 points. • 7 (D) - Generally good, but with significant shortcomings, worth 65-74 points. • 6 (E) - Meets minimum criteria, worth 55-64 points. • 5 (F, FX) - Does not meet minimum criteria, less than 55 points. Total Assessment of All Student Obligations During the Semester, or Exam Grade Based on the Total Number of Points (%): • Attendance at Lectures and Exercises: - • Homework/Seminar/Practical Work: 10 points (%) • Workshop: 5 points (%) • First Partial Exam/Test/Knowledge Check: 35 points (%) • Final Exam (Second Partial): 50 points (%) • Final Exam (Comprehensive): 85 points (%)
Literature:	Mandatory: 1. Š. Čekić: Osnovi metodologije i tehnologije izrade znanstvenog istručnog djela, Fakultet za saobraćaj i komunikacije, Sarajevo,1999 2. S. Dubić: Uvođenje u naučni rad, Zavod za izdavanje udžbenika,Sarajevo 1970. 3. M.Šamić: Kako nastaje naučno djelo, Svjetlost, Sarajevo,1980. 4. M.Vujović: Uvođenje u znanstveni rad, Informator, Zagreb, 1983 5. M. Filipović: Metodologija znanosti i znanstvenog rada,Svjetlost,Sarajevo 2004. 6. V. Silubrčić: Kako sastaviti, obajaviti i ocjeniti znanstveno djelo,Zagreb, 2003. 7. L. Kuba – Dž. Koking: Metodologija izrade naučnog teksta, CID;Podgorica,2004. 8. S. Kukić: Metodologija znanstveno istraživačkog rada,Ekonomski Fakultet, Mostar 2005.

Course code: 13-14-15-5TRWES020203	**Course title: TRAFFIC POLICY**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures: 45 Tutorials: 30 Seminars and project tasks: 15	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Students acquire the basic theoretical knowledge necessary for the study of transport policy: the national importance of the transport system and its integration into European traffic flows, the allocation of positive and negative effects of the integration of transport policy. Pyramidal structure and authority when defining and implementing traffic priorities at the national and international level.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Approaches to the national transport policy: the concept of politics, types of policies, the function of politics as an approach to the national transport policy, 2. National transport policy components: Transport policy holders, transport policy objectives, transport policy instruments, relationship between transport policy objectives and instruments, 3. Principles of the national transport policy - Part I: the connection between transport and the economy, coordination of the operation of the transport system and social profitability. 4. Principles of national transport policy - Part II: Principles of a unified transport system, allocation of resources, ownership and equal work opportunities, choice of transport policy and feasibility of transport policy 5. Formulation of transport policy: Formulation, evaluation, efficiency of national transport policy. The concept and meaning of determinants of transport policy. 6. Harmonization of transport policy – Part I: Objectives of common transport policy. General political guidelines of the common transport policy. 7. Harmonization of transport policy – Part II: Application and discussions on the future of transport within the framework of the common transport policy. 8. Trans-European transport network – Part I: Guidelines from 1996 and revision of the guidelines for the trans-European transport network from 2004. 9. Trans-European transport network – Part II: Revision of the 2013 guidelines: integrated network, two-layer structure and corridors of the trans-European transport network.		

	10. Trans-European transport network – Part III: Additional funding opportunities for trans-European network projects. Determination of general conditions for financing projects of trans-European networks. 11. Trans-European transport network - Part IV: Instrument and general objectives for connecting Europe with the trans-European network. Budget of the Instrument for Connecting Europe with the Trans-European Network 12. Sectoral policies of the EU - Part I: Objective and scope of application of Directive 97/67/EC of the European Parliament and of the Council. Universal postal services. 13. EU sectoral policies – Part II: Harmonization of bookable postal services. Conditions for providing non-reserved postal services and access to the network. 14. Sectoral policies of the EU – Part III: Quality of postal services. Harmonization of technical standards according to the interests of users. Board and National Regulatory Authority 15. Sectoral policies of the EU - Part IV: Market rules of postal traffic and European achievements in the field of postal traffic.
Learning outcomes:	**Knowledge:** The ability to create and apply traffic policy respecting the set objectives. **Skills:** Identification of traffic and transport priorities necessary for strategic planning and creation of traffic policy in the micro and macro environment. Define traffic policy goals and acceptable implementation models. Identifies priorities in the area of planning, construction, revitalization of traffic flows, assesses the need for integration and liberalization of internal traffic flows following European and international traffic policy, directives and guidelines as well as traffic flows, but also traffic flows and policies of neighboring countries. **Competencies:** Creation of internal efficient and effective transport system and integration into international and EU transport systems
Sustainable Development Goal (SDG):	Goals of sustainable development and impact on traffic policy: 1. SDG 1 - A world without poverty 2. SDG 2 - A world without hunger 3. SDG 5 – Gender equality 4. SDG 6 – Clean water and sanitation 5. SDG 7 – Affordable energy from clean sources 6. SDG 8 - Decent work and economic growth 7. SDG 9 – Industry, innovation and infrastructure 8. SDG 10 – Reducing inequality 9. SDG 11 – Sustainable cities and communities 10. SDG 12 - Sustainable consumption and production 11. SDG 13 – Climate protection 12. SDG 14 – Conservation of the aquatic world 13. SDG 15 – Preservation of life on earth 14. SDG 16 – Peace, justice and strong institutions 15. SDG 17 – Partnership to the goal
Teaching methods:	The teaching is realized through lectures, exercises and the practical part

	of the teaching, which includes the creation of project tasks. Lectures are conducted through oral presentation with presentation and presentation of examples from practice. It initiates a discussion on the problems of planning, modeling and analysis of information systems. Students will be required to create and present seminar papers and/or project assignments. Different methods are used in teaching, including: oral presentations and discussions, demonstration of examples, methods of graphic and video presentations and strengthening of work in groups using appropriate methodological approaches.
Assessment methods with grading structure:	The criteria for evaluating the student's work and evaluation during classes is as follows: Activity (seminar paper / project assignment): from 0 to 15 points; 1st test / 1st knowledge test / 1st partial exam: from 0 to 35 points. The total number of points that a student can earn during classes is a maximum of 50 points. The final/remedial exam includes the material that the student did not pass on the partial exam, which means that it includes the second part of the material (II partial) which is evaluated with 50 points or consists of the complete material, i.e. I and II partial exam. The total evaluation of all the student's obligations during the semester, i.e. the grade on the exam, is based on the total number of points (%) that the student earned by fulfilling the pre-exam obligations, passing the partial and final exams. According to the quality of acquired knowledge and skills, a student can win a maximum of 100 points, and according to the following scale: Scoring structure: Points (%) Seminar / Project task:..... 15 points (%) 1st test / 1st knowledge test (1st partial exam):..... 35 points (%) Final or remedial exam (II partial exam):..... 50 points (%) The required condition for successfully completing the exam is a score of 55 points, where a minimum of 55% must be achieved in each part of the exam (activity, partial exam, final exam), i.e. in order to pass the exam, the student must meet the following conditions: - Activity (seminar paper / project assignment): 9 points - 1st test / 1st knowledge test / partial exam: 19 points - Final or remedial exam (II partial exam): 27 points Students who passed the partial exam take only the second part of the material (the part that is not included in the partial exam) on the final/remedial exam. Students who did not pass the partial exam take the complete material as part of the final/remedial exam, while the criteria for passing the exam remain identical. The final / make-up exam is organized as written and/or oral. The activity can be followed through the creation of homework, seminar

	papers, project tasks or taking quizzes. The final success of the student, after all the foreseen forms of knowledge verification, is evaluated and graded by the grading system as follows: a) 10 - exceptional success without errors or with minor errors, carries 95-100 points; b) 9 - above average, with some errors, carries 85-94 points; c) 8 - average, with noticeable errors, carries 75-84 points; d) 7 - generally good, but with significant shortcomings, carries 65-74 points; e) 6 - meets the minimum requirements, carries 55-64 points; f) 5 - does not meet the minimum requirements, less than 55 points. The above scale can be adjusted according to the Rules of studying at the University of Sarajevo (Article 45).
Literature:	Mandatory: 1. Juraj Padjen, Traffic policy of Croatia, Masmedia, Zagreb, 2003. 2. Piero Soave, "A brief guide to the European Union", European Parliament, October 2016. 3. Marc Thomas, "A Brief Guide to the European Union", European Parliament, September 2016. 4. Beata Tuszynska and Frederic Gouarderes, "A Brief Guide to the European Union", European Parliament, October 2016. Supplementary: 1. Directive 97/67/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL OF 15.12.1997. year, "Official Gazette of the European Communities" no. 6/St. 9 of 21.01.1998. year. 2. Directive 2002/39/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL OF 10.06.2002. year, "Official Gazette of the European Communities" no. 6/St. 1 of 05.07.2002. year. 3. Directive 2008/6/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL dated February 20, 2008. on the amendment and Directive 97/67/EC regarding the complete achievement of the internal market of postal services in the Community, "Official Gazette of the European Communities" no. 06/St. 9 of 27.02.2008. year. 4. Directive 2008-68-EZ OF THE EUROPEAN PARLIAMENT AND COUNCIL dated September 24, 2008. "Official Gazette EU 7/Vol. 7" Land transport of controlled substances. 5. Directive 2010/40EU OF THE EUROPEAN PARLIAMENT AND COUNCIL dated 07.07.2010. "Official Gazette of the EU 7/Vol.8" Framework for the introduction of intelligent transport systems in road transport and for connections with other types of transport. 6. DIRECTIVE 2004/54/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL 7 of April 29, 2004 on minimum safety requirements for tunnels in the trans-European road network

	7. "DIRECTIVE 2008/96/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of November 19, 2008 on road infrastructure safety management 8. DIRECTIVE 2009/33/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of April 23, 2009 on the promotion of clean and energy-efficient vehicles in road transport 9. DIRECTIVE 1999/62/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of June 17, 1999 on charges for the use of certain infrastructures for heavy goods vehicles 10. DIRECTIVE 2004/52/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of April 29, 2004 on the interoperability of electronic toll collection systems in the Community 11. DIRECTIVE (EU) 2019/520 OF THE EUROPEAN PARLIAMENT AND COUNCIL of March 19, 2019 on the interoperability of electronic toll collection systems and facilitating the cross-border exchange of information on non-payment of tolls in the Union 12. REGULATION (EC) no. 1072/2009 OF THE EUROPEAN PARLIAMENT AND COUNCIL of October 21, 2009 on common rules for access to the international road freight transport market 13. REGULATION (EC) no. 561/2006 OF THE EUROPEAN PARLIAMENT AND COUNCIL of March 15, 2006 on the harmonization of certain social legislation related to road transport and on the amendment of Council Regulation (EEC) no. 3821/85 and (EC) no. 2135/98 and repealing Council Regulation (EEC) no. 3820/85 14. DIRECTIVE 2002/39/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of June 10, 2002 amending Directive 97/67/EC regarding the further opening of the postal services market in the Community 15. DIRECTIVE 2008/6/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of 20 February 2008 amending Directive 97/67/EC with regard to the full achievement of the internal market for postal services in the Community. 16. REGULATION (EU) no. 952/2013 OF THE EUROPEAN PARLIAMENT AND COUNCIL of October 9, 2013 on the Customs Code of the Union. 17. REGULATION (EU) 2018/644 OF THE EUROPEAN PARLIAMENT AND COUNCIL of April 18, 2018 on cross-border package delivery services 18. DIRECTIVE (EU) 2019/789 OF THE EUROPEAN PARLIAMENT AND COUNCIL of April 17, 2019 on establishing rules on the exercise of copyright and related rights that apply to certain internet transmissions by organizations for broadcasting and rebroadcasting of television and radio programs and on amending the Council Directive 93/83/EEC

	19. REGULATION (EU) 2015/2120 OF THE EUROPEAN PARLIAMENT AND COUNCIL of November 25, 2015 on establishing measures related to open Internet access and amending Directive 2002/22/EC on universal service and user rights in connection with electronic communications networks and services and Regulation (EU) no. 531/2012 on roaming in public mobile communication networks in the Union. 20. REGULATION (EU) 2018/1971 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2018 on the establishment of the Body of European Regulators for Electronic Communications (BEREC) and the BEREC Support Agency (BEREC Office), amending Regulation (EU) 2015 /2120 and repealing Regulation (EC) no. 1211/2009 21. REGULATION (EU) 2019/1150 OF THE EUROPEAN PARLIAMENT AND COUNCIL of June 20, 2019 on promoting fairness and transparency for business users of online mediation services 22. REGULATION (EC) no. 549/2004 OF THE EUROPEAN PARLIAMENT AND COUNCIL of March 10, 2004 on establishing the framework for the creation of a single European sky 23. REGULATION (EC) no. 550/2004 OF THE EUROPEAN PARLIAMENT AND COUNCIL of March 10, 2004 on the provision of air navigation services in the single European sky 24. REGULATION (EC) no. 552/2004 OF THE EUROPEAN PARLIAMENT AND COUNCIL of 10 March 2004 on the interoperability of the European air traffic management network 25. REGULATION (EU) 2019/712 OF THE EUROPEAN PARLIAMENT AND COUNCIL of April 17, 2019 on the protection of market competition in the air 26. DIRECTIVE 2012/34/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of 21 November 2012 on the establishment of a single European railway proctor 27. DIRECTIVE (EU) 2016/797 OF THE EUROPEAN PARLIAMENT AND COUNCIL of 11 May 2016 on the interoperability of the railway system in the European Union 28. DIRECTIVE (EU) 2016/798 OF THE EUROPEAN PARLIAMENT AND COUNCIL of May 11, 2016 on railway safety, 29. REGULATION (EU) 2016/796 OF THE EUROPEAN PARLIAMENT AND COUNCIL of May 11, 2016 on the European Union Agency for Railways and repealing Regulation (EC) no. 881/2004 30. REGULATION (EC) no. 1371/2007 OF THE EUROPEAN PARLIAMENT AND COUNCIL31 of October 23, 2007 on the rights and obligations of passengers in rail traffic 31. Notes and slides from lectures (can be downloaded from the official website of the Faculty of Traffic and Communications and distributed electronically to each individual student)

Course code: 13-14-15-6TRWES020203	**Course title: GEOGRAPHIC INFORMATION SYSTEMS**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: elective course		**Total number of contact hours: 90** Lectures: 45; Practical Exercises: 30; Seminars and Project Tasks: 15	
Course participants:			
Prerequisite for enrollment:	No		
Course goal (goals):	Familiarizing students with the fundamental concepts of GIS systems, their operational methods, planning, implementation, and potential applications.		
Topics covered (Units of study):	1. The concept of Geographic Information Systems (GIS) 2. Components of GIS 3. The process of collecting and manipulating GIS data 4. Structure and models of spatial data 5. Database management 6. Coordinate systems, projections, georeferencing 7. Geographic data bases 8. Standardization in GIS 9. Output data and cartography 10. Techniques for graphical representation 11. Principles of layered representation of spatial data 12. Areas of application and basic GIS functions 13. Web and mobile GIS 14. Application of GIS in telecommunications infrastructure planning 15. Application of GIS in transportation infrastructure planning		
Learning outcomes:	**Knowledge:** Students will become familiar with the fundamental concepts of GIS development and standardization, the principles of web and mobile GIS systems, and their specific applications with a particular focus on transportation and communications. They will learn about the process of developing GIS systems, from the initial idea and need for GIS, through data collection and formation of GIS databases, to georeferencing, graphical representation, and the use of GIS systems. **Skills:** Students will acquire proficiency in specific software tools needed for designing and developing GIS systems.**Competencies:** After passing the exam, students will be capable of planning, designing, and developing GIS systems, and selecting appropriate technologies for developing specific solutions.		

Sustainable Development Goal (SDG):	SDG 9 – Industry, Innovation, and Infrastructure SDG 11 – Sustainable Cities and Communities
Teaching methods:	The course is delivered through lectures, practical exercises, and hands-on laboratory work. Lectures are conducted through oral presentations with slides and practical examples. Exercises and laboratory work involve the use of software tools to address specific problems and practical tasks. Students will be required to prepare and present seminar papers and/or project tasks. Various methods are employed during the course, including oral presentations, discussions, demonstrations, individual and group work, etc.
Assessment methods with grading structure:	**Grading and Evaluation:** The total number of points a student can earn during the course is 50, with another 50 points available in the final exam. The points for the course are distributed among assignments and activities and/or seminar papers and/or project tasks, and the partial exam. The final/re-sit exam covers material not included in the partial exam, meaning it includes the second part of the material worth 50 points for students who have passed the partial exam. Students who have not passed the material covered in the partial exam will take the material from both the partial and final exams. The final/re-sit exam will be organized as a written and/or oral exam, including a practical component. The overall evaluation of all student obligations during the semester, including the exam grade, is based on the total number of points earned from fulfilling pre-exam obligations, the partial exam, and the final exam. Based on the quality of acquired knowledge and skills, a student can earn a maximum of 100 points, according to the following scale: **Grading Structure:** • Seminar / Class Participation / Project Task: 20 points (20%) • First Test / First Knowledge Check (Partial Exam): 30 points (30%) • Final or Re-sit Exam (Second Partial Exam): 50 points (50%) **Passing Criteria:** To pass, a student must earn at least 55 points in total and achieve at least 55% of the points on the knowledge checks (partial exam and final/re-sit exam). **Final Grade System:** After all forms of knowledge assessment, the student's performance is evaluated and graded as follows: a) 10 - Excellent performance with no errors or minimal errors (95-

	100 points) b) 9 - Above average, with a few errors (85-94 points) c) 8 - Average, with noticeable errors (75-84 points) d) 7 - Generally good, but with significant deficiencies (65-74 points) e) 6 - Meets minimum requirements (55-64 points) f) 5 - Does not meet minimum requirements (less than 55 points)
Literature:	Mandatory: 1. Alem Čolaković, "Geographic Information Systems (LECTURE NOTES)," Faculty of Traffic and Communications, Sarajevo, 2023. Supplementary: 1. Kang Tsung Chang, „*Introduction to Geographic Information Systems*“, McGraw-Hill Education, 2019. 2. Paul Bolstad, „*GIS Fundamentals A First Text on Geographic Information Systems,*“ Eider Press, 2016. 3. Ian Heywood, Sarah Cornelius, „*An introduction to geographical information systems*“, Pearson Education Limited, 2006. 4. Kurt Menke, Richard Smith Jr., Luigi Pirelli, John Van Hoesen, „*Mastering QGIS*“,“ Packt Publishing Ltd., 2016. 5. Gábor Farkas, „Practical GIS,“ Packt Publishing Ltd., 2017. 6. Anita Graser, „*Learning QGIS*,“ Packt Publishing Ltd., 2016. 7. Ralph M. Stair, George W. Reynolds, „*Fundamentals of Information Systems*,“ Cengage Learning, 2016. 8. Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, „*Systems analysis and design*,“ Wiley, 2015. 9. Patricia Wallace, „*Introduction to Information Systems*,“ Pearson Education, 2015. 10. Arthur M. Langer, „*Analysis and Design of Information Systems, Springer-Verlag*,“ 2008. 11. John Wang, „*Innovations in Supply Chain Management for Information Systems*,“ Business Science Reference, 2010. 12. Christos Kalloniatis: “*Modern Information Systems*,“ InTech Croatia, 2012.

Course code: 13-14-15-7TRWES020203	**Course title: E LOGISTICS AND EV INFRASTRUCTURE**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6

Status: Elective course	Total number of hours: 3 + 2 + 1 Optional breakdown of hours by type: Lectures: 3 hours Exercises: 2 hours Laboratory exercises: 1 hour
Course participants:	
Prerequisite for enrollment:	No
Course goal (goals):	Acquiring knowledge of scientific and professional processes, procedures and techniques of training and the use of measuring equipment in the preparation and transport of hazardous substances.
Topics covered (Units of study):	1. Overview of international agreements in the field TDG. 2. The legal framework in the field TDG. 3. Conditions, content and performance methods of training for drivers transporting TDG. 4. Conditions, content and performance methods of training for other persons involved in TDG. 5. Certification of successful trainings in TDG. 6. Ways of conducting training related to TDG in developed countries. 7. Overview of equipment used for TDG. 8. Equipment for personnel and vehicles at TDG. 9. Driver scheduling and route planning software for TDG. 10. Equipment for monitoring vehicles transporting TDG. 11. Equipment for tachograph analysis. 12. Equipment for testing the evaporation of dangerous gases and other dangerous substances, as well as measuring static electricity. 13. Procedure for work in the event of an incident situation on TDG. 14. Arduino equipment for TDG needs. 15. Concluding considerations and future actions on TDG.
Learning outcomes:	Knowledge: Theoretical relevant knowledge and experience for practical application in the field of processes and training procedures and techniques and performance of TDG measuring equipment, legal aspects, key phases and methods of implementation, roles and responsibilities of key entities in the process, and procedures and techniques for training and measuring equipment for the inspection of hazardous goods and equipment. Skills: Ability to apply theoretical and practical knowledge necessary for an adequate analysis of training processes and techniques and the performance of TDG measuring equipment, legal aspects, key stages and methods of implementation, roles and responsibilities of key entities in the process, and procedures and techniques for the implementation of training and performance of TDG measuring equipment. Competencies: Ability to independently understand and use regulations, use professional literature, apply methods and procedures, measure and research, make analyses, assessments and practical solutions, take preventive action, and procedures necessary for adequate process analysis using training techniques and performance of TDG measuring equipment.
Sustainable Development Goal (SDG):	SDG4 – Quality Education – To ensure inclusive and quality education, and to promote lifelong learning opportunities for all people, of all ages. SDG5 - Gender Equality - Achieve gender equality and empower all women and

	girls. SDG8 - Decent Work and Economic Growth - Promote inclusive and sustainable economic growth, employment and decent work for all. SDG9- Industry, Innovation and Infrastructure -Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG11 - Sustainable Cities and Local Communities - Make cities and settlements inclusive, safe, resilient and sustainable. SDG12-Sustainable consumption and production - Ensure sustainable forms of consumption and production. COR13-Climate Action - Take urgent action to combat climate change and its consequences SDG17- Partnerships for the Goals- Incorporating a Global Partnership for Sustainable Development
Teaching methods:	Oral presentation with presentation and presentation of various analyses, studies, models and methods in the field of road safety inspection (RSI) and road safety audit (RSA) processes, with the use of video and audio recordings, software, measuring equipment, and independent presentation of individual specific research. Initiating discussions and discussions on practical problems, individual observations from different environments, making independent analyses, research, measurements and modelling in the field of road safety inspection (RSI) and road safety audit (RSA) processes.
Assessment methods with grading structure:	Assessment of creativity in classes and exercises with the preparation of independent papers, evaluation of the partial test during the class as well as the evaluation of the final exam. The criterion for monitoring the work and evaluation of the student during the course is as follows: ✓ Seminar 15 points (%), passed if won over 50%. ✓ I Partial exam/test/knowledge test/35 points (%), is passed if more than 50% is scored. ✓ Final exam (II Partial) 50 points (%), passed if won over 50%. ✓ Final exam (Integral) 85 points (%), passed if won over 50%. The total number of points (%) that a student can achieve during the course is a maximum of 50 points (%), which together with the Final (II partial) makes 100 points (%). For students who have not passed the I Partial Exam, the Final Exam (Integral) is organized from the entire material covered during classes and exercises, and is evaluated with 85 points (%), which with the seminar paper/practical work makes 100 points (%). The final success of the student after all the foreseen forms of examination is evaluated and evaluated by the grading system as follows: a) 10 (A) - exceptional success without errors or with minor errors, carries 95-100 points; b) 9 (B) - above average, with some error, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with more significant drawbacks, carries 65-74 points; e) 6 (E) - meets the minimum requirements, carries 55-64 points; f) 5 (F, FX) - does not meet the minimum requirements, less than 55 points. The total evaluation of all student obligations during the semester, i.e. the grade on the exam, is based on the total number of points (%) that the student has acquired by fulfilling the pre-exam obligations and passing the partial and final exam, according to the quality of the acquired knowledge and skills, and contains a maximum of 100

	points, and is determined according to the following scale: The Student's Responsibilities — Score (%) Attendance at lectures and exercises (attendance at all forms of teaching is mandatory at least 80% and this is a condition for the certification/signature of regular attendance) — 0 points Seminar — 15 points (%) I Partial Exam / Test / Knowledge Assessment / — 35 points (%) Final exam (II partial) — 50 points (%) Final exam (Integral) — 85 points (%)
Literature:	Mandatory: 1. ADR: European Agreement Concerning the International Carriage of Dangerous Goods by Road, United Nations Economic Commission for Europe (UNECE), 2023 2. Transportation of Dangerous Goods Regulations, Minister of Justice Canada, 2023 3. Transportation of Dangerous Goods by ground, Worksite Safety 4. Legal regulation of national and lower levels 5. Guidelines on transport of dangerous goods, Transport Community, 2021. 6. Transport opasnih materija, knjiga Fakultet z asaobraćaj i komunikacije, Sarajevo 2023.Erasmus + DGTRANS projekt. Supplementary: 1. ADR – Evropski sporazum o međunarodnom cestovnom prijevozu opasnih materija sa prilozima A i B (The Evropean Agreement concerning the International Carriage of Dangerous Goods by Road), 2. RID – Međunarodni propisi o prijevozu opasnih materija željeznicom (Regulations Concerning the Intrnational Carriage of Dangerous Goods by Rail), 3. ICAO-TI – Tehnička upustva za prijevoz opasnih materija u vazdušnom saobraćaju (International Civil Aviation Organization – Technical Instructions for the Safe Prijevoz of Dangerous Goods by Air), 4. IATA-DGR – Propisi o zabranama (International Air Prijevoz Association – Dangerous Goods Regulations), 5. IMDG-CODE – Zakon o pomorskom prijevozu opasnih materija (International Maritime Dangerous Goods Code), 6. ADN – Odredbe prijevoza opasnih materija po Evropskim plovnim putevima (Carriage of Dangerous Goods by Inland Waterway), 7. ADN-R – Odredbe o prijevozu opasnih materija Rajnom (Agreement on Transport of Dangerous Goods on the Rhine).

Course code: 13-14-15-8TRWES020203	**Course title: TDG TRAINING AND EQUIPMENT**		
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6

Status: Elective	**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 30 Tutorials 20 Seminars 10 Fieldwork 10 Laboratory Tutorials 10 Practice 10
Course participants:	PhD Osman Lindov, Traff.Eng, Full professor Assistant 1: Doc Dr Adnan Omerhodžić, Traff.Eng Assistant 2: MA Ajdin Džananović, Traff.Eng
Prerequisite for enrollment:	No
Course goal (goals):	Acquiring knowledge of scientific and professional processes, procedures and techniques of training and the use of measuring equipment in the preparation and transport of hazardous substances.
Topics covered (Units of study):	1. Overview of international agreements in the field TDG. 2. The legal framework in the field TDG. 3. Conditions, content and performance methods of training for drivers transporting TDG. 4. Conditions, content and performance methods of training for other persons involved in TDG. 5. Certification of successful trainings in TDG. 6. Ways of conducting training related to TDG in developed countries. 7. Overview of equipment used for TDG. 8. Equipment for personnel and vehicles at TDG. 9. Driver scheduling and route planning software for TDG. 10. Equipment for monitoring vehicles transporting TDG. 11. Equipment for tachograph analysis. 12. Equipment for testing the evaporation of dangerous gases and other dangerous substances, as well as measuring static electricity. 13. Procedure for work in the event of an incident situation on TDG. 14. Arduino equipment for TDG needs. 15. Concluding considerations and future actions on TDG.
Learning outcomes:	Knowledge: Theoretical relevant knowledge and experience for practical application in the field of processes and training procedures and techniques and performance of TDG measuring equipment, legal aspects, key phases and methods of implementation, roles and responsibilities of key entities in the process, and procedures and techniques for training and measuring equipment for the inspection of hazardous goods and equipment. Skills: Ability to apply theoretical and practical knowledge necessary for an adequate analysis of training processes and techniques and the performance of TDG measuring equipment, legal aspects, key stages and methods of implementation, roles and responsibilities of key entities in the process, and procedures and techniques for the implementation of training and performance of TDG measuring equipment. Competencies: Ability to independently understand and use regulations, use professional literature, apply methods and procedures, measure and research, make analyses, assessments and practical solutions, take preventive action, and procedures necessary for adequate process analysis using training techniques and performance of TDG measuring equipment.

Sustainable Development Goal (SDG):	SDG4 – Quality Education – To ensure inclusive and quality education, and to promote lifelong learning opportunities for all people, of all ages. SDG5 - Gender Equality - Achieve gender equality and empower all women and girls. SDG8 - Decent Work and Economic Growth - Promote inclusive and sustainable economic growth, employment and decent work for all. SDG9- Industry, Innovation and Infrastructure -Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG11 - Sustainable Cities and Local Communities - Make cities and settlements inclusive, safe, resilient and sustainable. SDG12-Sustainable consumption and production - Ensure sustainable forms of consumption and production. COR13-Climate Action - Take urgent action to combat climate change and its consequences SDG17- Partnerships for the Goals- Incorporating a Global Partnership for Sustainable Development
Teaching methods:	Oral presentation with presentation and presentation of various analyses, studies, models and methods in the field of road safety inspection (RSI) and road safety audit (RSA) processes, with the use of video and audio recordings, software, measuring equipment, and independent presentation of individual specific research. Initiating discussions and discussions on practical problems, individual observations from different environments, making independent analyses, research, measurements and modelling in the field of road safety inspection (RSI) and road safety audit (RSA) processes.
Assessment methods with grading structure:	Assessment of creativity in classes and exercises with the preparation of independent papers, evaluation of the partial test during the class as well as the evaluation of the final exam. The criterion for monitoring the work and evaluation of the student during the course is as follows: ✓ Seminar 15 points (%), passed if won over 50%. ✓ I Partial exam/test/knowledge test/35 points (%), is passed if more than 50% is scored. ✓ Final exam (II Partial) 50 points (%), passed if won over 50%. ✓ Final exam (Integral) 85 points (%), passed if won over 50%. The total number of points (%) that a student can achieve during the course is a maximum of 50 points (%), which together with the Final (II partial) makes 100 points (%). For students who have not passed the I Partial Exam, the Final Exam (Integral) is organized from the entire material covered during classes and exercises, and is evaluated with 85 points (%), which with the seminar paper/practical work makes 100 points (%). The final success of the student after all the foreseen forms of examination is evaluated and evaluated by the grading system as follows: a) 10 (A) - exceptional success without errors or with minor errors, carries 95-100 points; b) 9 (B) - above average, with some error, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with more significant drawbacks, carries 65-74 points; e) 6 (E) - meets the minimum requirements, carries 55-64 points; f) 5 (F, FX) - does not meet the minimum requirements, less than 55 points. The total evaluation of all student obligations during the semester, i.e. the grade on

	the exam, is based on the total number of points (%) that the student has acquired by fulfilling the pre-exam obligations and passing the partial and final exam, according to the quality of the acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: The Student's Responsibilities — Score (%) Attendance at lectures and exercises (attendance at all forms of teaching is mandatory at least 80% and this is a condition for the certification/signature of regular attendance) — 0 points Seminar — 15 points (%) I Partial Exam / Test / Knowledge Assessment / — 35 points (%) Final exam (II partial) — 50 points (%) Final exam (Integral) — 85 points (%)
Literature:	Mandatory: 7. ADR: European Agreement Concerning the International Carriage of Dangerous Goods by Road, United Nations Economic Commission for Europe (UNECE), 2023 8. Transportation of Dangerous Goods Regulations, Minister of Justice Canada, 2023 9. Transportation of Dangerous Goods by ground, Worksite Safety 10. Legal regulation of national and lower levels 11. Guidelines on transport of dangerous goods, Transport Community, 2021. 12. Transport opasnih materija, knjiga Fakultet z asaobraćaj i komunikacije, Sarajevo 2023.Erasmus + DGTRANS projekt. Supplementary: 8. ADR – Evropski sporazum o međunarodnom cestovnom prijevozu opasnih materija sa prilozima A i B (The Evropean Agreement concerning the International Carriage of Dangerous Goods by Road), 9. RID – Međunarodni propisi o prijevozu opasnih materija željeznicom (Regulations Concerning the Intrnational Carriage of Dangerous Goods by Rail), 10. ICAO-TI – Tehnička upustva za prijevoz opasnih materija u vazdušnom saobraćaju (International Civil Aviation Organization – Technical Instructions for the Safe Prijevoz of Dangerous Goods by Air), 11. IATA-DGR – Propisi o zabranama (International Air Prijevoz Association – Dangerous Goods Regulations), 12. IMDG-CODE – Zakon o pomorskom prijevozu opasnih materija (International Maritime Dangerous Goods Code), 13. ADN – Odredbe prijevoza opasnih materija po Evropskim plovnim putevima (Carriage of Dangerous Goods by Inland Waterway), 14. ADN-R – Odredbe o prijevozu opasnih materija Rajnom (Agreement on Transport of Dangerous Goods on the Rhine).

Course code: 13-14-15-9TRWES02020	**Course title: DANGEROUS GOODS LOGISTICS**

3			
Level: II	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: Elective		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 30 Tutorials 20 Seminars 10 Fieldwork 10 Laboratory Tutorials 10 Practice 10	
Course participants:			
Prerequisite for enrollment:	No		
Course goal (goals):	Acquiring knowledge about the basics of hazardous materials logistics, transportation, handling, and storage. Gaining knowledge about packaging, labeling, and identifying dangerous goods, as well as procedures and regulations.		
Topics covered (Units of study):	Theoretical classes: 1. Introduction to Dangerous Materials and Logistics. 2. Classification of dangerous Materials and Identification. 3. Determining the Hazard Class of Dangerous Cargo. 4. Risks in TDG. 5. Transportation and Distribution of Dangerous Materials. 6. Devices and Equipment for Vehicles TDG. 7. Marking of Vehicles TDG. 8. Storage of Dangerous Materials. 9. Selection of Packaging for Dangerous Goods. 10. Labeling of Packages Containing Dangerous Materials. 11. Recognition of Hidden Dangerous Materials. 12. Procedures for Storing and Loading dangerous material. 13. Procedures in Emergency Situations. 14. Regulations and Laws Regarding TDG. 15. Autonomous Vehicles for TDG. Practical teaching: The practical part of the classes will be organized in laboratories and field visits through the use of appropriate equipment and, if applicable, software packages to apply the knowledge gained in the theoretical part of the classes.		
Learning outcomes:	▪ Acquiring knowledge of hazardous substances logistics, classification and class determination of dangerous goods. ▪ Gaining knowledge of the risks of handling TDG. ▪ Acquiring knowledge of the necessary equipment in vehicles for the transport of dangerous goods. ▪ Acquiring knowledge of the transport and distribution of certain classes of hazardous substances. ▪ Acquiring knowledge of how to mark vehicles carrying dangerous goods.		

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Acquisition of knowledge on the storage and selection of packaging of hazardous substances.
Acquiring knowledge of the ways and methods of recalling goods that are hidden in different transport packages.
Gain ing familiarity with the procedures, regulations and laws governing TDG.
Acquiring the ability to apply theoretical and practical knowledge in the logistics of hazardous substances in practice

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<tr><td>Teaching methods:</td><td>Lectures accompanied by multimedia presentations
Solving practical problems and specific project tasks</td></tr>
<tr><td>Assessment methods with grading structure:</td><td>
<table>
<tr><th colspan="4">Knowledge assessment (maximum number of points: 100)</th></tr>
<tr><th>Pre-examination obligations</th><th>points</th><th>Final exam</th><th>points</th></tr>
<tr><td>Activity during the lecture</td><td>-</td><td>Written exam</td><td>50</td></tr>
<tr><td>Practical teaching</td><td>-</td><td>Oral exam</td><td>-</td></tr>
<tr><td>Colloquiums</td><td>35</td><td></td><td></td></tr>
<tr><td>Seminar work/project, etc.</td><td>15</td><td></td><td></td></tr>
<tr><td>In total</td><td></td><td>In total</td><td>100</td></tr>
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<tr><td>Literature:</td><td>

Pfohl, H. C.: Logistics Systems. Managerial Foundations, Berlin et al, 2010.
Mekovec, I.: Basics of Dangerous Goods Transport by Road, Zagreb, 2003.
Tanackov et al., “Risk Distribution of Dangerous Goods in Logistics Subsystems,” Journal of Loss Prevention in the Process Industries, vol. 54, pp. 373–383, Jul. 2018, doi: 10.1016/j.jlp.2018.03.013.
Deljanin, Safety and Protection of Postal Traffic. Sarajevo: Faculty of Traffic and Communications, 2011.
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Klimecka-Tatar, Dorota. "Safety Restrictions in the Logistics of Dangerous and Toxic Substances." Production Engineering Archives 7.2 (2015): 45-48.
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Barysienė, Jurgita, et al. "Analysis of the Current Logistics and Transport Challenges in the Context of the Changing Environment." Transport 30.2 (2015): 233-241.
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Li, Jiaru, et al. "Design of Optimized Forklift Routes for a Four-Door Dangerous Goods Monolayer Warehouse Through Genetic Particle Swarm Optimization Algorithm." International Journal of Industrial Engineering 27.2 (2020).
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United Nations: Transport of Dangerous Goods, Model Regulations, VOLUME 1, 2015.

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	15. Law on the Transport of Dangerous Materials, BiH, FBiH, draft, March 2016. 16. Regulation on the Transport of Dangerous Materials in the Ministry of Defense and Armed Forces of BiH. 17. Regulation on International Transport of Dangerous Materials by Rail (RID Regulation from January 1, 2009). 18. Directive (EC) No. 1907/2006. 19. Barut, M., Prcanović, H., et al.: Manual for Carriers and Drivers for Transporting Dangerous Materials and Personnel at Vehicle Technical Inspection Stations, IPI, Zenica, 2009. 20. Srinivas, Sharan, Surya Ramachandiran, and Suchithra Rajendran. "Autonomous Robot-Driven Deliveries: A Review of Recent Developments and Future Directions." Transportation Research Part E: Logistics and Transportation Review 165 (2022): 102834. 21. European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) 2021.