UNIVERZITET U SARAJEVU

FAKULTET ZA SAOBRAĆAJ I KOMUNIKACIJE

STUDIJSKI PROGRAM
ŽELJEZNIČKI SAOBRAĆAJ
I 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.);

OBAVEZNI PREDMETI za sve odsjeke i usmjerenja

R.b	Šifra predmeta	Naziv predmeta	Semestar					
			I	ECTS	II	ECTS	III	ECTS
1.	01ATCOS010101	INŽINJERSKA MATEMATIKA I	3+3	6				
2.	02ATCOS010101	INŽENJERSKA GRAFIKA	4+2	6				
3.	03ATCOS010101	OSNOVI SAOBRAĆAJNIH I KOMUNIKACIJSKIH SISTEMA	4+2	6				
4.	04ATCOS010101	RAČUNARSTVO I INFORMATIKA	4+2	6				
5.	05ATCOS010101	ELEKTROTEHNIČKI SISTEMI U SAOBRAĆAJU I KOMUNIKACIJMA	3+2+1	6				
6.	06ATCOS010102	INŽINJERSKA MATEMATIKA II			3+3	6		
7.	07ATCOS010102	TEHNIČKA MEHANIKA			3+3	6		
8.	08ATCOS010102	SAOBRAĆAJ I PROSTOR			4+2	6		
9.	09ATCOS010102	INDUSTRIJSKI TRANSPORT			3+3	6		
10.	10ATCOS010102	LOGISTIKA U SAOBRAĆAJU I KOMUNIKACIJAMA			4+2	6		
11.	11ATCOS010203	PRIMJENJENA MATEMATIKA I STATISTIKA					4+2	6
12.	12ATCOS010203	SISTEMSKO INŽINJERSTVO					4+2	6
13.	13ATCOS010203	EKONOMIKA U SAOBRAĆAJU I KOMUNIKACIJAMA					3+2+1	6
14.	14ATCOS010203	INFORMACIONI SISTEMI U SAOBRAĆAJU I KOMUNIKACIJAMA					2+2+2	6
15.		IZBORNI PREDMET III semestra					4+2	6
Broj kredita/sati				30		30		30

Izborni predmeti

Šifra predmeta	Naziv predmeta	Broj sati			ECTS	Semestar
		P	V	L/PR		
15-1ATCES010203	ELEMENTI TRANSPORTNIH SREDSTAVA I UREĐAJA	4	2	0	6	**III**
15-2ATCES010203	INFORMACIJE I KOMUNIKACIJE	4	2	0	6	**III**

NASTAVNI PLAN ZA ODSJEK: SAOBRAĆAJ USMJERENJE: ŽELJEZNIČKI SAOBRAĆAJ

R.b.	Šifra predmeta	Naziv predmeta	Status	SEMESTAR

				IV	ECTS	V	ECTS	VI	ECTS
16.	16TRWOS010204	**ŠINSKA VOZILA**	Obavezni	3+2+1	6				
17.	17TRWOS010204	**TEORIJA SAOBRAĆAJNIH TOKOVA**	Obavezni	4+2	6				
18.	18TRWOS010204	**MATERIJALI I ROBE U TRANSPORTU**	Obavezni	4+2	6				
19.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (IV SEMESTAR)	Izborni	3+2+1	6				
20.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (IV SEMESTAR)	Izborni	3+2+1	6				
21.	21TRWOS010305	**TEHNOLOGIJSKI MARKETING**	Obavezni			3+2+1	6		
22.	22TRWOS010305	**INTELIGENTNI TRANSPORTNI SISTEMI**	Obavezni			3+2+1	6		
23.	23TRWOS010305	**INFRASTRUKTURA ŽELJEZNIČKOG SAOBRAĆAJA**	Obavezni			3+2+1	6		
24.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (V SEMESTAR)	Izborni			3+2+1	6		
25.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (V SEMESTAR)	Izborni			3+2+1	6		
26.	26TRWOS010305	PRAKSA	Obavezni			2	2		
27.	27TRWOS010306	**SIGURNOST ŽELJEZNIČKOG SAOBRAĆAJA**	Obavezni					3+2+1	6
28.	28TRWOS010306	**TEHNOLOGIJA ŽELJEZNIČKOG TRANSPORTA**	Obavezni					3+2+1	6
29.	29TRWOS010306	**PLANIRANJE ŽELJEZNIČKOG SAOBRAĆAJA**	Obavezni					3+2+1	6
30.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (VI SEMESTAR)	Izborni					3+2+1	6
31.		IZBORNI PREDMET: ŽELJEZNIČKI SAOBRAĆAJ (VI SEMESTAR)	Izborni					3+2+1	6
Broj kredita/sati					30		30		30

Izborni predmeti: usmjerenje: željeznički saobraćaj

Šifra predmeta	Naziv predmeta	Broj sati			ECTS	Semestar
		P	V	L/PR		
19-20-1TRWES010204	LOGISTIČKI SISTEMI	3	2	1	6	**IV**
19-20-2TRWES010204	ŠPEDITERSKO POSLOVANJE	3	2	1	6	**IV**
19-20-3TRWES010204	VERTIKALNI TRANSPORT	3	2	1	6	**IV**
24-25-1TRWES010305	TEHNIČKA EKSPLOATACIJA ŠINSKIH VOZILA	3	2	1	6	**V**
24-25-2TRWES010305	MULTIMODALNI TRANSPORT	3	2	1	6	**V**
24-25-3TRWES010305	NADZOR I REGULISANJE ŽELJEZNIČKOG SAOBRAĆAJA	3	2	1	6	**V**
30-31-1TRWES010306	DIJAGNOSTIKA I ODRŽAVANJE ŠINSKIH VOZILA	3	2	1	6	**VI**
30-31-2TRWES010306	JAVNI GRADSKI PRIJEVOZ	3	2	1	6	**VI**
30-31-3TRWES010306	TRANSPORT I OKOLIŠ	3	2	1	6	**VI**

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

Šifra predmeta: 01ATCOS010101	**Naziv predmeta:** INŽENJERSKA MATEMATIKA 1		
Ciklus: I	**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 45	
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 stiču osnovna znanja za nastavak praćenja matematskih disciplina višeg nivoa koji se javljaju u predmetima: *Inžinjerska matematika II* i *Primjenjena matematika i statistika,* te na taj način stvaraju preduslove za primjenu matematičkog alata u praćenju,		

	razumjevanju i izučavanju fenomena koji se pojavljuju u stručnim predmetima oblasti saobraćaja i komunikacija.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Matematička logika: Logičke operacija sa iskazima. Relacije, skupovi i preslikavanja. 2. Skupovi realnih i kompleksnih brojeva: Prirodni brojevi. Matematička indukcija. Newton-ova binomna formula. Razni oblici kompleksnog broja 3. Linearna algebra: Pojam matrice. Operacije sa matricama. Pojam determinante. Sistemi linearnih jednačina: Gauss-ov metod eliminacije, Kramerovo pravilo i Kroneker-Kapelijev stav. 4. Linearna algebra: Vektorska algebra. Operacije sa vektorima. Skalarni proizvod. Vektorski proizvod. Mješoviti proizvod. 5. Analitička geometrija prostora: Ravan u prostoru. Prava u prostoru. Udaljenost tačke od prave. Međusobni odnos dvije prave u prostoru. Međusobni odnos prave i ravni. 6. Nizovi i redovi: Limes niza. Kriterij konvergencije. Monotoni nizovi. Beskonačni red 7. Funkcije realne promjenljive: Svojstva funkcija jedne promjenljive. Granična vrijednost funkcija jedne promjenljive. 8. Diferencijalni račun funkcija jedne promjenljive: Neprekidnost funkcija. Elementarne funkcije 9. Diferencijalni račun funkcija jedne promjenljive: Pojam izvoda funkcija jedne promjenljive . Geometrijsko značenje izvoda. Mehaničko značenje izvoda. 10. Diferencijalni račun funkcija jedne promjenljive: Diferencijabilnost i diferencijal funkcije. Izvodi i diferencijali višeg reda. Pravila diferenciranja. 11. Diferencijalni račun funkcija jedne promjenljive:Primjena diferencijalnog računa. Rolleova, Cauchy-jeva i Lagrange-ova teorema. L'Hospital-ovo pravilo. Taylor-ova formula. Maclaurin-ova formula. 12. Ispitivanje funkcija realne promjenljive: Monotonost funkcija . Određivanje lokalnih ekstremnih vrijednosti. Konveksnost, konkavnost i prevojne tačke funkcija. Ispitivanje toka. Crtanje grafika funkcija. 13. Neodređeni integral: Primitivna funkcija i neodređeni integral. Osobine neodređenog integrala. Pravila integriranja. Metode integracije 14. Određeni integral: Osobine određenog integrala. Newton – Leibniz-ova formula. Nesvojstveni (nepravi) integral 15. Primjena određenog integrala u geometriji: Primjena određenog integrala na izračunavanje površine ravne figure, dužine luka krive u ravni, zapremine tijela i površine obrtnih površi.
Ishodi učenja:	Znanje: • rješavaju i primjenjuju sisteme linearnih jednačina,

	• definiraju i rješavaju probleme opisane vektorima, primjenjujući operacije s vektorima, • pokazaju razumjevanje osnovnih koncepata analize: granične vrijednosti, diferenciranje i integriranje realnih funkcija sa jednom realnom promjenljivom, • primjenjuju procedure diferenciranja u rješavanju problema ekstrema, • crtaju grafike funkcija na bazi primjene prvog i drugog izvoda za njenu analizu, • definiraju i računaju neodređeni integral korištenjem metoda zamjene i parcijalne integracije, • razumiju i primjenjuju procedure za integraciju racionalnih funkcija, koristite integraciju za proračun površine i zapremine. Vještine: potiče kreativnost, preciznost, sistematičnost, apstraktno mišljenje i kritičko razmišljanje koje pomaže pri uočavanju i rješavanju problema, a što je ključno za nastavak školovanja. Kompetencije: prikazivanje i komuniciranje matematičkim jezikom, logičko razmišljenje, argumentiranje i zaključivanje
Cilj održivog razvoja (SDG):	SDG 4 – Kvalitetno obrazovanje SDG 9– Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Predavanja teorijske nastave uz upotrebu multimedijskih sredstava, tehnika aktivnog učenja i diskusije,praktična nastava – vježbe, te samostalno izlaganje i rješavanje pojedinih konkretnih problema.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Testovi tokom semestra od 0 - 15 bodova; I parcijalni ispit/I test/ I provjera znanja/ od 0 - 35 bodova (položeno ako se osvoji preko 50 %). Ukupan broj bodova koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova. Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave i iznosi najviše 50 bodova, od čega je II parcijalni ispit od 0 - 25 bodova (položeno ako se osvoji preko 50 %) i Teorija i zadaci od 0 - 25 bodova, koji traje 60 min (studenti polažu teoriju i zadatke koje nisu radili na parcijalnim ispitima). Na završnom ispitu studenti mogu popravljati I parcijalni ispit, ako to ranije nisu zadovoljili. Isto vrijedi i za ispitni rok popravni završnog ispita i oba termina jesenjeg ispitnog roka.

	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 85-94,9 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84,9 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74,9 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64,9 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, 0 – 54,9 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 (%) Mini testovi u toku nastave.....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni + Teorija) .....50 bodova (%)
Literatura:	Obavezna: 1. M. Uščumlić, P.Miličić, Zbirka zadataka iz više matematike I, Naučna knjiga, Beograd 2. Kostić, V. Hadžiabdić, M. Mehuljić, J. Bektešević, Matematika I – teorija sa urađenim zadacima, Mašinski fakultet Sarajevo, 2011. ISBN 978-9958-601-32-3. 3. Alma Omerspahić, Vahidin Hadžiabdić, Midhat Mehuljić, Jasmin Bektešević, Teorijske osnove i zbirka zadataka iz integralnog računa, Mašinski fakultet Sarajevo, 2012. Dopunska: 1. P. JAVOR: Matematička analiza I, Element, Zagreb,1996. 2. S. KUREPA: Matematička analiza 1 i 2, Tehnička knjiga, Zagreb, 1972.

Šifra predmeta: 02ATCOS010101	**Naziv predmeta:** Inženjerska grafika

Ciklus: I (prvi)	**Godina: I (prva)**	**Semestar: I (prvi)**	**Broj ECTS kredita:** 6
Status: Obavezni		**Ukupan broj sati: 90**	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Osposobljavanje studenata za univerzalno inžinjersko komuniciranje – komuniciranje crtežom, upoznavanje studenata sa osnovama tehničkog crtanja i nacrtne geometrije, te sadržajem i primjenom standarda iz područja grafičkih komunikacija i tehničke dokumentacije. Osposobljavanje studenata za čitanje i razumijevanje tehničkih crteža i različitih tehničkih situacija, sa posebnim osvrtom na saobraćajne situacije. Osposobljavanje studenata za izradu tehničkih crteža upotrebom računarskih alata.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	– Uvod – Značaj i primjena grafičkih komunikacija u tehnici – Praktični primjeri crteža u oblasti saobraćaja i komunikacija. – Računarski programi i CAD sistemi u oblasti saobraćaja i komunikacija. – Standardizacija u grafičkim komunikacijama. – Tehnički crteži, vrste crteža, načini njihovog formiranja, formati crteža, zaglavlja i sastavnice. – Tehničko pismo i tehničko prostoručno skiciranje – Vrste linija i njihova upotreba. – Konstrukcija krivih linija i kružnih lukova. – Mjerila. – Predstavljanje predmeta i situacija na crtežima sa osnovama nacrtne geometrije. – Projiciranje. Vrste projekcija, aksonometrijska projekcija, izometrija, dimetrija i kosa projekcija. Ortogonalna projekcija i ortogonalno projiciranje. – Presjeci, vrste presjeka i srafura. – Kotiranje. – Crtanje osnovnih standardnih elemenata u oblasti saobraćaja i komunikacija. – Računarom potpomognuta izrada 3D modela i tehničke dokumentacije proizvoda i situacija. – Upotreba i uvođenje CAD sistema u inžinjerskoj praksi. – Historijski razvoj CAD sistema. – Osnove CAD sistema. – Principi rada CAD sistema. – Razlika između 2D i 3D CAD Sistema. – Osnove primjene GIS (geografski informacijski sistem) sistema u oblasti saobraćaja i komunikacija.		
Ishodi učenja:	**Znanje:** Razvijanje sposobnosti za samostalno postavljanje i rješavanje		

	jednostavnijih problema iz navedenih oblasti. Usvajaje inžinjerskog pristupa pri rješavanju problema. **Vještine:** Sposobnost primjene teorijskih i praktičnih znanja iz oblasti inženjerske grafike. **Kompetencije:** Studenti bi kroz nastavni program i primjere iz realnih situacija trebali biti osposobljeni za grafičko prezentiranje ideja, te univerzalno, nedvosmisleno razumijevanje tehničke dokumentacije uz primjenu standardnih elemenata grafičkog komuniciranja.
Cilj održivog razvoja (SDG):	SDG 4 – Kvalitetno obrazovanje SDG 9– Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Usmeno iznošenje sa prezentacijom i prikazom različitih problema uz korištenje određenih didaktičkih sredstava, te samostalan rad studenata na konkretnim problemima iz oblasti inženjerske grafike.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i kroz parcijalne, završne i popravne ispite. Prema sljedećem načinu: – Redovno prisustvo predavanjima i vježbama 10 bodova. – Projektni zadaci 25 bodova. – I Parcijalni ispit/test/provjera znanja/30 bodova. – II Parcijalni ispit/test/provjera znanja/35 bodova. Ukupan broj bodova koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 100 bodova (%). Položio je student koji skupi minimalno 55 bodova prema gornjim kriterijima. Završni i popravni ispit se organizuje za studente koji nisu položili jednu, drugu ili obje provjere znanja. Na završnom i popravnom ispitu može se osvojiti maksimalno 70 bodova, što sa projektnim zadacima i bodovima na osnovu prisustva nastavi čini ukupno 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... ..... 10 bodova (obavezno je prisustvu svim oblicima nastave min. 80 % i ovo je uslov za ovjeru/potpis urednog pohađanja) Projektni zadaci .....……. 25 bodova I Parcijalni ispit/Test/Provjera znanja/..... 30 bodova II Parcijalni ispit/Test/Provjera znanja/..... 35 bodova Završni ispit (I i/ili II parcijalni) ..... 65 bodova Popravni ispit (I i/ili II parcijalni) ..... 65 bodova
Literatura:	Obavezna: 1. Milan Kljajin i Milan Opalić: Inženjerska grafika, Strojarski fakultet u Slavonskom brodu, 2020. Dopunska: 1. Samir Lemeš: Računarska grafika i geometrijsko modeliranje, Zenica, 2017.

Šifra predmeta: 03ATCOS010101	**NAZIV PREDMETA:** **OSNOVI SAOBRAĆAJNIH I KOMUNIKACIJSKIH SISTEMA**		
Ciklus: I	**Godina: I**	**Semestar: I**	**Broj ECTS kredita:** 6
Status: obvezni		**Ukupan broj kontakt sati: 90** Predavanja 60 Vježbe 30	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		

Preduslov za upis:	nema
Cilj (ciljevi) predmeta:	Sticanje znanja i vještina potrebnih za razumijevanje strukture i funkcija transportnih,saobraćajnih i komunikacijskih sustava. Usvajanje baznih znanja o transportnim, saobraćajnim i komunikacijskim procesima, načinu njihovog odvijanja i upravljanja.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Pojam i značaj prometnog i komunikacijskog sustava 2. Osnovne karakteristike transportnog supstrata 3. Transportni uređaji 4. Manipulacijska sredstva i transportna oprema 5. Čovjek kao komponenta prometnog i transportnog sustava 6. Osnovni koncept i funkcije modova transporta 7. Kapacitet i razina usluge transportnog sustava 8. Osnovne karakteristike i izazovi mobilnosti 9. Mod cestovnog transporta 10. Mod željezničkog transporta 11. Mod zrakoplovnog transporta 12. Mod vodnog transporta 13. Mod cjevovodnog transporta 14. Poštanske i komunikacijske tehnologije 15. Informacijsko komunikacijske tehnologije u transportu
Ishodi učenja:	Znanje: Predmet Osnovi saobraćajnih i komunikacijskih sistema treba osigurati potreban nivo znanja o osnovim komponentama i funkcijama transportnih, prometnih i komunikacijskih sustava i specifičnim karakteristikama pojedinih modova transporta te načina odvijanja transportnih i komunikacijskih procesa. Vještine: Predmet Osnovi saobraćajnih i komunikacijskih sistema omogućava stjecanje vještina neophodnih za mjerenje, analizu i procjenu učinkovitosti, sigurnosti, utjecaja na okoliš i ekonomskih koristi od transportnog sustava i pojedinih modova transporta. Kompetencije: Studenti kroz nastavni proces predavanja, vježbe, i seminarski rad trebaju steći odgovarajuće kompetencije za analizu funkcija i karakteristika komponenti transportnog i komunikacijskog sustava i mogućnosti korištenja različitih modova transporta kako bi se iskoristile prednosti svakog moda transporta.
Cilj održivog razvoja (SDG):	"SDG3 – Zdravlje i blagostanje"; "SDG 9 Industrija, inovacije i infrastruktura ", „SDG11- Održivi gradovi i zajednce", 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: -Nastavni materijal dostupan na online platformi za učenje Fakulteta za saobraćaj i komunikacije Dopunska: - Bert van Wee, Jan Anne Annema: The Transport System and Transport Policy, Edward Elgar, Massachusett s, 2013. - Milan Janić : Advanced Transport Systems, Springer, London, 2014. - Mehrdad Ehsani, Fei-Yue Wang: Transportation Technologies for Sustainability, Springer, London, 2012

Šifra predmeta: 04ATCOS010101	**Naziv predmeta: Računarstvo i informatika**		
Ciklus: I	**Godina: I**	**Semestar: I**	**Broj ECTS kredita: 6**
Status: obavezan predmet		**Ukupan broj sati: 90**	
Učesnici u nastavi	Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Cilj nastavnog predmeta Računarstvo i informatika je sticanje znanja i ovladavanje vještinama koje doprinose razvoju informatičke pismenosti neophodne za daljni studij. Studenti se trebaju upoznati sa osnovnim karakteristikama računara, načinu rada i njihovim mogućnostima, tj. postići razumjevanje arhitekture računarskih sistema, operativnih sistema i aplikacionog softvera.		
Tematske jedinice:	- Uvod u računarstvo i informatiku - Osnovni pojmovi u računarstvu i informatici i razvoj računara - Brojni sistemi i kodovi u računarstvu - Arhitektura i komponente računara - Uređaji za pohranu podataka - Operativni sistemi - Aplikativni softver - Računarske mreže i usluge		

	- Bežične i mobilne mreže - Mrežne multimedijalne usluge - Alati za izradu web stranica - Programski jezici za razvoj softvera - Baze podataka - Kriptovalute - Vještačka inteligencija - Sigurnost u računarstvu i informatici - Budućnost u računarstvu i informatici
Ishodi učenja:	Znanje: Studenti će steći teorijska i praktična znanja o računarstvu i informatici, te će se osigurati osnovni nivo znanja o harveru i softveru, te njihovoj primjeni u različitim poljima saobraćaja i komunikacija. Vještine: Očekuje se da studenti ovladaju vještinama i alatima koji se koriste u računarstvu i informatici. Kompetencije: Studenti će biti osposobljeni da učestvuju u aktivnostima u vezi računarstva i informatike u kontekstu saobraćaja i komunikacija.
Cilj održivog razvoja:	SDG 4 – Kvalitetno obrazovanje SDG 9– Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi i praktičnog dijela nastave koja uključuje izradu seminarskih radova. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom i prikazom primjera iz prakse, te iniciranje diskusije. 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.
Literatura:	Obavezna: - Milosavljević, M., Veinović, M., Grubor, G.: „Informatika“, Univerzitet Singidunum, Beograd, 2009. - Kozić, M.: „Uvod u informatiku i računarstvo“, Mostar, 2006. - Baraković, S., Baraković Husić, J.: „Osnove modelovanja prijetnji u oblasti informaciono-komunikacijskih sistema“, Dobra knjiga, 2022. Dopunska: – Plazibat, B., Jerčić, S.: „Informatika“, Veleučilište u Splitu, Split, 2005. – Tanenbaum, A.S.: "Structured Computer Organization", 4 izdanje, Prentice Hall, 1999. – Mark Burel, „Fundamentals of Computer Architecture“, Palgrave Macmillan, 2003. – Hennessy J. L., Patterson D. J.: "Computer Architecture: A Quantitative Approach", Morgan Kaufman. – Tanenbaum, A.S.: „Računarske mreže“, prevod četvrtog izdanja, Mikro knjiga, 2005.

Šifra predmeta: 05ATCOS010101	**Naziv predmeta: ELEKTROTEHNIČKI SISTEMI U SAOBRAĆAJU I KOMUNIKACIJAMA**		
Ciklus: I	**Godina: I**	**Semestar: I**	**Broj ECTS kredita: 6**
Status: obavezni predmet		**Ukupan broj sati: 90** 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:	Kurs ima za cilj studentima prezentirati osnovne koncepte iz		

	elektrotehničkih sistema u saobraćaju i komunikacijama, te njihovo tretiranje pomoću matematičkih termina. Izlažu se bazni koncepti fenomena u elektrotehnici koji su nužni za bazno oblikovanje budućih inženjera saobraćaja i komunikacija. Studenti trebaju postići znanja vezana za znanstvenu metodologiju i prorodne zakone na način da se fenomenima u elektrotehnici susretnu kako sa kvalitiativnog tako i sa kvantitativnog aspekta.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Električno naelektrisanje i materija, Kulonov zakon sile, raspodjela električnih naelektrisanja. Električno polje: definicija, primjeri proračuna. Gausova teorema za električno polje u integralnoj formi. Električni potencijal: rad sila električnog polja, konzervativna priroda električnog polja. Potencijal i razlika potencijala, princip superpozicije pri računanju potencijala. Električni kapacitet: Sistem nabijenih vodiča, izolirani vodič. Definicija električnog kapaciteta, primjeri proračuna kapaciteta. Vezivanje kondenzatora. Elektrostatička energija. Ponašanje i primjena kondenzatora u istosmjernim i izmjeničnim električnim krugovima. Dielektrici i polarizacija materije. 2. Električni krugovi stalnih jednosmjernih struja: definicija električne vodljivosti i stacionarne električne struje, Ohmov zakon, električna vodljivost, električni otpor, specifični električni otpor, serijski i paralelno spojeni otpornici. Joulov zakon. Razmjena energije u električnom krugu. Kirchhoffovi zakoni. Zakon o očuvanju energije u električnom krugu. Metode analize električni krugovi stalnih jednosmjernih struja 3. Magnetno polje: magnetna interakcija, elektricitet i magnetizam. Magnetna sila na električno naelektrisanje u kretanju, magnetna sila na vodič protjecan strujom. Izvori magnetnog polja, Amperov zakon u osnovnom obliku, magnetna svojstva materije: magnetno polje proizvedeno strujom, Biot–Savartov zakon, elektrodinamička sila, magnetna svojstva materije. Električna i magnetna polja promjenjiva u vremenu: karakteristike elektromagnetnog polja, Faradayov zakon elektromagnetne indukcije, Lanzov princip, inducirana elektromotorna sila. Primjena Faradayevog zakona: generatori izmjenične struje, električni motori. Samoindukcija, induktivni električni krug. 4. Električni krugovi vremenski promjenjivih struja sa koncentriranim parametrima. Osnovne električne veličine: napon, struja, snaga. Kirchoffovi zakoni. Dvopoli: otpornik, strujni i naponski izvori, kratak spoj i otvoreni krug. Serijski i paralelni spoj. Elementarni dinamički krugovi: Zavojnica i kondenzator: energija i početno stanje. Krugovi prvog reda (RC i RL) priključeni na istosmjerni napon. 5. Krugovi u stacionarnom sinusoidalnom režimu: Periodički signali i efektivna vrijednost. Odnos između sinusoidalnih signala i fazora. Kirchoffovi zakoni u fazorskom načinu predstavljanja. Impedansa, admitansa, reaktansa i susceptansa dvopola u

	sinusoidalnom režimu. Analiza dinamičkih krugova u sinusoidalnom režimu (RC, RL i RLC). Aktivna, reaktivna i prividna snaga. 6. Trofazni sistemi, spoj u trokut i zvijezdu, simetrični i nesimetrični režim. Trofazno obrtno polje, princip rada električnih motora. 7. Transformatori, princip rada, Linearni transformator. Osnove rada kolektorskih i asinhronih električnih mašina: Principi i energetski bilans elektromehaničke pretvorbe energije. 8. Osnovna mjerenja električnih veličina. Osnovi mjerne tehnike i račun greške. Osnovna mjerna oprema. Analogni i digitalni mjerni instrumenti. Metode mjerenja električnih velićina. 9. Analogna elektronika, Električne osobine poluvodiča, Elektroni i šupljine. Donori i akceptori. Karakteristike *p-n* (diodnog) spoja: Otvoreni *p-n* spoj. Dioda (*p-n* spoj) kao ispravljač. Direktno polarizirani *p-n* spoj. Inverzno polarizirani *p-n* spoj. Statička karakteristika diode. Primjena linearnog modela diode. Princip rada tranzistora. Struje u tranzistoru. Spoj sa zajedničkim emiterom. Područja rada tranzistora. 10. Osnovi digitalne tehnike. Bullova algebra. Osnovna logička kola. Osnovni spojevi AD I DA konvertora
Ishodi učenja:	**Znanje:** Teorijska i praktična znaja iz oblasti električnih sistema u saobraćaju i komunikacijama. Osnovne zakonitosti elektrotehnike i elektronike i njihova primjena u inženjerstvu. **Vještine:** Nakon uspješnog savladavanja kursa student će biti u stanju u daljem školovanju koristiti osnovne zakonitosti iz oblasti električnih sistema. **Kompetencije:** Student će moći analizirati i predložiti moguće modele i metode rješavanja problema u električnim sistemima
Cilj održivog razvoja (SDG):	SDG4 – Kvalitetno obrazovanje; SDG12 – Održiva potrošnja i proizvodnja
Metode izvođenja nastave:	Sadržaj kursa se izvodi kroz tri aktivnosti: Predavanja u suli za sve studente koje provodi nastavnik i tokom kojih se predstavljaju teorijski aspekti uz rješavanje numeričkih problema i praktičnih primjera. Predavanje se odvija uz korištenje video i audio zapisa. Vježbe tokom kojih se rješavaju i drugi numerički i praktični problemi, a što uključuje rješavanje problema sa prethodnih ispita s ciljem postizanja boljeg razumijevanja prezentiranih teorijskih tema. Laboratorijsve vježbe na kojima se studenti upoznavaju sa praktičnim

	mjerenjima i načinima korištenja mjerne opreme za prezentaciju pojedinih zakonitosti iz oblasti elektrotehnike. Od studenata se stoga očekuje da redovito sudjeluju u odvijanju svih oblika nastave, kao i da kontinuirano samostalno rade.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: – Domaća zadaća/seminarski rad/ 15 bodova (%), položeno ako se osvoji preko 50 %. – I Parcijalni pismeni ispit/provjera znanja/35 bodova (%), položen je ako se osvoji preko 50 %. – Završni ispit 50 bodova (%) koji se sastoji iz dva dijela: - II parcijalni pismeni ispit/provjera znanja 35 bodova (%), položen je ako se osvoji preko 50 %. - Usmeni ispit 15 bodova (%), nema bodovne granice Ukupan broj bodova (%) koji student prema navedenom može ostvariti u toku nastave iznosi maksimalno 50 bodova (%), što sa Završnim ispitom 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 (%) Zadaća/Seminarski.....15 bodova (%) I Parcijalni ispit/Provjera znanja.....35 bodova (%) Završni ispit (II Parcijalni/usmeni.....50 bodova (%) Završni ispit (Integralni) .....85 bodova (%)
Literatura:	Obavezna: 1. I. Turković: Bilješke i slajdovi sa predavanja i vježbi 2. E. Hot: Osnovi elektrotehnike, knjiga prva, Sarajevo, 1996. 3. E. Hot: Osnovi elektrotehnike, knjiga druga, Sarajevo, 1996. 4. D Milatović: Osnovi elektronike, Svjetlost, Sarajevo 1995.

Šifra predmeta: 06ATCOS010102	**Naziv predmeta:** : **INŽINJERSKA MATEMATIKA 2**		
Ciklus: I	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja 45 Vježbe 45	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Studenti nadograđuju osnovna znanja sa matematskim tematskim cjelinama višeg nivoa razumjevanja. Na taj način studenti postaju osposobljeni da prepoznaju primjenu tih općih znanja na konkretne praktične probleme (koji proizilaze iz oblasti stručnih predmeta), te da ih samostalno definiraju i rješavaju.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje*	1. Funkcije više varijabli: Osnovni pojmovi. Granična vrijednost i neprekidnost 2. Diferencijalni račun funkcija više varijabli: Diferenciranje. Tangentna ravan i normala prostorne površi. Pracijalni izvod		

uvažavajući specifičnosti organizacionih jedinica)	višeg reda. Diferencijal višeg reda. Taylor-ova formula za funkcije dvije promjenljive 3. Diferencijalni račun funkcija više varijabli: Ekstremne vrijednosti funkcija više promjenljivih. Uslovni ekstrem funkcija više promjenljivih. 4. Integralni račun funkcija više varijabli: Izračunavanje dvojnog integrala. Izračunavanje trojnog integrala. 5. Diferencijalne jednačine: Diferencijalne jednačine prvog reda: Diferencijalna jednačina sa razdvojenim promjenljivim. Homogena jednačina. Linearna diferencijalna jednačina. Bernulijeva jednačina. Rikatijeva jednačina. Klerova jednačina. Lagranžeova jednačina. 6. Diferencijalne jednačine: Diferencijalne jednačine višeg reda koje dopuštaju snižavanje reda. Linearne diferencijalne jednačine višeg reda. 7. Diferencijalne jednačine. Sistemi diferencijalnih jednačina. 8. Linijski integrali: Linijski integrali I i II tipa (definicija, osobine, računanje). Nezavisnost linijskog integrala od puta. Greenova formula u ravni. 9. Površinski integrali: Površinskog integrala I i II tipa (definicija, osobine, računanje). Formula Gauss-Ostrogradskog. Stokesova formula. 10. Elementi teorije polja i vektorske analize: Skalarno polje i njegove osnovne karakteristike. Vektorsko polje i njegove osnovne karakteristike. Vektorske linije. 11. Elementi teorije polja i vektorske analize: Divergencija vektorskog polja. Green – Gauss-Ostrogradski teorema. Cirkulacija vektorskog polja. Rotor vektorskog polja. Stoksova teorema u vektorskom obliku. Potencijalno polje, soledoidno pole, Laplaceovo polje. 12. Teorija redova: Brojni redovi. Redovi s pozitivnim članovima. Redovi s kompleksnim članovima. 13. Teorija redova: Nizovi i redovi funkcija. Uniformna konvergencija reda. Stepeni red. 14. Teorija redova: Laurentov red. Fourijeov red. 15. Laplasova tranformacija.
Ishodi učenja:	Znanje: - Studenti ovladaju diferencijalnim računom funkcija više promjenljivih, - postavljaju i rješavaju diferencijalne jednačine i primjenjuju ih na konkretnim problemskim zadacima, - rješavaju i primjenjuju sisteme diferncijalnih jednačina, - primjenjuju procedure diferenciranja u rješavanju problema ekstrema funkcija više promjenljivih, - definiraju i računaju dvostruki, trostruk, linijski i površinski integral uz mogućnost prepoznavanje njihove primjene na konkretnim problemima, - pokazaju razumjevanje osnovnih koncepata vektorske analize Vještine: potiče kreativnost, preciznost, sistematičnost, apstraktno

	mišljenje i kritičko razmišljanje koje pomaže pri uočavanju i rješavanju problema, a što je ključno za nastavak školovanja. Kompetencije: prikazivanje i komuniciranje matematičkim jezikom, logičko razmišljenje, argumentiranje i zaključivanje
Cilj održivog razvoja (SDG):	SDG 4 – Kvalitetno obrazovanje SDG 9– Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Predavanja teorijske nastave uz upotrebu multimedijskih sredstava, tehnika aktivnog učenja i diskusije,praktična nastava – vježbe, te samostalno izlaganje i rješavanje pojedinih konkretnih problema.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Testovi u toku semestra 0 - 15 bodova; I parcijalni ispit/I test/ I provjera znanja/ od 0 - 35 bodova (položeno ako se osvoji preko 50 %). Ukupan broj bodova koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova. Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave i iznosi najviše 50 bodova, od čega je II parcijalni ispit od 0 - 25 bodova (položeno ako se osvoji preko 50 %) i Teorija i zadaci od 0 - 25 bodova, koji traje 60 minuta (studenti polažu teoriju i zadatke koje nisu radili na parcijalnim ispitima). Na završnom ispitu studenti mogu popravljati I parcijalni ispit, ako to ranije nisu zadovoljili. Isto vrijedi i za ispitni rok popravni završnog ispita i oba termina jesenjeg ispitnog roka. 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 85-94,9 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84,9 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74,9 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64,9 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, 0 – 54,9 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 (%) Mini testovi u toku nastave.....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni + Teorija) .....50 bodova (%)
Literatura:	Obavezna: 1. J. Bektešević, V. Hadžiabdić, M. Mehuljić, E. Pilav Teorijske osnove i zbirka riješenih zadataka iz višestrukih, krivolinijskih i površinskih integrala, PMF, Sarajevo 2018. 2. P. Miličić, M. Uščumlić, Zbirka zadataka iz više matematike II, Nauka, Beograd, 1998 3. A.Omerspahić, V.Hadžiabdić, M.Mehuljić, J.Bektešević, Teorijske osnove i zbirka zadataka iz integralnog računa, Mašinski fakultet Sarajevo, Sarajevo 2012. 4. D. Mihailović, D. Đ. Tošić, Elementi matematičke analize II, (Funkcije više promjenljivih, 5. vektorska analiza, višestruki integrali i teorija polja), Naučna knjiga, Beograd, 1976; 1988; 1991. 6. B.P. Demidovič: Zadaci I riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1963 Dopunska: 1. S. Kurepa: Matematička analiza 2 i 3, Tehnička knjiga, Zagreb, 1976. 2. A.Omerspahić, Matematika 3, Mašinski fakultet Sarajevo, Sarajevo 2012.

Šifra predmeta: 07ATCOS010102	**Naziv predmeta: Tehnička mehanika**		
Ciklus: I	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: OBAVEZNI PREDMET		**Ukupan broj kontakt sati: 90** Predavanja 45 Vježbe 45	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet**		

	pripada/predmet
Preduslov za upis:	Ne
Cilj (ciljevi) predmeta:	Usvajanje osnovnih pojmova i zakona: Statike krutog i čvrstog tijela, Kinamatike i Dinamike u cilju osposobljavanja za uspješno praćenje i usvajanja znanja iz drugih stručnih predmeta. Razumjevanje mehaničkih procesa i primjena usvojenih znanja pri rješavanju problema koji se odnose na uslove ravnoteže krutih tijela, analizu naprezanja i dimenzionisanje čvrstih tijela, rješavanje problema koji su vezani za geometriju i kinematičke karakteristike kretanja kao i problema koji uzimaju u obzir i uzroke kretanja. Razvijanje sposobnosti za samostalno postavljanje i rješavanje jednostavnijih problema iz navedenih oblasti. Usvajaje inžinjerskog pristupa pri rješavanju problema.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	– Uvod. Statika krutih tijela. Veze i reakcije veza. – Sistemi sučeljnihi sila. Statički moment sile za tačku. Spreg sila – Redukcija sile na tačku. Proizvoljni sistem sila u ravni. – Gredni nosači u ravni – Trenje. Težišta – Uvod u otpornost materijala.Vanjske sile. Naprezanje. Deformacije – Veza između napona i deformacija. Aksijalno naprezanje. – Smicanje. Geometrijske karakteristike ravnih presjeka. – Savijanje. Uvijanje. – Uvod u kinematiku. Kinematika čestice. Pravolinijsko harmonijsko oscilatorno krtanje. – Kinematika krutog tijela. Translatorno kretanje. – Obrtanje tijela oko nepomične ose. Analiza mehanizama – Uvod u dinamiku. Zakoni dinamike.Diferencijalne jednačine kretanja tačke i njihovo integriranje. – Opšti zakoni dinamike tačke Rad i snaga – Prinudno kretanje tačke i Dalamberov princip, Teorija udara
Ishodi učenja:	Znanje: Poznavanje osnovnih pojmova i zakona: Statike krutog i čvrstog tijela, Kinamatike i Dinamike. Vještine: Sposobnost prepoznavanja problema koji se odnose na uslove ravnoteže krutih tijela, analizu naprezanja i dimenzionisanje čvrstih tijela, rješavanje problema koji su vezani za geometriju i kinematičke karakteristike kretanja kao i problema koji uzimaju u obzir i uzroke kretanja. Sposobnost prepoznavanja osnovnih karakteristika naučnog

	istraživanja i prenošenja zaključaka i razloga koji su do njih doveli. Kompetencije: Kroz nastavni proces predavanja i vježbi, student će biti sposoban, na osnovu usvojenog znanja da: – Razumije i ukaže na uzroke koji dovode promjene stanja mirovanja i mehaničkog kretanja tijela u prirodi, da odredi kinematičke i dinamičke karakteristike kretanja. – Prati i usvaja znanja iz drugih stručnih predmeta. – Koristi tehničku literaturu, priručnike i tabele iz ove oblasti. – Samostalno postavljati i rješavati jednostavne probleme iz navedenih oblasti
Cilj održivog razvoja (SDG):	SGD4 – Kvalitetno obrazovanje; SDG12 – Održiva potrošnja i proizvodnja
Metode izvođenja nastave:	– Samostalno izlaganje – Diskusija – Analiza primjera iz prakse(zadaci na vježbama i domaće zadaće)
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 55 %. – I Parcijalni ispit/test/provjera znanja/35 bodova (%), položen je ako se osvoji preko 55 %. – Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji preko 55 %. – Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji preko 55 %. 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.....80 (%) - 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: – Dacić,S.: Mehanika u saobraćajnom inženjerstvu, Fakultet za saobraćaj i komunikacije, Sarajevo, 2021. – Dacić,S.: Osnovi mašinstva, Fakultet za saobraćaj i komunikacije, Sarajevo, 2007. – Dacić,S.:Odabrana poglavlja iz statike krutih i čvrstih tijela, kinematike i dinamike-skripta, Fakultet za saobraćaj i komunikacije, Sarajevo, 2013. – Jurum- Kipke , J.: Mehanika u prometnom inžinjerstvu, Fakultet prometnih znanosti, Zagreb, 2001. – Kuzmanović, D., Kastratović, G., Vidanović, N.: Mehanika 1, Univerzitet u Beograd, Sabraćajni fakultet, 2012. – Kuzmanović,D., Kastratović, G., Vidanović, N.: Mehanika 2, Univerzitet u Beogradu, Sabraćajni fakultet, 2012. Dopunska: – Rusov,L. Mehanika –Statika, Naučna knjiga ,Beograd, 1992. – Rusov,L. Mehanika – Kinematika, Naučna knjiga ,Beograd, 1992 – Rusov,L. Mehanika – Dinamika, Naučna knjiga, Beograd, 1992 – Beer, F., E.Russel, L., J.Kornwell. P., Vector Mechanics for Engineers, McGraw Hill, 2010.

	– Kuzmanović,D., Kastratović, G., Vidanović, N.: Zbirka zadataka izMehanika 1, Univerzitet u Beograd, Sabraćajni fakultet, 2012.

Šifra predmeta: 08ATCOS010102	**Naziv predmeta: SAOBRAĆAJ I PROSTOR**		
Ciklus: I	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj sati: 90**	

Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**
Preduslov za upis:	NE
Cilj (ciljevi) predmeta:	Sticanje edukacijskih znanja iz oblasti saobraćajnog planiranja, i praktična analiza urbanističkog, regionalnog i okolinskog planiranja saobraćaja. Sticanje znanja iz oblasti planskog upravljanja, korištenja zemljišta, zaštite prostora, određivanja dugoročnih ciljeva i mjera prostornog razvoja u skladu sa planiranim ukupnim privrednim, društvenim i historijskim razvojem prostora koji se tretira.
Tematske jedinice:	1. Uvod – osnove prostornog planiranja 2. Osnovne karakteristike okolinske problematike 3. Mjerenje nivoa društvenog razvoja 4. Prostorna organizacija 5. Razvoj prostornog planiranja i prostorne organizacije u BiH 6. Procjena uticaja na okolinu 7. Zakonski okvir za prostorno planiranje 8. Trendovi razvoja i novi pristup prostornom planiranju 9. Marketing rada 10. Elementi održivog razvoja 11. Prostorni modeli 12. Lokalne inicijative i strateški planovi na lokalnom nivou 13. Nove dimenzije europske politike u prostornom planiranju 14. Prostorni rezultati značajni za Evropu 15. Digitalna tehnologija u prostornom planiranju
Ishodi učenja:	Znanje: Teorijska i praktična znanja iz oblasti prostornog planiranja saobraćaja. Osnovni propisi, pravila, metode i postupci u oblasti prostornog planiranja u kontekstu saobraćajnog planiranja, kao i analiza saobraćajnih prostornih planova. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti prostornog planiranja saobraćaja.

	Kompetencije: Sposobnosti samostalnog razumijevanja i korištenja propisa, korištenja stručne literature, primjene metoda i postupaka, mjerenja i istraživanja, izrada analiza, procjena i praktičnih rješenja u funkciji realizacije i daljeg poboljšanja prilikom prostornog planiranja saobraćaja.
Cilj održivog razvoja (SDG):	SDG 4 – Kvalitetno obrazovanje SDG 9– Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Usmeno iznošenje sa prezentacijom i prikazom različitih sistema i procesa iz oblasti prostornog planiranja saobraćaja uz korištenje video i audio zapisa, te samostalno izlaganje pojedinih konkretnih problema na konkretnom području istraživanja. Iniciranje rasprava i diskusija o problemima iz prakse, pojedinačnih zapažanja iz različitih okruženja, izrada samostalnih istraživanja i analiza postojećih prostornih planova saobraćaja odabranog područja.
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 (pismena i usmena provjera) 15 bodova (%), položeno ako se osvoji preko 50 %. – I Parcijalni ispit/test/provjera znanja/ (pismena provjera) 35 bodova (%), položen je ako se osvoji preko 50 %. – Završni ispit (II Parcijalni) (pismena provjera) 50 bodova (%), položeno ako se osvoji preko 50 %. – Završni ispit (Integralni) (pismena provjera) 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 i polaganjem parcijalnog i završnog ispita, a prema kvalitetu stečenih znanja i vještina, i sadrži maksimalno 100 bodova, te se utvrđuje prema sljedećoj skali: <u>Obaveze studenta Bodovi (%)</u> Prisutnost na predavanjima i vježbama.....0 bodova (Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80%, a prisustvo na nastavi je uslov za ovjeru urednog pohađanja nastave. Ukoliko postoje opravdani razlozi, koji moraju biti pisano dokumentirani, studenti mogu izostati i do 30%, a odluku o pravdanju donosi predmetni nastavnik) 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: 1. Bublin, M., Planiranje saobraćaja i saobraćajnica, Sarajevo 2007. 2. Bublin, M., Prostorno planiranje i zaštita okoline, Univerzitetska knjiga Sarajevo, 2010 3. Bublin, M., Saobraćaj i prostor, Univerzitetska knjiga Sarajevo, 2000 Dopunska: 1. Appleyard, D., Kerin, L., Majer, R., The viev from the road, Harwaed 2. Čekić, Š., Osnovi metodologije i tehnologije znanstvenog i stručnog dijela, Fakultet za saobraćaj i komunikacije, Sarajevo, 1996. 3. Okvirna prometna strategija BiH, Sarajevo, 2016. 4. The study on the transport master plan in Bosnia and Herzegovina, 2001. 5. Zelenika, R., Livio, J., Suvremeni transportni sustavi, Ekonomski fakultet Rijeka, Rijeka, 1995.

Šifra predmeta: 09ATCOS010102	**Naziv predmeta: INDUSTRIJSKI TRANSPORT**		
Ciklus: I	**Godina:** II	**Semestar: IV**	**Broj ECTS kredita:** 6
Status: OBAVEZNI PREDMET		**Ukupan broj sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja 45 Vježbe 45	

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 projektovanja i upravljanja u industrijskim tokovima.

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

R.b.	Nastavne cjeline	Broj sati (P+V)
1.	Uvod – osnove industrijskog transporta	(3+3)
2.	Podjela i osnovna obilježja transportne mehanizacije	(3+3)
3.	Pribor i pomoćni uređaji	(3+3)
4.	Osnove hidrauličkih sistema	(3+3)

	5. Sredstva kontinuiranog transporta (3+3) 6. Sredstva diskontinuiranog transporta (3+3) 7. Pretovarna sredstva u industrijskom transportu (3+3) 8. Grabuljari, elevatori, konvejeri (3+3) 9. Žičare (3+3) 10. Zavojni, vibracioni i valjkasti transporteri (3+3) 11. Damperi i autokiperi (3+3) 12. Trakasti transporteri i proračun trakastih transportera (3+3) 13. Pneumatski transport (3+3) 14. Hidraulični transport (3+3) 15. Troškovi rada i optimizacija industrijskog transporta (3+3)
Ishodi učenja: (Znanje; vještine; kompetencije)	Studenti kroz nastavni proces predavanja, vježbe, i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti projektovanja, izbora, upravljanja i održavanja sredstava unutrašnjeg transporta. Kroz ovaj predmet obezbjeđuje se nivo znanja za optimizaciju industrijskih tokova.
Cilj održivog razvoja (SDG):	Za predmet "Industrijski transport" ciljevi i podciljevi održivog razvoja (SDG) su: Cilj 8: Promovirati inkluzivni i održivi ekonomski rast, zaposlenost i dostojanstven rad za sve Cilj 9: Izgraditi izdržljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost Cilj 12: Osigurati održive oblike potrošnje i proizvodnje:
Metode izvođenja nastave:	Predavanja, vježbe i izrada seminarskog rada sa praktičnim osvrtom.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Prisustvo nastavi i vježbama od 0 – 10 bodova (%); Domaća zadaća/seminarski rad/praktični rad/

	od 0 do 10 bodova (%);I parcijalni ispit/I test/ I provjera znanja/ od 0 do 15 bodova (%);II parcijalni ispit/II test/ II provjera znanja / od 0 do 20 bodova (%). Ukupan broj bodova (%) koji studenta prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 55 bodova (%). Završni ispit iznosi najviše 45 bodova odnosno 45 (%). Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave.
Literatura:	Obavezna: 1. Ahmić, A., Pretovarna i transportna mehanizacija, Univerzitetska knjiga, Sarajevo, 1996. 2. Marvin I., Prekrcajna mehanizacija, Zagreb, 1997. 3. Dedijer S., Osnovi transportnih uređaja, Građevinska knjiga, Beograd, 1989.

Šifra predmeta: 10ATCOS010102	**Naziv predmeta: Logistika u saobraćaju i komunikacijama**		
Ciklus: I	**Godina: I**	**Semestar: II**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 60 Vježbe: 30	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Osnovni cilj predmeta „Logistika u saobraćaju i komunikacijma“ je sticanje znanja o logistici kao filozofiji kvaliteta usluga, tehnološkim promjenama u saobraćaju i komunikacijama, zahtjevima u razvoju logistike, strukturi i potrebama razvoja modernih logističkih centara.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti*	1. Pojam, definicija i razvoj logistike naučne discipline koje se koriste u logistici 2. Podjela i sadržaj logistike prema oblastima u kojima se koristi 3. Pojam, struktura i pocesi logističkih sistema 4. Logistički operatori 5. Skladišta 6. Skladišni procesi		

organizacionih jedinica)	7. Transportni lanac u logističkim sistemima, snabdijevanje i lanac snabdjevanja 8. Skladišni proces u lancu snabdjevanja 9. Zalihe i vrste zaliha 10. Povratna logistika 11. Informacijske i komunikacijske tehnologije u logistici 12. Logistička strategija 13. Utvrđivanje kvaliteta logističke usluge 14. Upravljanje kvalitetom u logistici 15. Savremeni koncept razvoja logističkih centara i logistički centar kao strateški značajan faktor povečanja kvalitete usluga
Ishodi učenja:	**Znanje:** Predmet proučavanja treba da osigura nivo kompetencija i znanja potrebnih za rješavanje konkretnih problema u oblasti logistike. Teorijska i praktična znanja iz oblasti logistike u saobraćaju i komunikacijama. **Vještine:** Razvijene sposobnosti primjene teorijskih i praktičnih znanja iz oblasti logističkih procesa u saobraćaju i komunikacijama. **Kompetencije**: Razvijene sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti logistike i logističkih procesa.
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:	Nastava se realizira kroz usmeno iznošenje sa prezentacijom (ex-katedra) i prikazom različitih sistema i procesa iz oblasti logistike u saobraćaju i komunikacijama uz korištenje video i audio zapisa, te

	samostalno izlaganje pojedinih konkretnih problema u oblasti logističkih procesa na konkretnom području istraživanja. Iniciranje rasprava i diskusija sa studentima o problemima iz prakse, pojedinačnih zapažanja iz različitih okruženja, izrada samostalnih istraživanja i analiza iz oblasti logistike i logističkih sistema.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: 1. Domaća zadaća/seminarski rad/praktični rad/ max 15 bodova (%), položeno ako se osvoji preko 50 %. 2. I Parcijalni ispit/test/provjera znanja / max 35 bodova (%), položen je ako se osvoji preko 50 %. 3. Završni ispit - pismeni 20 bodova 4. Završni ispit - usmeni 30 bodova 5. Završni ispit (Integralni) - pismeni - 40 bodova 6. Završni ispit (Integralni) - Usmeni - 45 bodova Da bi student položio ispit mora položiti usmeni dio ispita. 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 - obavezno se vodi evidencija. Prisustvo nastavi i vježbama se ne boduje. Zadaća/Seminarski/Praksa/.....max 15 bodova I Parcijalni ispit/Test/Provjera znanja/.....max 35 bodova Završni ispit - pismeni .....max 20 bodova Završni ispit - usmeni .....max 30 bodova Završni ispit (Integralni) - pismeni.....max 40 bodova Završni ispit (Integralni) - usmeni.....max 45 bodova Završni ispit se organizuje na način da studenti koji su položili prvu provjeru znanja polažu samo završni dio ispita (II dio gradiva), dok studenti koji nisu položili prvu provjeru znanja zajedno sa završnim polažu i prvi parcijalni ispit (I dio gradiva). Ispit se polaže pismeno i usmeno. Navedena skala se usvaja prema Pravilima studiranja na Univerzitetu u Sarajevu. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati. 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.
Literatura:	Obavezna: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. BERKOVIĆ, M.: skripta predavanja, „Logistika u saobraćaju i komunikacijama, Fakultet za saobraćaj i komunikacije, 2024. godine. 3. KOSOVAC, A; Muharemović, E.: „Procesi logističkih sistem“, Fakultet za saobraćaj i komunikacije, 2022. godine. 4. ZELENIKA, R.: Logistički sustavi, Ekonomski fakultet u Rijeci, Rijeka 2005. 5. ZELENIKA, R.: Temelji logističke špedicije, Knjiga prva, Sveučilište u Rijeci 2005. Dopunska:

	1. ZELENIKA, R.: Prometni sustavi, Tehnologija-organizacija-ekonomika-logistika-menadžment, Sveučilište u Rijeci 2001. 2. OBLAK, H.: Makrologistična politika,Ekonomsko-poslovna fakulteta Maribor, 1996. 3. VASILJEVIĆ, M. R.:"Logistika u saobraćaju", Univerzitet u istočnom Sarajevu, Saobraćajni fakultet Doboj, Doboj 2015. 4. PERIŠIĆ R.: Sistem kvaliteta usluga logistika i informatika, Institut tehničkih nauka SANU, Beograd, 2002.

Šifra predmeta: 11ATCOS010203	**Naziv predmeta: PRIMIJENJENA MATEMATIKA I STATISTIKA**		
Ciklus: I	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: Obavezni predmet		**Ukupan broj kontakt sati: 90**	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Cilj predmeta je da studenti steknu znanja iz oblasti primjenjene matematike i opšte statistike koje su značajne u saobraćajnim i komunikacijskim naučnim/znanstvenim oblastima (teorije grešaka, osnova numeričke algebre i analize, vjerovatnoće i statistike, te primjena kombinatorike i teorije vjerovatnoće u statistici), kako bi bolje pratili i savlađivali građu pojedinih stručnih predmeta koji obilnije koriste ove važne i sadržajne oblasti savremene matematike.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	• Uvod – osnove primijenjene matematike u inženjerstvu (saobraćaju i komunikacijama). Greške približnih vrijednosti brojeva i funkcija • Numeričko rješavanje linearnih jednačina i sistema linearnih jednačina, Gaussov algoritam • Rješavanje sistema nelinearnih transcendentnih jednačina. Lokalizacija nula polinoma. Određivanje minimuma funkcija • Metoda najmanjih kvadrata. Interpolacije i aproksimacije • Numeričko diferenciranje i integriranje • Zakoni velikih brojeva • Elementi kombinatorike • Uvod u teoriju vjerovatnoće - Osnove klasične teorije vjerovatnoće (tri klasična koncepta vjerovatnoće, osnovne teoreme ,formula totalne vjerovatnoće i Bajesova formula) • Opšta (aksiomatska) definicija pojma vjerovatnoće. Diskretni i nediskretni prostori vjerovatnoće		

	• Analiza diskretne i kontinualne slučajne varijable. Funkcija/zakon (gustoće) vjerovatnoće i funkcija distribucije (raspodjele, teorijskog rasporeda) vjerovatnoće • Uvod u opštu i matematičku statistiku. Pojam, predmet i značaj statistike (posebno u tehničkim naukama/znanostima). • Statistički skup i statističke jedinice. Obilježja statističkih jedinica. Pojam statističkog istraživanja. Deskriptivna statistička analiza, obrada i analiza podataka i rezultata (grafičko prikazivanje statističkih serija, mjere varijacije/disperzije) • Metod statističkih uzoraka. Testiranje statističkih (parametarskih i neparametarskih) hipoteza • Pojam i predmet regresione analize: regresija i korelacija • Dinamička analiza u statistici
Ishodi učenja:	Znanje: Nakon završetka kursa, student bi trebao: • imati razvijen osjećaj za deduktivno rasuđivanje; • razumjeti osnovne pojmove iz oblasti teorije grešaka, numeričke matematike, teorije vjerovatnoće i statistike i tako biti upoznat kako se intuitivni koncepti prevode u precizan matematički jezik; • ovladati standardnim numeričkim, stohastičkim i statističkim metodama i njihovim primjenama ; • razumjeti ulogu koju proces linearizacije ima u matematičkom modeliranju konkretnih fizikalnih, saobraćajnih, komunikacijskih i drugih inženjerskih problema; • ovladati osnovnim tehnikama numeričke algebre, numeričke analize, klasične i savremene teorije vjerovatnoće i statistike; • produbiti razumijevanje osnovnih problema iz oblasti inženjerskih matematika 1 i 2. Vještine: potiče kreativnost, preciznost, sistematičnost, apstraktno mišljenje i kritičko razmišljanje koje pomaže pri uočavanju i rješavanju problema, a što je ključno za nastavak školovanja. Kompetencije: prikazivanje i komuniciranje matematičkim jezikom, logičko razmišljanje, argumentiranje i zaključivanje.
Cilj održivog razvoja (SDG):	SDG4 – Kvalitetno obrazovanje, SDG9 – Industrija, inovacije i infrstruktura
Metode izvođenja nastave:	Predavanja provodi nastavnik tokom kojih se predstavljaju teorijski aspekti uz rješavanje numeričkih problema i praktičnih primjera. Predavanje se odvijaju uz korištenje video i audio zapisa. Vježbe uključuju rješavanje numeričkih i praktičnih problema, a što uključuje i rješavanje problema sa prethodnih ispita s ciljem postizanja boljeg razumijevanja prezentiranih teorijskih tema.

Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Testovi tokom semestra (ili praktični zadatak) od 0 - 15 bodova; I parcijalni ispit/I test/ I provjera znanja/ od 0 - 35 bodova (uslov 50%). Ukupan broj bodova koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova. Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave i iznosi najviše 50 bodova, od čega je II parcijalni ispit od 0 - 25 bodova (uslov 50%) i završni - teorija i zadaci od 0 - 25 bodova, koji traje 60 min (studenti polažu teoriju i zadatke koje nisu radili na parcijalnim ispitima). Na završnom ispitu studenti mogu popravljati I parcijalni ispit, ako to ranije nisu zadovoljili. Isto vrijedi i za ispitni rok popravni završnog ispita i oba termina jesenjeg ispitnog roka. 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 85-94,9 bodova; c) 8 (C) - prosječan, sa primjetnim greškama, nosi 75-84,9 bodova; d) 7 (D) - općenito dobar, ali sa značajnijim nedostacima, nosi 65-74,9 bodova; e) 6 (E) - zadovoljava minimalne uslove, nosi 55-64,9 bodova; f) 5 (F, FX) - ne zadovoljava minimalne uslove, 0 – 54,9 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 (%) Aktivnost /Mini testovi/Zadaće/Seminarski rad .....15 bodova (%) I Parcijalni ispit/Test/Provjera znanja/.....35 bodova (%) Završni ispit (II Parcijalni + Teorija) .....50 bodova (%)
Literatura:	Obavezna: 1. Blažić, M. R., Opšta statistika - Osnovi i analiza, Savremena administracija, Beograd, 1982. 2. Carnahan, B. , H. A. Luther, H. A. , Wilkes, J. O., Applied Numerical Methods, John Wiley &Sons, 1969.

	3. Elezović, N., Teorija vjerojatnosti, zbirka zadataka, Element, Zagreb, 1995. 4. Fatkić, H., Vjerovatnoća i statistika, I . dio, The Soros Foundations, FOD BiH, Sarajevo, 1997; Corons, Sarajevo, 2000. 5. Fatkić, H., Hasković, A., Čolaković, A., Avdagić, E., Primjenjena matematika i statistika, Predavanja i vježbe, Slajdovi i bilješke, Sarajevo, 2012, http://www.fsk.unsa.ba/ 6. Hadžć, O., Numeričke i statističke metode u obradi eksperimentalnih podataka,Institut za matematiku, Novi Sad, 1989. Dopunska: 1. Ivanšić, I., Numerička matematika, Element, Zagreb, 1998. 2. Johnson, R. A. , Bhattacharyya, G. K., Statistics: Principles and Methods, Wiley, New York, 5th edition, 2006. 3. Lučić, B., Statistika, Ekonomski fakultet, Sarajevo, 1996.

Šifra predmeta: 12ATCOS010203	**Naziv predmeta: SISTEMSKO INŽENJERSTVO**		
Ciklus: I	**Godina: II**	**Semestar: III**	**Broj ECTS kredita: 6**
Status: Obavezni predmet		**Ukupan broj sati: 90** Razrada distribucije sati po tipu: Predavanja: 60 Vježbe: 30 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 jeste ovladavanje prometnim procesima, kao i utvrđivanje zajedničkih prometnih veličina koje omogućavaju kvalitetnije povezivanje u jedinstvenu prometnu mrežu. Postizanjem adekvatne interakcije između komponenata prometnog sustava kroz njegov životni ciklus bit će dat osvrt na pojedine faze tehnoloških procesa u saobraćaju		

	i komunikacijama.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod – pojmovi i definicije 2. Sustavski pristup proučavanja prometa (Struktura prometnog sustava; Sustavsko modeliranje prometa) 3. Temeljni sustavski koncepti (Opće definicije i interpretacije pojma sustav; Klasifikacija sustava) 4. Analogija, homomorfija i izomorfija. Stanje I proctor stanja. Sustavska analiza. Sustavska arhitektura. Životni ciklus sustava. 5. Sustavski dijagrami i pomagala (Objektogram i funkciogram; ER dijagrami; DFD dijagrami; GPSS blok dijagrami; Petrijeva mreža) 6. Ponašanje otvorenih dinamičkih sustava (Vrste ponašanja sustava; Prijelazni procesi; Statička i dinamička karakteristika sustava) 7. Definiranje i razvoj sustava (Primarne faze sustavskog inženjerstva; Definiranje sustavskih zahtjeva) 8. Sustav i procesi cestovnog prometa (Sustavsko definiranje cestovnog prometa; Sustavsko dizajniranje cestovne mreže) 9. Tehnologija cestovnog prometa (Sustavski opis tehnologije prevoza putnika i tereta u cestovnom prometu) 10. Sustav i procesi željezničkog prometa (Definiranje i opisivanje sustava željeznčkog prometa; Sustavski pristup izboru željezničkih vozila) 11. Sustav i procesi zračnog prometa (Sustavsko definiranje zračnog prometa; Sustavski razvoj mrežne infrastrukture; Tehnologija zračnog prometa) 12. Sustavi i procesi telekomunikacijskog prometa (Sustavsko definiranje tk. Prometa; Sustavski razvoj tk.mreže) 13. Tehnološki procesi Inteligentne mreže 14. Sustav i procesi poštanskog prometa (Sustavsko definiranje poštanskog prometa; Razvoj poštanske mreže i tehnologija; Tehnologija poštanskog prometa) 15. Razvoj inteligentnih transportnih sustava (Koncept i usluge ITS-a; Razvoj ITS-a)
Ishodi učenja:	Znanje:. Studenti kroz nastavni proces predavanja i auditornih vježbi, kao i kroz praktičan rad će ovladati predmetnom tematikom i steći teorijska i praktična znanja iz oblasti sistemskog inženjerstva Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti sistemskog inženjerstva. Kompetencije: Sposobnosti praćenja tehnoloških procesa, a u cilju stvaranja kvalitetne strukture prometnog sustava koja za rezultat ima kvalitetnu, sigurnu, bez kašnjenja i ekološki prihvatljivu prometnu uslugu.
Ciljevi održivog razvoja (SDGs)	SDG9 – Industrija, inovacije i infrastruktura SDG11 – Održivi gradovi i zajednice SDG12 – Održiva potrošnja i proizvodnja

	SDG13 – Zaštita klime
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:	1. Čaušević S, Bošnjak I, SUSTAVSKO INŽENJERSTVO U TRANSPORTU I KOMUNIKACIJAMA, Univerzitet u Sarajevu, Fakultet za saobraćaj i komunikacije, Sarajevo, 2006.
	2. Bilješke i slajdovi s predavanja i vježbi

Šifra predmeta: 13ATCOS010203	**Naziv predmeta: Ekonomika u saobraćaju i komunikacijama**		
Ciklus: I	**Godina:** II	**Semestar: IV**	**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**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje elementarnih znanja iz područja ekonomike u saobraćaju i komunikacijama u funkciji ekonomski efikasnog i kvalitetnog		

	saobraćajno-komunikacijskog sistema.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Pojam i značaj ekonomike saobraćajno-komunikacijskih modela 2. Uloga saobraćaja u društvenoj reprodukciji 3. Karakterstike proizvodnje saobraćajno-komunikacijskih usluga 4. Ponuda i potražnja kao tržišni elementi 5. Oblikovanje i utvrđivanje vrijednosti saobraćajno-komunikacijske usluge 6. Troškovi saobraćajno-komunikacijskog procesa 7. Analiza dinamike troškova 8. Remanentnost troškova i faktori remanentnosti u saobraćaju i komunikacijama 9. Cijene saobraćajno-komunikacijske usluge i faktori od kojih zavise 10. Tarife i tarifska politika 11. Principi ekonomije poslovanja u saobraćaju i komunikacijama 12. Investicije u saobraćaju i komunikacijama 13. Metode vrednovanja investicijskih projekata u SIK 14. Osnovna obilježja poreskog sistema i poreske politike u SIK 15. Faktori relevantni za vođenje ekonomike preduzeća u SIK
Ishodi učenja:	*Znanje*: Studenti će steći znanja iz područja ekonomike u saobraćaju i komunikacijama u funkciji ekonomski efikasnog i kvalitetnog saobraćajno-komunikacijskog sistema *Vještine*: Razumijevanje ekonomskih zakonitosti i kvalitativno-kvalitativnih analiza ekonomskih procesa koji se pojavljuju u saobraćajnom preduzeću i saobraćajnom tržištu *Kompetencije*: Aplikaciju stečenih znanja u konkretnim modelima.
Cilj održivog razvoja (SDG):	SDG 4: Osigurati inkluzivno i kvalitetno obrazovanje, te promovirati mogućnosti cjeloživotnog učenja za sve, SDG 8: Promicati održiv ekonomski rast kroz punu i produktivnu zaposlenost i dostojanstven rad za sve, SDG 9: Industrija, inovacije i infrastruktura - Izgraditi otporniju infrastrukturu, promovirati inkluzivnu i održivu industrializaciju te poticati inovacije, SDG 10: Smanjenje nejednakosti - Smanjiti nejednakosti unutar i među zemljama. 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 i seminarskih radova. Case Study, Workshop.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Domaća zadaća: od 0 do 5 bodova Seminarski rad / projektni zadatak): od 0 do 10 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 (%) Domaća zadaća .....5 bodova (%) Seminarski / Projektni zadatak:..... 10 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 55% (aktivnost, parcijalni ispit, završni ispit), tj. da bi student položio ispit

	mora ostvariti sljedeće uslove: - Domaća zadaća:3 boda - Aktivnost (seminarski rad / projektni zadatak): 6 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 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. Azra Ferizović, Aida Kalem, „Ekonomika u saobraćaju i komunikacijama (SKRIPTA I dio)," Fakultet za saobraćaj i komunikacije, Sarajevo, 2020. 2. Azra Ferizović, Aida Kalem „Ekonomika u saobraćaju i komunikacijama (SKRIPTA II dio)," Fakultet za saobraćaj i komunikacije, Sarajevo, 2020. 3. Čekić, Š., Ekonomika u transportu i komunikacijama, Univerzitet u Sarajevu, Fakultet za saobraćaj i komunikacije, Sarajevo, 2005. 4. Novaković, S., Ekonomija saobraćaja, Beograd, 5. Perić, T., Radačić, Ž., Šimulčik, D., Ekonomika prometnog sustava, Sveučilište u Zagrebu, Fakultet prometnih znanosti, Zagreb, 2000. 6. Perović, D., Teorija troškova, Beograd, 7. Samuelson, P., Nordhaus, D., Ekonomija, Mate, 1992. Dopunska: 1. J. Petrović-Vujačić: Osnovi ekonomije, Saobraćajni fakultet Beograd, 2010. 2. Šunjić-Beus, M. et al. (2009). Ekonomika preduzeća, elektronsko izdanje, Ekonomski fakultet u Sarajevu, Sarajevo 3. Martinović, D. (2013). Tačka pokrića kao instrument poslovnog odlučivanja, Ekonomski fakultet u Sarajevu 4. Thompson, A. Economics of the Firm, theory and practice, fifth Edition, New Jersey 5. Tatić, K. (2008). Menadžerska ekonomija. Ekonomski fakutet u Sarajevu 6. Somun-Kapetnović, R., Arnaut-Berilo, A. Šehić, E & Kahvić, E. (2009). Kvantitativne metode u ekonomiji i menadžmentu, Sarajevo. Ekonomski fakultet u Sarajevu

Šifra predmeta: 14ATCOS010203	**Naziv predmeta: Informacioni sistemi u saobraćaju i komunikacijama**		
Ciklus: I	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj sati: 90**	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje znanja o informacijskim sistemima, njihovoj primjeni, komponentama, tehnologijama i principima razvoja, a u cilju osposobljavanja studentata za rješavanje zadataka i problema planiranja, razvoja i analize informacijskih sistema u saobraćaju i komunikacijama.		

Tematske jedinice:	– Pojam sistema i informacijskih sistema (IS) – Infrastruktura i arhitektura informacijskih sistema – Informacijske i komunikacijske tehnologije – Sistemi za upravljanje bazama podataka – Programska rješenja za razvoj IS – Komunikacijske tehnologije za razvoj IS – Životni ciklus razvoja informacijskih sistema (SDLC) – Organizacija razvoja informacijskih sistema – Primjena CASE alata za projektovanje IS – Planiranje razvoja informacijskih sistema – Modeliranje i reinženjering procesa: *Workflow, DFD, BPR* – Modeliranje strukture, baze podataka i ponašanja IS – Implementacija informacijskih sistema – Analiza informacijskih sistema – Sigurnost i kvalitet informacijskih sistema
Ishodi učenja:	**Znanje**: Studenti će steći teorijska i praktična znanja o vrstama i komponentama informacijskih sistema, načinu njihovog projektovanja i mogućnostima primjene u saobraćaju i komunikacijama. **Vještine**: Studenti će ovladati vještinama i alatima koji se koriste kod projektovanja i razvoja informacijskih sistema kao što su CASE alati. **Kompetencije**: Studenti će biti osposobljeni da učestvuju u planiranju i razvoju informacijskih sistema, a posebno sistema koji su namjenjeni za oblasti saobraćaja i komunikacija.
Ciljevi održivog razvoja (SDG):	SDG9 – Industrija, inovacije i infrastruktura
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja i vježbi. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom i prikazom primjera iz prakse. Tokom realizacije nastave se inicira diskusija o problemima planiranja, analize, projektovanja i razvoja informacijskih sistema sa posebnim osvrtom na sisteme koji se primjenjuju u oblasti saobraćaja i komunikacija. U toku nastave se koriste različite metode koje uključuju: usmeno izlaganje, diskusije, demonstracije, individualni i grupni rad.
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/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 nije obuhvaćen parcijalnim ispitom) koji se vrednuje sa 50 bodova za studente koji su položili parcijalni ispit ili se sastoji od kompletnog gradiva koje se vrednuje sa 80 bodova za studente koji nisu položili parcijalni ispit. Aktivnost studenta se prati i ocijenjuje kroz učestvovanje u diskusijama na nastavi, izradu zadaća, seminarskih radova, projektnih zadataka ili polaganje kvizova. Završni / popravni ispit se organizuje kao pismeni i/ili usmeni ispit. 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/popravnog ispita. Prema kvalitetu stečenih znanja i vještina student može osvojiti maksimalno 100 bodova, a prema sljedećoj skali:

	Struktura bodovanja Bodovi (%) Zadaće / Aktivnost na nastavi:..... 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). Navedena skala ocjenjivanja se može korigovati prema Pravilima studiranja na Univerzitetu u Sarajevu (Član 49).
Literatura:	Obavezna literatura: – A. Čolaković, „*Informacioni sistemi u saobraćaju i komunikacijama (SKRIPTA),"* Fakultet za saobraćaj i komunikacije, Sarajevo, 2020. Dopunska literatura: – Ralph M. Stair, George W. Reynolds, „*Fundamentals of Information Systems*," Cengage Learning, 2016. – Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, „*Systems analysis and design*," Wiley, 2015. – Patricia Wallace, „*Introduction to Information Systems*," Pearson Education, 2015. – Richard T. Watson (editor), „*Information Systems*," Global Text Project (Creative Commons Attribution 3.0 License), 2017. – Arthur M. Langer, „*Analysis and Design of Information Systems, Springer-Verlag*," 2008. – John Wang, „*Innovations in Supply Chain Management for Information Systems*," Business Science Reference, 2010. – Anita Pickerden, „*Planning and Managing your Work Based Projects*," bookboon.com, 2015. – Terra Vanzant Stern, „*Lean and Agile Project Management*," Taylor & Francis Group, 2017. – Andrew Stellman & Jennifer Greene, „*Learning Agile*," O'Reilly Media, 2015. – Christos Kalloniatis: "*Modern Information Systems*," InTech Croatia, 2012. – Poliščuk Jaroslav: „*Projektovanje informacionih sistema*," Podgorica, 2007.

	– Kelly R. Jr, Efraim T.: „*Uvod u informacione sisteme*," Data Status, 2009. – Information Security Management Systems (ISMS) standards, ISO/IEC 27000 – ISO 9000 family of quality management systems (QMS) standards

Šifra predmeta: 15-1ATCES010203	**Naziv predmeta: Elementi transportnih sredstava i uređaja**		
Ciklus: I	**Godina: II**	**Semestar: III**	**Broj ECTS kredita:** 6
Status: IZBORNI PREDMET		**Ukupan broj kontakt sati: 90**	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	Ne		
Cilj (ciljevi) predmeta:	Cilj predmeta je da student upozna sa racionalnim konstrukcionim oblicima, principima rada, osnovama proračuna i principima izbora materijala elemenata i uređaja transportnih i pretovarnih sredstava.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	– Uvod. Elementi za spajanje. Zavareni, lemljeni, lijepljeni spojevi. Spojevi sa zakovicama. – Spojevi sa vijcima. Spojevi sa klinovima. strujanje. Stoksova teorema – Elastični spojevi. – Elementi za kružno kretanje . Vratilo i osovine. – Spojnice. Ležišta. – Elementi za prijenos snage. Frikcioni prenosnici. – Zupčasti prenosnici. – Remeni prenosnici. – Karakteristika prenosnika snage i njihova primjena na transpornim i pretovarnim sredstvima. – Elementi za provođenje tekućina (tečnosti) i gasova (cijevi, cijevni zatvarači i drugi). – Uvod. Prvi glavni zakon termodinamike – Kalorična svojstva gasova. Smjese gasova – Promjene stanja gasova. Kružni procesi. – Drugi glavni zakon termodinmike – Toplotne mašine. Kompresori. Motori SUS. Turbine		
Ishodi učenja:	Znanje: Poznavanje racinalnih konstrukcionih oblika, principa rada, osnova proračuna i izbora materijala elemenata i uređaja transpornih i pretovarnih sredstava. Vještine: Primjena usvojenih znanja iz navedene oblasti će studentu		

	omogućiti da u toku praktičnog rada maksimalno iskoristi eksploatacione karakteristike elemenata i uređaja koji su ugrađeni u transportna i pretovarna sredstva i izvrši pravilan izbor elemenata.Usvojeno znanja iz ovog predmeta je potrebno za lakše praćenje i razumjevanje drugih stručnih predmeta u nastavku studija. Kompetencije: Kroz nastavni proces predavanja, vježbi i izrade domaćih zadataka student će biti sposoban, na osnovu usvojenog znanja da: – shvati osnovne principe rada kompresora, motora sus i gasnih turbina. – analizira elemente i uređaje koji ulaze u sastav transportnih i pretovarnih sredstava te da izvrši pravilan izbor i zamjenu potrebnih elemenata. – postavi i definiše mehaničko- matematičke modele prenosa snage od pogonskog do radnog dijela transportnih i pretovarnih sistema i izvriši pravilan izbor potrebne opreme i snage pogonskog agregata.
Cilj održivog razvoja (SDG):	SDG12 – Održiva potrošnja i proizvodnja
Metode izvođenja nastave:	– Samostalno izlaganje – Diskusija – Analiza primjera iz prakse(zadaci,seminarski radovi)
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 55 %. – I Parcijalni ispit/test/provjera znanja/35 bodova (%), položen je ako se osvoji preko 55 %. – Završni ispit (II Parcijalni) 50 bodova (%), položeno ako se osvoji preko 55 %. – Završni ispit (Integralni) 85 bodova (%), položeno ako se osvoji preko 55 %. 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.....80 (%) 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: – Perše,S., Višnjić,V.: Strojarstvo u prometu, Fakultet prometnih znanosti, Zagreb, 2000. – Decker,K.H.: Elementi strojeva ,Tehnička knjiga, Zagreb, 1975. – Vrhovski, D., Nikšić. M.: Osnove strojarstva –zbirka rješenih zadataka ,FPZ, Zagreb,1998. Dopunska: – Šelmić,R.: Elementi transportnih sredstava i uređaja, Saobraćajni fakultet, Beograd, 2005.

	– Šelmić,R, Mijailović,D., Perišić, D.: Elementi transportnih sredstava i uređaja-Praktikum Saobraćajni fakultet, Beograd, 2006. – Šelmić,R.:Tehnička termodinamika, Saobraćajni fakultet, Beograd, 2006.

Šifra predmeta: 15-2ATCES010203	**Naziv predmeta: Informacije i komunikacije**		
Ciklus: I	**Godina: II**	**Semestar: III**	**Broj ECTS kredita: 6**
Status: Izborni predmet		**Ukupan broj sati: 90**	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	**Studenti stiču osnovna teorijska znanja potrebna za izučavanje savremenih digitalnih telekomunikacijskih sistema:** osnovna teorijska i djelomično praktična znanja iz oblasti teorije informacija i komunikacija u obimu koji odgovara početnom kursu iz ovih oblasti i osnove informacijskih i IP mreža.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Informacija: Slučajni događaji. Definicija informacije, matematička interpretacija, svojstva informacije na sintatičkom, semantičkom i programskom nivou. Sadržaj informacije. Logika, sintaksa i semantika. Formalni sistemi, metode i tehnike. Izvori informacija i vrste. 2. Diskretni izvori informacije: količina informacije, entropija. Svojstva entropije. Entropija kontinualnog izvora. Uslovne entropije, uzajamna količina informacije. Izvori sa memorijom - izvori Markova, ergodični izvori. Entropija izvora Markova, izvori višeg reda. 3. Kodiranje izvora: osnovni pojmovi, prefiksni kodovi, Kraftova nejednakost. Statističko kodiranje. Optimalno statističko kodiranje, kodiranje proširenog izvora. Prvi Shannonov teorem. Shannon-Fano kod, Huffmanov kod. 4. Statistički model kanala: diskretni kanal, osnove zaštitnog kodiranja. Shannonov teorem o kodiranju. 5. Signali: pojam, podjela. Deterministički signali: obrada signala u frekvencijskom domenu. Fourierov red. Fourierova transformacija. 6. Slučajni procesi: Autokorelaciona fukcija. Spektralna gustina snage. Signali šumova. Gaussov šum.		

	7. Kontinualni kanal: pojam, kontinualni kanal sa aditivnim Gaussovim šumom, kapacitet kanala. 8. Analogno digitalna konverzija: Diskretni prikaz kontinualnog signala. Kvantiziranje po amplitudi. PCM. 9. Specifičnosti prenosa digitalnih signala: model telekomunikacijskog sitema, prenos u osnovnom opsegu učestanosti.. 10. Specifičnosti prenosa digitalnih signala u trensponovanom opsegu učestanosti: linearne digitalne modulacije: ASK. FSK. PSK. QAM. Višestruki pristup. 11. Mreže: Informacijska mreža. Telekomunikacijska mreža. Obilježja mreža. OSI i IP modeli mreža. 12. Internet mreže: IP protokol. Familija protokola TCP/IP. IP adresiranje. 13. Internet komunikacije: principi, napredne Internet aplikacije i tehnike komuniciranja, organizacija web-a. 14. Telekomunikacijske mreže: podjela, specifičnosti žičnih i bežičnih mreža. Kvalitet servisa u mrežama QoS. 15. Napredne telekomunikacijske tehnike i višestruki pristup: raširenI spektar, sistemi sa više nosilaca.
Ishodi učenja:	Znanje: osnovna teorijska i djelomično praktična znanja iz oblasti teorije informacija i komunikacija u obimu koji odgovara početnom kursu iz ovih oblasti i osnove informacijskih i IP mreža. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti savremenih digitalnih telekomunikacijskih sistema. Kompetencije: Sposobnosti samostalnog analiziranja osnovnih parametara relevantnih za teoriju informacija, dizajniranje i analiziranje sistemske karakteristike diskretnog i kontinualnog kanala, sposobnost korištenja osnovnih analitičkih metode u analizi informacijskih i IP mreža.
Ciljevi održivog razvoja (SDGs)	SDG4 – Kvalitetno obrazovanje SDG5 – Rodna ravnopravnost SDG9 – Industrija, inovacije i infrastruktura SDG17 –Partnerstvom do ciljeva
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi i laboratorijskih vježbi. 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 princip uz prikaz opisnih primjera i rješavanje određenih zadataka. Dodatni primjeri se razmatraju i rješavaju kroz vježbe i laboratorijske vježbe, što omogućava kontinuiran rad i pripremu za samostalno rješavanje problema. Rad na domaćoj zadaći/seminarskom radu/ praktičnom radu ima za cilj razvijanje vještina individualnog i timskog rada, te organizacije i realizacije praktičnog projekta.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta vrši se na sljedeći načinu: – Zadaća: 0 do 15 bodova (%); – I parcijalni ispit: 0 do 35 bodova (%); – Završni ispit: II parcijalni (0 do 50 bodova (%)) i/ili popravni I parcijalni (0 do 35 bodova (%)); Završni ispit se organizuje kao pismeni i/ili 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 I parcijalnom i završnom (II parcijalnom) dijelu ispita, a dovoljan uslov je da suma ostvarenih bodova (zadaća/praktični rad + I parcijalni + II parcijalni) bude 55. Zadaća se realizira kroz izradu domaće zadaće i polaganje kvizova ili izradu praktičnog rada Postignuti bodovi na kvizovima i dostavljenoj zadaći nemaju mogućnost popravljanja. Za studente koji nisu uspješno okončali I 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.
Literatura:	Obavezna: 3. Bilješke i slajdovi s predavanja 4. K. Suruliz i M. Hadžialić, Statistička teorija telekomunika- cija, Elektrotehnički fakultet u Sarajevu, 2009, ISBN 978-9958-629-27-3. 5. B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, New York 998. Dopunska: 1. V. Sinković, Informacijske mreže, Školska knjiga, Zagreb, 1994. 2. Bažant i dr, Osnovne arhitekture mreža, Element, 2004. 3. M. Schwartz, Telecommunications Network: Protocols, Modelling and Analysis, Adisson-3. Wesley PC, Reading, Massachusetts, 1987. 4. J. F. Kurose, K.W. Ross, Internet and Communication Networks, Mc Graw-Hill, 2003.

Šifra predmeta: 16TRWOS010204	**Naziv predmeta: ŠINSKA VOZILA**		
Ciklus: I	**Godina: II**	**Semestar: IV**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminar 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:	Sticanje znanja iz oblasti šinskih vozila u željezničkom saobraćaju, te praktična primjena šinskih vozila u suvremenom transportu putnika i roba.		
Tematske jedinice:	1. Uvod – osnovni pojmovi željezničkog saobraćaja 2. Klasifikacija željezničkih vozila 3. Karakteristike tipova vuče 4. Komparativne prednosti pojedinih tipova vuče 5. Diesel – motorna vučna vozila 6. Prijenosnici snage 7. Elektromotorna vučna vozila 8. Regulacija vučnih elektromotora		

	9. Vučena vozila 10. Teretna kola 11. Putnička kola 12. Kočioni uređaji šinskih vozila 13. Motorni vozovi i ostala željeznička vozila 14. Nove koncepcije šinskih vozila 15. Tendencije u razvoju šinskih vozila u Europi i svijetu
Ishodi učenja:	Znanje: Predmet Šinska vozila pruža studentima znanja o klasifikaciji i karakteristikama željezničkih vozila, metodologiji njihovog izbora prema potrebama prevoza i postrojenja, te uvod u savremene trendove razvoja vozila Vještine: Studenti stječu praktične vještine kroz rad na terenu i vježbe, primjenjujući stečena znanja na realne probleme. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 3 - Osigurati zdravlje i blagostanje za sve ljude u svim uzrastima, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje, 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 i seminarskih radova. 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:	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/popravnom 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. Gačanin, E., Šinskavozila – skripta, Saobraćajni fakultet, Sarajevo, 2008. 2. dalla Chiara B., Gačanin, E., Railway Transport Systems – Improving capacity through innovation and automation, politecnico di Torino, Torino (Italija), FakultetzasaobraćajikomunikacijeSarajevo, (Bosna i Hercegovina), University of Southampton, Southampton (United Kingdom) 2004. 3. Dinić, D., Željeznička električna vozila, Saobraćajni fakultet, Beograd Dopunska: 1. Pajić, D., Vučna vozila, Zavod za novinsko-izdavačku djelatnost, Beograd 2. Valter, Z., Dizel električne lokomotive, Zagreb 3. Vainhal, V., Kočnice i kočenje vozova, Beograd

Šifra predmeta: 17TRWOS010204	**Naziv predmeta: TEORIJA SAOBRAĆAJNIH TOKOVA**		
Ciklus: I (prvi)	**Godina:** II (druga)	**Semestar: I**V (četvrti)	**Broj ECTS kredita:** 6 (šest)

Status: obavezni 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:	Obavezno je prisustvo i aktivnost na predavanjima i vježbama, te izrada seminarskog rada i zadataka za samostalne vježbe
Cilj (ciljevi) predmeta:	Nastavna materija koja je obuhvaćena sadržajem, treba da omogući studentima upoznavanje sa osnovama Teorije saobraćajnog toka i sa osnovnim metodama saobraćajno – tehničkog proračuna. Cilj je da se studentima pruži teorijska i stručna osnova za dimenzioniranje saobraćajne infrastrukture, što pretstavlja nezaobilazan segment u saobraćajnom planiranju.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Predmet i zadaci teorije saobraćajnog toka Tehnička baza cestovnog saobraćaja 2. Osnovi trasiranja i projektovanja cestovnih saobraćajnica 3. Kretanje pojedinačnog vozila Definisanje parametara saobraćajnog toka 4. Karakteristika saobraćajnih tokova Teorijske relacije između osnovnih parametara saobraćajnog toka. Karakteristične vrijednosti osnovnih parametara saobraćajnog toka. 5. Empirijski modeli međuzavisnosti osnovnih parametara saobraćajnog toka 6. Matematički modeli u opisivanju zakonitosti kretanja vozila u saobraćajnim tokovima na putevima 7. Monitoring i kontrola cestovnih saobraćajnih tokova 8. Pješački tokovi 9. Kapacitivna analiza i dimenzioniranje dijelova saobraćajne mreže pri vladajućim uslovima odvijanja saobraćaja 10. Robni i putnički tokovi na željeznici 11. Pruge i pružna postrojenja, lokomotive, željeznička kola, rad željezničke mreže i definiranje propusne i prijevozne moći željezničke pruge 12. Obrt kola i brzine u željezničkom saobraćaju, rad lokomotiva,obrt lokomotiva, potreban broj lokomotiva, grafikoni saobraćaja vozova. 13. Planiranje kapaciteta u zračnom saobraćaju, eksploatacija zrakoplova, linije zračnog saobraćaja, izvršenje prevoznog procesa, eksploatacija zračnih puteva. 14. Saobraćajni tokovi na aerodromima 15. Modeli za ocjenu potražnje za zračnim prevozom, modeli raspodjele putovanja, multimodalni modeli, frekvencija letenja, vremenski gubici, usaglašavanje prevoznih kapaciteta i putničkih zahtjeva, raspodjela saobraćaja na mrežu.
Ishodi učenja:	Studenti kroz nastavni proces predavanja, vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti planiranja saobraćajne infrastrukture i njenog usklađivanja sa potražnjom, odnosno dostignutim i budućim potrebama u različitim vidovima saobraćaja. Predmet Teorija saobraćajnih tokova treba da osigura potreban nivo znanja o pravilima, metodama i postupcima za

	praćenje i utvrđivanje zakonitosti kretanja vozila u saobraćajnim tokovima.Također predmet omogućava sticanje znanja i vještina neophodnih za praćenje i upravljanje saobraćajnim tokovima sa ciljm edukacije u oblasti usklađivanja postojeće i planirane infrastrukture sa zahtjevima savremenog saobraćaja.
Cilj održivog razvoja (SDG):	Specifični ciljevi održivog razvoja koji se mogu povezati sa silabusom predmeta su: – SDG 9: Industrija, inovacije i infrastruktura – SDG 11: Održivi gradovi i zajednice – SDG 13: Klimatske promjene **SDG 9: Industrija, inovacije i infrastruktura** Podcilj 9.1 govori o razvoju održive, pouzdane i prilagodljive infrastrukture, uključujući transportnu. Održivi saobraćaj podrazumjeva efikasne sisteme saobraćajnog toka kako bi se smanjila gužva i emisija štetnih gasova. Teorija saobraćajnog toka proučava kako protok vozila utječe na saobraćajnu infrastrukturu i kako se može poboljšati efikasnost. Primjena teorije saobraćajnog toka može pomoći u boljem dizajnu saobraćajnica i u optimizaciji protoka vozila, što direktno doprinosi održivom transportu i smanjenju zagađenja, kao što je navedeno u ciljevima održivog razvoja. **SDG 11: Održivi gradovi i zajednice** Podcilj 11.2 ističe potrebu za sigurnim, pristupačnim i održivim transportnim sistemima, sa posebnim naglaskom na proširenje javnog prevoza. Optimizacija saobraćajnih tokova može povećati kapacitet i smanjiti zagušenja u javnom prevozu, čime se poboljšava efikasnost i sigurnost. Teorija saobraćajnog toka može pomoći u boljoj organizaciji saobraćajnih režima, kao što su kružni tokovi ili prilagodljivi semafori, što doprinosi smanjenju gužvi i zagađenja, omogućavajući održiv transport. **SDG 13: Klimatska akcija** Podcilj 13.2 poziva na integrisanje mjera za klimatske promjene u nacionalne politike i strategije, uključujući saobraćaj. Teorija saobraćajnog toka doprinosi smanjenju emisije štetnih gasova putem optimizacije saobraćajnih tokova i smanjenja zastoja u saobraćaju, čime se smanjuje i uticaj transportnog sektora na klimatske promjene. Teorija saobraćajnog toka može biti alat koji se koristi za unapređenje održive urbane mobilnosti, smanjenje emisije gasova i unapređenje kvaliteta života u urbanim sredinama, u skladu sa ciljevima održivog razvoja.
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 dobivanje potpisa i ovjeru semestra uz max. 20% 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**, stim 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. Kuzović Lj.: Teorija saobraćajnog toka, Građevinska knjiga, Beograd, 1987. 2. Kuzović Lj.,Bogdanović V.: Teorija saobraćajnog toka,FTN Izdavaštvo N. Sad, 2010. 3. Kovačević P.: Eksploatacija željeznica, Zavod za novinsko-izdavačku i propagandnu djelatnost JŽ, Beograd, 1986. 4. Kiso Fahrudin., Kiso Fadila: Aerodromi, Fakultet za saobraćaj i komunikacije Sarajevo, 2000. 5. Teodorović D.: Modeli u vazdušnom transportu, Saobraćajni fakultet Beograd, 1988. 6. Kiso F.: Tokovi u željezničkom saobraćaju, Predavanja skripta, 2009. 7. Kiso F.: Tokovi u zračnom saobraćaju, Predavanja skripta, 2012. 8. Mussone L.: Instrumenti za monitoring cestovnih saobraćajnih tokova, Education and Culture TEMPUS , Sarajevo 2004. 9. Highway Capacity Manual 2010, Transportation Research Board, National Research Council, WashingtonD.C.,2010.

Šifra predmeta: 18TRWOS010204	**Naziv predmeta: MATERIJALI I ROBE U TRANSPORTU**		
Ciklus: I	**Godina: II**	**Semestar: IV**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 60 Vježbe: 30	
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 „Materijali i robe u transportu“ je sticanje znanja o tehničko-tehnološkom, ekonomsko-komercijalnom i transportnom		

	aspektu izučavanja nauke o materijalima; klasifikacija, standardizacija i identifikacija proizvoda; Sticanje znanja o novom konceptualnom pristupu kvaliteta materijala, roba i usluga kroz upoznavanje i razradu pojmova; Upoznavanje sa osnovnim karakteristikama materijala za tehniku transporta i materijala koji se pojavljuju kao roba u transportu, sa ciljem očuvanja njihove upotrebne vrijednosti u svim fazama transportnog procesa.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod. Osnovni pojmovi o materijalima i robama. Transportni aspekt 2. Podjela i klasifikacija materijala, roba i usluga 3. Opći pojmovi o standardizaciji i srodnim djelatnostima (akreditiranje, certificiranje, ispitivanje, mjeriteljstvo, kalibriranje) 4. Kvalitet proizvoda i kontrola kvaliteta. Osnove i principi evropske transportne politike u funkciji kvaliteta 5. Tehničko - tehnološki elementi kvaliteta materijala, roba i usluga 6. Ekonomsko - komercijalni elementi kvaliteta materijala, roba i usluga 7. Metode utvrđivanja kvaliteta materijala i roba 8. Označavanje i identifikacija materijala i roba. Dokumenti za robu u transportu 9. Okrupnjavanje, ambalaža i pakovanje materijala i roba 10. Materijali za tehniku transporta: podjela, osobine, kontrola 11. Metodologija izbora materijala za tehniku transporta 12. Materijali kao roba u transportu-transportujući materijali 13. Podjela i osobine transportujućih roba: opasne materije, rasuti tereti, žive životinje 14. Zvanične kontrole transportujuće robe 15. Zaključna razmatranja
Ishodi učenja:	Znanje: Predmet proučavanja treba da osigura nivo kompetencija i znanja potrebnih za rješavanje konkretnih problema u oblasti transporta roba i materijala. Teorijska i praktična znanja iz oblasti materijala i roba u transportu. Također, predviđeni program treba da ukaže na naučni pristup problemima transporta različitih materijala i roba. Vještine: Razvijene sposobnosti primjene teorijskih i praktičnih znanja iz oblasti ponašanja roba i materijala u transportu. Kompetencije: Razvijene sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti ponašanja roba i materijala u transportu.
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:	Nastava se realizira kroz **usmeno iznošenje sa prezentacijom (ex katedra)** i prikazom različitih procesa iz oblasti ponašanja roba i materijala u tranasportu uz **korištenje video i audio zapisa**, te **samostalno izlaganje** pojedinih konkretnih problema u oblasti identifikacije proizvoda. **Iniciranje rasprava i diskusija** sa studentima o problemima iz prakse, pojedinačnih zapažanja iz različitih okruženja, izrada samostalnih istraživanja i analiza iz oblasti ponašanja roba i materijala u transportu.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: 7. Domaća zadaća/seminarski rad/praktični rad/ max 15 bodova (%), položeno ako se osvoji preko 50 % 8. I Parcijalni ispit/test/provjera znanja / max 35 bodova (%), položen je ako se osvoji preko 50 % 9. Završni ispit - pismeni 20 bodova 10. Završni ispit - usmeni 30 bodova 11. Završni ispit (Integralni) - pismeni - 40 bodova 12. Završni ispit (Integralni) - Usmeni - 45 bodova **Da bi student položio ispit mora položiti usmeni dio ispita.** 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 - obavezno se vodi evidencija. Prisustvo nastavi i vježbama se ne boduje. Zadaća/Seminarski/Praksa/.....max 15 bodova I Parcijalni ispit/Test/Provjera znanja/..... max 35 bodova Završni ispit - pismeni ..... max 20 bodova Završni ispit - usmeni ..... max 30 bodova Završni ispit (Integralni) - pismeni..... max 40 bodova Završni ispit (Integralni) - usmeni..... max 45 bodova Završni ispit se organizuje na način da studenti koji su položili prvu provjeru znanja polažu samo završni dio ispita (II dio gradiva), dok studenti koji nisu položili prvu provjeru znanja zajedno sa završnim polažu i prvi parcijalni ispit (I dio gradiva). Ispit se polaže pismeno i usmeno. Navedena skala se usvaja prema Pravilima studiranja na Univerzitetu u Sarajevu. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati. Student može, u opravdanim slučajevima (bolest) odsustvovati sa nastave, za što je obavezan dostaviti zdravstveno opravdanje. Seminarski rad i domaća zadaća će biti bodovane samo ako budu predane prema definisanim terminima. Naknadne predaje istih neće se bodovati.
Literatura:	Obavezna: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. BERKOVIĆ, M.: skripta predavanja, „Materijali i robe u transportu, Univerzitet u Sarajevu - Fakultet za saobraćaj i komunikacije, 2024. godine. 3. BEHMEN, A., SALIHOVIĆ, S., Materijali i robe u transportu, Knjiga I - klasifikacija, standardizacija, identifikacija, Fakultet za saobraćaj i komunikacije Sarajevo, 2007. 4. BEHMEN, A., SALIHOVIĆ, S., Materijali i robe u transportu, Knjiga II – kvalitet: osnove, principi, kontrola, Fakultet za saobraćaj i komunikacije Sarajevo, 2008. 5. ŠPAGNUT, D., Tehnološke osobine roba u transportu, Saobraćajni fakultet, Beograd, 1989. 6. DŽANIĆ, H., Tehnologija materijala u prometu, Fakultet prometne znanosti, Zagreb, 1989. 7. DŽANIĆ, H., Tehnologija materijala za prometnu tehniku, Fakultet prometne znanosti, Zagreb, 1995. 8. ŠTRUMBERGER, N., Tehnologija materijala, Fakultet prometne znanosti, Zagreb, 1996.

	9. Međunarodni/evropski Pravilnici o prijevozu opasnih materija:RID, ADR, IATA, IMDG, AND 10. BAS/EN/ISO/IEC standardi Dopunska: 1. Grupa autora: TRANSPORT OPASNIH MATERIJA, Univerzitet u Sarajevu Fakultet za saobraćaj i komunikacije, 2023.

Šifra predmeta: 19-20-1TRWES010204.	**Naziv predmeta: LOGISTIČKI SISTEMI**		
Ciklus: I	**Godina: II**	**Semestar: IV**	**Broj ECTS kredita:** 6
Status: izborni predmet		**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 cilj izbornog predmeta „Logistički sistemi“ je sticanje i ovladavanje osnovnim teoretskim znanjima o logističkim sistemima u saobraćaju i transportu, te primjena tih znanja na vježbama i izradi samostalnih seminarskih radova; Sticanje znanja o ulozi i funkciji logističkih sistema u modernoj ekonomiji te razrada tehničkih pojmova; Upoznavanje sa osnovnim karakteristikama logističkih sistema u fazama planiranja, provedbe i kontrole efikasnih tokova i skladištenja roba, usluga i povezanih informacija od mjesta porijekla do tačke potrošnje kako bi se zadovoljili zahtjevi kupaca.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Uvod u „logističke sisteme“. Pojam, struktura i misija logističkog sistema, trendovi 2. Osnovni koncept logistike i distribucije, struktura opšteg i univerzalnog logističkog sistema 3. Robni i informacijski tokovi logističkog lanca. Kanali distribucije, Operacije i upravljanje lancem opskrbe 4. Osnovne karakteristike i funkcije logističkih sustava Modaliteti upravljanja robnim tokovima u logističkim sistemima 5. Logističke mreže. Funkcijski (pod) sistemi logističkog sistema 6. Skladišta u logističkoj mreži. Skladišno logistički sistemi. Pojam i misija skladišne logistike 7. Pojam, funkcija i misija informacijsko logističkog sistema 8. Pojam saobraćajno logistički sistemi, struktura, misija i upravljanje saobraćajno logističkim sistemima		

	9. Manipulacijsko logistički sistemi. Upravljanje zalihama. Kontrola logističkog sistema 10. Skladišni infomacijski sistemi i upravljanje skladišno logističkim sistemima 11. Pojam i značaj distribucijsko logističkih sistema. Projektiranje distribucijskog sistema 12. Analiza logističkog sistema. Fizički internet. Struktura, misija i upravljanje logističko distribucijskim sistemima 13. Pojam, obilježje, struktura i misija obrazovno logističkih sistema 14. Sistemi logističko poslovnih usluga. Sistemi pravnih, računovodstvenih, tržišnih i ostalih poslovnih djelatnosti logistike 15. Zaključna razmatranja
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, seminarski rad i praktičan rad trebaju steći odgovarajuća znanja i iskustva u oblasti logističkih sistema. Predmet proučavanja treba da osigura kritičan nivo kompetencija i znanja potrebnih za rješavanje konkretnih problema u oblasti logističkih sistema. Također, predviđeni program treba da ukaže na naučni pristup problemima logističkih sistema; Vještine: Razvijene sposobnosti primjene teorijskih i praktičnih znanja iz oblasti logističkih sistema; Kompetencije: Razvijene sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti logističkih sistema.
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:	Nastava se realizira kroz izvođenje predavanja i vježbi. Predavanja se realizuju kroz usmeno izlaganje sa prezentacijom (ex katedra) i prikazom primjera. Inicira diskusija o problemima upravljanja i organizacije logističkim sistemima. Studenti će biti obavezni izraditi i prezentirati seminarske radove. U realizaciji nastave se koriste različite metode koje uključuju: usmeno izlaganje i diskusije, demonstracije primjera, metoda video prikaza i potenciranje samostalnog rada primjenom odgovarajućih metodoloških pristupa.
Metode provjere znanja sa strukturom ocjene:	Kriterijum praćenja rada i ocjenjivanja studenta u toku nastave i to prema sljedećem načinu: Domaća zadaća/seminarski rad/praktični rad/ max 15 bodova (%), položeno ako se osvoji preko 50 %. I Parcijalni ispit/test/provjera znanja / max 35 bodova (%), položen je ako se osvoji preko 50 %. Završni ispit - pismeni 20 bodova

	Završni ispit - usmeni 30 bodova Završni ispit (Integralni) - pismeni - 40 bodova Završni ispit (Integralni) - Usmeni - 45 bodova Da bi student položio ispit mora položiti usmeni dio ispita. 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 - obavezno se vodi evidencija. Prisustvo nastavi i vježbama se ne boduje. Zadaća/Seminarski/Praksa/.....max 15 bodova I Parcijalni ispit/Test/Provjera znanja/.....max 35 bodova Završni ispit - pismeni .....max 20 bodova Završni ispit - usmeni .....max 30 bodova Završni ispit (Integralni) - pismeni.....max 40 bodova Završni ispit (Integralni) - usmeni.....max 45 bodova Završni ispit se organizuje na način da studenti koji su položili prvu provjeru znanja polažu samo završni dio ispita (II dio gradiva), dok studenti koji nisu položili prvu provjeru znanja zajedno sa završnim polažu i prvi parcijalni ispit (I dio gradiva). Ispit se polaže pismeno i usmeno.

	Navedena skala se usvaja prema Pravilima studiranja na Univerzitetu u Sarajevu. Napomena: Studenti su obavezni prisustvovati svim oblicima nastave minimalno 80 % od ukupnog fonda sati. 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.
Literatura:	Obavezna: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. Berković, M.: skripta predavanja, „Logistički sistemi, Fakultet za saobraćaj i komunikacije, 2024. godine, 3. Berković, M.: skripta predavanja, „Logistika u saobraćaju i komunikacijama, Fakultet za saobraćaj i komunikacije, 2024. godine. Dopunska: 1. Perišić, R., Sistem kvaliteta usluga, logistika i informatika, Institut tehničkih nauka SANU, Beograd, 2002. 2. Zelenika, R., Prometni sustavi, Tehnologija-organizacija-ekonomika-logistika-menadžment, Sveučilište u Rijeci 2001. 3. Zelenika, R., Temelji logističke špedicije, Knjiga prva, Sveučilište u Rijeci 2005.

Šifra predmeta: 19-20-2TRWES010204	**Naziv predmeta: ŠPEDITERSKO POSLOVANJE**		
Ciklus: I	**Godina: II**	**Semestar: IV**	**Broj ECTS kredita:** 6
Status: Izborni 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:	Sticanje potrebnih znanja iz oblasti špedicije u funkciji usvajanja osnovnih postupaka, tehnika i procedura za organizaciju vanjskotrgovinskog prometa i robnih transportnih tokova		
Tematske jedinice:	1. Osnovne značajke špedicije i špeditera		

(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)	2. Funkcije špedicije u vanjskotrgovinskom prometu 3. Vrste špedicije 4. Međunarodna špedicija kao sistem 5. Stručne organizacije za međunarodnu špediciju 6. FIATA dokumenta 7. Osnovni poslovi međunarodnog špeditera 8. Instradacija 9. Pravni položaj špeditera u carinskom postupku 10. Transportno osiguranje 11. Specijalni poslovi međunarodnog špeditera 12. Pravni položaj špeditera u svijetu i BiH 13. Obaveze, prava i odgovornosti špeditera iz ugovora o špediciji 14. Incoterms termini 15. Uloga špeditera u primjeni Incoterms-a
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe i praktičan rad stiču odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti vanjskotrgovinskog prometa i špediterskog poslovanja. Vještine: Aplikacijom stečenih znanja, student će biti osposobljen za oblikuje, organizira i realizira međunarodne robne tokove i obavlja sve zadatke iz područja logističke špedicije. 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,
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 i seminarskih radova. Case Study, Workshop.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Domaća zadaća: od 0 do 5 bodova, položeno ako se osvoji preko 50%

	Seminarski rad / projektni zadatak: od 0 do 10 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 (%) Domaća zadaća:.....5 bodova (%) Seminarski / Projektni zadatak:..... 10 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 (domaća zadaća): 2,5 bodova - Aktivnost (seminarski rad / projektni zadatak): 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. Zelenika, R., Međunarodna špedicija, Ekonomski fakultet, Rijeka, 1996. 2. Zelenika, R., Temelji logističke špedicije, Ekonomski fakultet, Rijeka, 2005. 3. F.Jašarević, V.Peulić, Logistika i špedicija, Banja Luka 2005. Dopunska: 1. Ivaković, Č., Stanković, R., Šafran, M., Špedicija i logistički procesi, Fakultet prometnih znanosti, Zagreb, 2010. 2. Kilibarda,M.J., Špedicija i agencijsko poslovanje, Saobraćajni fakultet Beograd, 2009. 3. Mađarić, J., Međunarodna špedicija, Fakultet promrtnih znanosti, Zgreb, 1991. 4. M.Kilibarda, M.Andrejić, V. Pajić , Špedicija i međunarodna logistika, Beograd 2022 5. M.Kilibarda, M.Andrejić, V. Pajić, Praktikum iz špedicije

Šifra predmeta: 19-20-3TRWES010204	**Naziv predmeta: VERTIKALNI TRANSPORT**		
Ciklus: I	**Godina:** II	**Semestar: IV**	**Broj ECTS kredita:** 6

<table>
<tr><td colspan="2">Status: Izbornı predmet</td><td>Ukupan broj sati: 90
Opciono razraditi distribuciju sati po tipu:
Predavanja 45
Vježbe 45</td></tr>
<tr><td>Učesnici u nastavi:</td><td colspan="2">Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet</td></tr>
<tr><td>Preduslov za upis:</td><td colspan="2">Ne</td></tr>
<tr><td>Cilj (ciljevi) predmeta:</td><td colspan="2">Sticanje edukacijskih oblika u realizaciji programa iz oblasti izbora, upravljanja i modernizacije vertikalnog transporta.</td></tr>
<tr><td>Tematske jedinice:
(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)</td><td colspan="2">
<table>
<tr><td>R.b.</td><td>Nastavne cjeline</td><td>Broj sati (P+V)</td></tr>
<tr><td>1.</td><td>Vrste uređaja vertikalnog transporta</td><td>(3+3)</td></tr>
<tr><td>2.</td><td>Podjela liftova</td><td>(3+3)</td></tr>
<tr><td>3.</td><td>Liftovi sa vučom čeličnom užadi</td><td>(3+3)</td></tr>
<tr><td>4.</td><td>Sporohodni, brzohodni i ekspres liftovi</td><td>(3+3)</td></tr>
<tr><td>5.</td><td>Teretni liftovi</td><td>(3+3)</td></tr>
<tr><td>6.</td><td>Fasadni liftovi</td><td>(3+3)</td></tr>
<tr><td>7.</td><td>Hidraulični liftovi</td><td>(3+3)</td></tr>
<tr><td>8.</td><td>Pogon hidrauličkih liftova</td><td>(3+3)</td></tr>
<tr><td>9.</td><td>Proračun hidrauličkih liftova</td><td>(3+3)</td></tr>
<tr><td>10.</td><td>Pokretne stepenice</td><td>(3+3)</td></tr>
<tr><td>11.</td><td>Žičare</td><td>(3+3)</td></tr>
<tr><td>12.</td><td>Platforme</td><td>(3+3)</td></tr>
<tr><td>13.</td><td>Održavanje, servisiranje i atestiranje liftova</td><td>(3+3)</td></tr>
<tr><td>14.</td><td>Modernizacija liftova</td><td>(3+3)</td></tr>
<tr><td>15.</td><td>Evropske direktive o liftovima</td><td>(3+3)</td></tr>
</table>
</td></tr>
<tr><td>Ishodi učenja:
(Znanje; vještine; kompetencije)</td><td colspan="2">Studenti kroz nastavni proces predavanja, vježbe, i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti projektovanja, izbora, upravljanja i održavanja sredstava vertikalnog transporta.</td></tr>
<tr><td>Cilj održivog razvoja (SDG):</td><td colspan="2">Za predmet "Vertikalni transport" ciljevi i podciljevi održivog razvoja (SDG) su:

Cilj 7: Osigurati pristup pouzdanoj, održivoj i suvremenoj energiji po pristupačnim cijenama za sve

Cilj 9: Izgraditi izdržljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost

Cilj 11: Učiniti gradove i naselja inkluzivnim, sigurnim, prilagodljivim i održivim</td></tr>
</table>

	Povezanost ovih ciljeva s predmetom "Vertikalni transport" ogleda se u potrebi za razvojem i održavanjem vertikalnih transportnih sistema koji su energetski efikasni, sigurni, i pristupačni za sve korisnike, dok istovremeno podržavaju šire ciljeve održivog urbanog razvoja i infrastrukture.
Metode izvođenja nastave:	Predavanja, vježbe i izrada seminarskog rada sa praktičnim osvrtom.
Metode provjere znanja sa strukturom ocjene:	Kriterijum vrednovanja rada i ocjenjivanja studenta u toku nastave, vrši se na sljedeći način: Prisustvo nastavi i vježbama od 0 – 10 bodova (%); Domaća zadaća/seminarski rad/praktični rad/ od 0 do 10 bodova (%); I parcijalni ispit/I test/ I provjera znanja/ od 0 do 15 bodova (%); II parcijalni ispit/II test/ II provjera znanja / od 0 do 20 bodova (%). Ukupan broj bodova (%) koji studenta prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 55 bodova (%). Završni ispit iznosi najviše 45 bodova odnosno 45 (%). Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave.
Literatura:	Obavezna: 1. Šelendić B., Vertikalni, kosi i horizontalni transport, Delta pres, Beograd 1973. 2. Strakosch G., Vertical transportation, New Jersey, 2010. Dopunska: 1. Evropske norme EN 81, EN 115. 2. Naredbe i Pravilnici o liftovima

Šifra predmeta: 21TRWOS010305	**Naziv predmeta: TEHNOLOGIJSKI MARKETING**		
Ciklus: I	**Godina: III**	**Semestar: V**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja: 60 Vježbe, Seminari i projektni zadaci: 15 Laboratorijske vježbe/ Terenski rad/Praksa: 30	
Učesnici u nastavi	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		

Cilj (ciljevi) predmeta:	Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti tehnologijskog marketinga.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Saobraćaj kao oblast materijalne proizvodnje, pojmovno shvatanje saobraćaja. 2. Društvena podjela rada na transportnom tržištu. Marketing kao koncepcijska osnova tržišnog poslovanja. 3. Pojam, definicija i razvoj marketinga. Uloga i značenje marketinga u tržišnom poslovanju i formiranju poslovne politike saobraćajnih preduzeća, tehnologijski marketing. 4. Osnovni elementi marketing mixa u saobraćajnim preduzećima, dodatni instrumentarij tehnologijskog marketinga. 5. Karakteristike saobraćajnog tržišta kao osnove za formiranje poslovne politike saobraćajnih procesa. 6. Organizacija i metode utvrdivanja tržišnih elemenata za planiranje poslovne politike. Metode prognoziranja i planiranja poslovne politike saobraćajnih preduzeća. 7. Organizacija funkcije marketinga u saobraćajnim preduzećima. 8. Troškovi i cijene kao instrument marketing poslovne politike saobraćajnih preduzeća. 9. Odabir i upravljanje kanalima marketing funkcije u saobraćaju. 10. Upravljanje uslužnim poslovima i dodatnim uslugama. 11. Kreiranje strategije komunikacijskog i promocijskog marketinga. 12. Kreiranje programa direktnog marketinga u prometnim sistemima. Planiranje marketing funkcije u saobraćajnim preduzećima. 13. Organizacija i primjena marketing funkcije u saobraćajnim preduzećima. 14. Ocjenjivanje i kontrola izvršenja marketing funkcije u saobraćaju. 15. Razvijanje, testiranje i lansiranje novih usluga u saobraćaju.
Ishodi učenja:	Znanje: Teorijska i praktična znanja iz oblasti tehnologijskog marketinga u saobraćaju. 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 tehnologijskog marketinga u saobraćaju. Kompetencije: Sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti tehnologijskog marketinga u saobraćaju.
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”; SDG8 – “Promovirati uključiv i održiv gospodarski rast, punu zaposlenost i dostojanstven rad za sve”;

	SDG9 – "Izgraditi prilagodljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost"; SDG10 – "Smanjiti nejednakost unutar i između država"; SDG11 - „Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim".
Metode izvođenja nastave:	Nastava se realizira kroz izvođenje predavanja, vježbi, laboratorijskih vježbi/terenskog rada/prakse/izrade workshopova. 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/worshopu 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/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, I. Bošnjak : Tehnologijski marketing u transportu i komunikacijama, Univerzitet u Sarajevu, Fakultet za saobraćaj i komunikacije, Sarajevo, 2011. 2. I. Bošnjak: Tehnologijski marketing, Fakultet prometnih znanosti, Zagreb, 1996. 3. P.Kotler: Upravljanje marketingom, Zagreb,2006. 4. B.Tihi : Istraživanje marketinga,Sarajevo,2007. 5. Š. Čekić, I. Bošnjak: Menadžment u transportu i komunikacijama, Fakultet za saobraćaj i komunikacije- Fakultet prometnih znanosti, Sarajevo-Zagreb, 2000. 6. Grupa autora- B.Tihi: Osnovi marketinga, Sarajevo,1999.

Šifra predmeta: 22TRWOS010305	**Naziv predmeta: INTELIGENTNI TRANSPORTNI SISTEMI**		
Ciklus: I	**Godina: III**	**Semestar: V**	**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:	NE
Cilj (ciljevi) predmeta:	Sticanje znanja i vještina potrebnih u realizaciji programa iz područja inteligentnih transportnih sustava, analiza učinka ITS funkcionalnosti na promjene parametara stanja klasičnog prometnog sustava. Korištenje ITS funkcionlanosti u upravljanju prometnim procesima.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1.Definiranje osnovnih pojmova i uloge ITS-a 2. Znanstveno-tehnološki okvir razvoja ITS-a 3. Umjetna inteligencija u sustvu ITS-a 4. Mjerenje učinka i koristi ITS-a 5. Arhitektura ITS-a 6. Europska arhitektura ITS-a 7. Inteligentna vozila 8. Itteligentna transportna infrastruktura 9. Inteligentni terminali 10. Inteligentni teret i transportna oprema 11. Standardizacija Funkcionalnih područja ITS-a 12. Komunikacijske tehnologije u sustavu ITS-a 13. Digitalizacija transporta 14. Planiranje i upravljanje razvojem sustav ITS-a 15. Sigurnost i zaštita sustava ITS-a
Ishodi učenja:	Znanje: Predmet Inteligentni transportni sustavi treba osigurati potreban nivo znanja o tehnologijama, funkcijama i učnicima ITS-a, metodama njihovog planiranja, razvoja i implementacije. Vještine: Predmet ITS omogućava stjecanje vještina neophodnih za mjerenje, analizu i procjenu učinkovitosti, sigurnosti, utjecaja na okoliš i ekonomskih koristi od implementacije sevisa ITS-a. Kompetencije: Studenti kroz nastavni proces predavanja, vježbe, i seminarski rad trebaju steći odgovarajuće kompetencije za dizajniranje, razvoj i upravljanje inteligentnim transportnim sustavima.
Cilj održivog razvoja (SDG):	"SDG3 – Zdravlje i blagostanje"; "SDG 9 Industrija, inovacije i infrastruktura ", „SDG11- Održivi gradovi i zajednce", „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. Ezgeta,D.: Inteligentni transportni sustavi, Fakultet za saobraćaj i komunikacije univerziteta u Sarajevu, Sarajevo, 2018.

	2. Bošnjak, I. : Inteligentni transportni sustavi, Sveučilište u Zagrebu, Fakultet prometnih znanosti , Zagreb, 2006. Dopunska: 1. Ghosh, S., Lee, T.: Inteligent Transportation Systems- New Principels and Architectures, CRC Press, London, 2000. 2. Miles, J. Chen, K.: ITS Handbook, 2nd edition, PIRAC, 2004. 3. Meng Lu:Evaluation of Intelligent Road Transport Systems – Methods and Results. Institution of Engineering and Technology, London.2016. 4. Meneguette , R.I., De Grande, R., Loureiro ,A. F.: Intelligent Transport System in Smart Cities, Springer, Ontario, 2018. 5. Sładkowski , A.: Wiesław Pamuła:Intelligent Transportation Systems – Problems and Perspectives, Springer, Katowice, 2016. 6. Perallos , A.:Intelligent transport systems – technologies and applications. Wiley & Sons, Bilbao,2016. 7. Chow, Y.J.:Informed urban transport systems, Elsever, Amaterdam, 2018. 8. Dimitrakopoulos , G., Uden,L.: The Future of Intelligent Transport Systems, Elsever, Amaterdam, 2020.

Šifra predmeta: 23TRWOS010305	**Naziv predmeta:** **INFRASTRUKTURA ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: I	**Godina: III**	**Semestar: V**	**Broj ECTS kredita: 6**
Status: Obavezni 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**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje osnovnih teorijskih znanja potrebna iz oblasti željezničke infrastrukture: osnovni građevniski elementi željezničke infrastrukture i vrste željezničke infrastrukture. Kontaktne mreže, signalizacija i komunikacijski uređaji koji se koriste za upravljanje i eksploataciju željezničkom infratsrukturom. Direktive Europske unije i interoperabilnost kao i domaća legislativa i regulatorna tijela.		

Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Građevinski elementi željezničke infrastrukture – I dio: Razvrstavanje pruga prema broju kolosijeka i prema širini kolosijeka. Parametri koji utječu na željeznički kolosijek.. 2. Građevinski elementi željezničke infrastrukture – II dio: Glavni dijelovi željezničke pruge. Gornji stroj i donji stroj 3. Građevinski elementi željezničke infrastrukture – III dio: Dužina pruge i dužina kolosijeka. Nadvišenje vanjske šine u kružnoj krivini. Nagib pruge i šine. 4. Građevinski elementi željezničke infrastrukture – IV dio: Vrste željezničkih pragova. Kolosiječni pričvrsni pribor i spojni pribor. Nasipi, usjeci i tuneli. 5. Građevinski elementi željezničke infrastrukture – V dio: Propusti i željezničke stanice. Ukrsnice i mimoilaznice. Podjela kolosijeka u stanicama. Matični kolosijek i izvlačni kolosijek. Grudobrani međik. 6. Građevinski elementi željezničke infrastrukture – V dio: Kolosiječni razmak. Korisna dužina kolosijeka. Građevine i postrojenja na putničkim stanicama. Građevine i postrojenja za tertni promet. 7. Građevinski elementi željezničke infrastrukture – VI dio: Tehničko-putničke stanice i tehničko-terene stanice. Zona potiskivanja na spuštalici, zona ubrzavanja na spuštalici i zona kočenja na spuštalici. 8. Kontaktne mreže – I dio: Značaj i svrha stabilnih postrojenja elektrovuče. Svrha i dijelovi kontaktne mreže. Vrste i raspored stubova kontaktne mreže. Portali na kontaktnoj mreži vrste i primjena 9. Kontaktne mreže – II dio: Oprema za vješanje kontaktnog voda. Obrtna konzola i tramvajski kontaktni vozni vod. Lančasti kontaktni vozni vod. 10. Kontaktne mreže – III dio: Način zatezanja lančastog kontaktnog voznog voda. Povratni vozni vodovi na elektrificiranim prugama. Podužni električni kontinuitet i način kako se ostvaruje. Vrste sekcionisanja kontaktne mreže i kako se ostvaruju. 11. Kontaktne mreže – IV dio: Svrha i značaj pantografa. Svrha i namjena EVP – a. Motka za uzemljenje i poligonacija. Podjela signalno-sigurnosnih uređaja i signali. 12. Kontaktne mreže – V dio: Boje na glavnim signalima. Skretnica i njeni dijelovi. Značaj minenjalice na skretnici. Upravljanje skretnicama. Robel brave. 13. EU prometna politika u oblasti željezničkog prometa: EU Direktive. Svrha i značaj interoperabilnost u željezničkom saobraćaju. 14. Domaća legislativa iz oblasti željezničkog saobraćaja – I dio: Zakonska regulativa koja definiše ustrojstvo željezničkog sektora u BiH i podzakonski akti iz naveden oblasti. 15. Domaća legislativa iz oblasti željezničkog saobraćaja – II dio: Svrha i značaj Sporazuma o uspostavi Bosanskohercegovačke, Javne

	Željezničke Korporacije (BHŽJK). Uloga i značaj Regulatornog odbora Bosne i Hercegovine i njegova ovlaštenja.
Ishodi učenja:	Znanje: Poznavanje temeljnih građevinskih elemenata željezničke infratsrukture njene funkcija i značaja. Vještine: Poznavanje elemente željezničke infrastrukture, primjena I funkcija željezničke infratstrukture, upravljanje I eksploatacija željezničkom infrastrukturom. Izvršiti procjenu potrebe za integracijom i liberalizacijom unutrašnjih prometnih tokova prateći europsku prometnu politiku u njene prometne tokove, kao i prometnu politiku zemalja okruženja. Kompetencije: Sposobnosti samostalnog razumijevanja i korištenja znanja potrebnih za rješavanje specifičnih problema u oblasti upravljanje i eksploatacije željezničke infrastrukture.
Cilj održivog razvoja (SDG):	Ciljevi održivog razvoja i uticaj na saobraćajnu politiku: SDG 1 - Svijet bez siromaštva SDG 2 - Svijet bez gladi SDG 5 – Rodna ravnopravnost SDG 6 – Čista voda i sanitarni uvjeti SDG 7 – Pristupačna energija iz čistih izvora SDG 8 - Dostojanstven rad i ekonomski rast SDG 9 – Industrija, inovacije i infrastruktura SDG 10 – Smanjenje nejednakosti SDG 11 – Održivi gradovi i zajednice SDG 12 - Održiva ppotrošnja i proizvodnja SDG 13 – Zaštita klime SDG 14 – Očuvanje vodenog svijeta SDG 15 – Očuvanje života na zemlji SDG 16 – Mir, pravda i snažne institucije 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. Doc.dr. Nedžad Branković, Infrastruktura željezničkog saobraćaja, UNIVERZITET U SARAJEVU, Fakulteta za saobraćaj i komunikacije, maj/svibanj 2010. godine. 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. Dopunska: 1. DIREKTIVA 2012/34/EU EUROPSKOG PARLAMENTA I VIJEĆA od 21. studenoga 2012. o uspostavi jedinstvenog Europskog željezničkog proctora 2. DIREKTIVA (EU) 2016/797 EUROPSKOG PARLAMENTA I VIJEĆA od 11. svibnja 2016. o interoperabilnosti željezničkog sustava u Europskoj uniji 3. DIREKTIVA (EU) 2016/798 EUROPSKOG PARLAMENTA I VIJEĆA od 11. svibnja 2016. o sigurnosti željeznica, 4. 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 5. UREDBA (EZ) br. 1371/2007 EUROPSKOG PARLAMENTA I VIJEĆA od 23. listopada 2007. o pravima i obvezama putnika u željezničkom prometu. 6. DIREKTIVA 2007/59/EZ EUROPSKOG PARLAMENTA I VIJEĆA od 23. listopada 2007.o davanju ovlaštenja strojovođama koji upravljaju lokomotivama i vlakovima na željezničkom sustavu Zajednice 7. UREDBA (EU) 913/2010 EUROPSKOG PARLAMENTA I VIJEĆA od 22. rujna 2010. o europskoj željezničkoj mreži za konkurentni prijevoz robe. 8. Bilješke i slajdovi s predavanja (mogu se preuzeti sa službene internet stranice Fakulteta za saobraćaj i komunikacije i elektronska distribucija svakom pojedinačnom studentu) 9. Beata Tuszynska i Frederic Gouarderes, Kratak vodić o Europskoj uniji, Eurospki parlament, oktobar 2016. Godine.)

Šifra predmeta:	**Naziv predmeta: TEHNIČKA EKSPLOATACIJA ŠINSKIH VOZILA**

24-25-1TRWES010305			
Ciklus: I	**Godina: III**	**Semestar: V**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminar 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:	Ovladavanje znanjem o racionalnoj eksploataciji šinskih vozila i sredstava transportnog rada u željezničkom saobraćaju. Fokus na analizu i proračun tehničko-eksploatacionih karakteristika šinskih vozila, što predstavlja osnovu za izbor optimalnih vozila za specifične uslove eksploatacije. Uključuje postavljanje dinamičkih modela šinskih vozila u procesima vuče i kočenja kako bi se odredili potrebni podaci za analize i ekspertize saobraćajnih nezgoda.		
Tematske jedinice:	1. Kopnena vozila i njihovo kretanje. 2. Jednačine kretanja šinskih vozila. 3. Analiza kretanja šinskih vozila. 4. Otpori kretanja vozila. 5. i-V dijagram. Q-V dijagram. 6. Jednačina kretanja voza-vlaka. 7. Dijagram kretanja voza. 8. Realizacija vučnih i kočionih sila. 9. Vučne karakteristike vozila. 10. Karakteristike kočionih uređaja i sistema. 11. Vučno-energetska ispitivanja vozila. 12. Potrošnja pogonske energije. 13. Vučni, kočioni i dopunski proračuni. 14. Simulacije kretanja vozila. 15. Optimizacija eksploatacionih parametara		
Ishodi učenja:	**Znanje:** Studenti će steći duboko razumijevanje tehničko-eksploatacionih karakteristika šinskih vozila, uključujući dizajn, performanse, i održavanje. Razumjet će analizu dinamičkih karakteristika vozila u kontekstu vuče, kočenja, i stabilnosti. **Vještine:** Osposobit će se za pravilno biranje šinskih vozila prema specifičnim uvjetima eksploatacije. Razvijat će vještine u izvođenju dinamičkih analiza, korištenju softverskih alata za modeliranje i simulaciju, te primjeni znanja iz tehničke literature. **Kompetencije:** Studenti će biti kompetentni za upravljanje tehničkim sistemima šinskih vozila, donošenje informiranih odluka vezanih uz		

	optimizaciju eksploatacije, identifikaciju i rješavanje sigurnosnih problema, te suradnju s drugim stručnjacima u području željezničkog saobraćaja.
Cilj održivog razvoja (SDG):	SDG 3 - Osigurati zdravlje i blagostanje za sve ljude u svim uzrastima, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje, 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 i seminarskih radova. 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:	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: <u>Struktura bodovanja Bodovi (%)</u> 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/popravnom 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. D. TADIĆ: Teorija kretanja vozila, Saobraćajni fakultet, Sarajevo 2. H. BRATIĆ: Zbirka zadataka iz teorije kretanja vozila, Saobraćajni fakultet, Sarajevo, 1986. 3. D. DINIĆ: Vuča vozova, Zavod za novinsko-izdavačku djelatnost JŽ, Beograd, 1986. Dodatna 1. J. ZAVADA: Željeznička vozila i vuča vlakova, Fakultet prometnih znanosti, Zagreb, 1991

Šifra predmeta: 24-25-2TRWES010305	**Naziv predmeta: MULTIMODALNI TRANSPORT**		
Ciklus: I (prvi)	**Godina:** III	**Semestar:** V	**Broj ECTS kredita:** 6
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:	Obavezno je prisustvo i aktivnost na predavanjima i vježbama, te izrada seminarskog rada i zadataka za samostalne vježbe
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 multimodalnog transporta i uz primjenu principa logistike i mogućnosti koje pružaju nove informacione i telekomunikacijske tehnologije.
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Osnovne karakteristike savremenih tehnoloških promjena u društvu, privredi i transportu. 2. Transportni lanci. Tehnologije klasičnog transportnog lanca. Industrijski transport. 3. Sistemski pristup analizi transportnog procesa kao složenog tehnološkog sistema 4. Paletni sistem transporta 5. Kontejnerski sistem transporta. 6. Tipične tehnologije za realizaciju kontejnerskog transportnog lanca 7. Sistemi «vozilo – vozilo» 8. Integralni kopneno – pomorski sistemi transporta. 9. Integralni pomorsko – riječni sistemi transporta. Sistemi multimodalnog transporta u PT saobraćaju. 10. Kontejnerski terminali, HUCKE – PACK terminali, RO – RO terminali 11. Robno transportni centri (RTC) 12. Uvođenje principa logistike u planiranje transportnih lanaca 13. Tehnološke funkcije podsistema marketing logistike, logistika sa aspekta savremene transportne i špediterske organizacije, 14. Skladišni sistemi, teorija zaliha 15. Konkretna istraživanja i projektovanje savremenih logističkih i transportnih lanaca.
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.
Cilj održivog razvoja (SDG):	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 12: Odgovorna proizvodnja i potrošnja – SDG 14: Život u vodi Povezanost tematskih jedinica sa navedenim ciljevima održivog razvoja objašnjena je detaljnije u nastavku. “SDG 8”: Tehnološke funkcije u marketing logistici mogu poboljšati efikasnost i konkurentnost preduzeća. Implementacija naprednih tehnologija može poboljšati radne uslove i podstaći ekonomski rast kroz inovacije i optimizaciju. (podcilj „SDG 8.2“: Postići visoke nivoe produktivnosti rada kroz unapređenje tehnologije i inovacije) “SDG 9”: Savremene tehnološke promjene, kao što su digitalizacija, automatizacija i primjena vještačke inteligencije, mogu poboljšati industrijsku produktivnost i podstaći inovacije. Sistemski pristup omogućava analizu i unaprjeđenje cjelokupnog transportnog procesa. Identifikacija i integracija svih komponenti u jednom sistemu može pomoći u optimizaciji resursa, smanjenju troškova i unaprjeđenju energetske efikasnosti. Kontejnerski sistem transporta omogućava standardizaciju i automatizaciju, što poboljšava efikasnost i smanjuje troškove. Ove tehnologije podržavaju globalnu trgovinu i mogu pomoći u smanjenju emisija kroz optimizaciju transportnih ruta. RTC-ovi služe kao ključne tačke za optimizaciju i distribuciju robe; podržavaju održivu industrijalizaciju i efikasnije korišćenje resursa (podcilj “SDG 9.1”: Izgraditi otpornu infrastrukturu i unaprijediti održivu industrijalizaciju; podcilj “SDG 9.5”: Ojačati istraživanje i unaprjeđenje tehnologije u industriji) “SDG 11”: Tehnologije klasičnog transportnog lanca uključuju tradicionalna prevozna sredstva kao što su kamioni, vozovi i brodovi. Ove tehnologije mogu biti unaprijeđene da budu ekološki prihvatljivije i efikasnije, čime se doprinosi smanjenju zagađenja i poboljšanju pristupa održivom prevozu u urbanim sredinama. Integracija različitih sistema može smanjiti gužve, emisije i poboljšati pristup prevozu. (podcilj “SDG 11.2”: Osigurati da cestovne dionice doprinose sigurnom i efikasnom saobraćaju) “SDG 12”: Efikasno upravljanje transportnim lancima može pomoći u smanjenju otpada i emisija, optimizovanjem resursa i smanjenjem uticaja na životnu sredinu. Paletni sistem transporta poboljšava efikasnost u skladištenju i transportu, smanjuje potrebu za pakovanjem i minimizira otpad. Efikasniji transportni sistemi mogu značajno smanjiti zagađenja. Tehnologije poput automatskih skladišta i robota za utovar mogu poboljšati efikasnost i smanjiti potrebu za manualnim radom, što smanjuje rizik od grešaka i otpada. Ovo doprinosi smanjenju štetnog uticaja na životnu sredinu. Efikasno upravljanje skladištima i zalihama može smanjiti količinu otpada i poboljšati održivost kroz bolju kontrolu resursa i smanjenje viška proizvoda. (podcilj “SDG 12.4”: Upravljati

	hemikalijama i otpadom tokom životnog ciklusa i smanjiti njihov uticaj na životnu sredinu; podcilj "SDG 12.5": Drastično smanjiti količinu otpada generisanog kroz prevenciju, smanjenje, reciklažu i ponovnu upotrebu; podcilj "SDG 12.6": Podstaći kompanije da usvoje održive prakse i izveštavaju o njima) "SDG 14": Integralni kopneno-pomorski sistemi transporta omogućavaju efikasnije korišćenje pomorskih puteva i smanjenje uticaja na obalu i morski ekosistem. Efikasna integracija može smanjiti emisije i smanjiti zagađenje koje dolazi iz transporta. (podcilj "SDG 14.1": Smanjiti zagađenje mora, uključujući otpad od plastike i druge vrste zagađenja)
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. 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 i vježbama je obavezno kao uslov za polaganje ispita uz max. 10% izostanaka bez opravdanja. Redovno prisustvo se neće dodatno bodovati. 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 8 ili 9 sedmici nastave sa vrednovanjem od 35 bodova, stim da će se bodovati samo oni studenti koji su položili preko 50 % od navedenog parcijalnog ispita.Završni ispit iznosi najviše 50 bodova.
Literatura:	Obavezna: 1. Dalla Chiara B., Ercolani F., Gačanin E., Kiso F.: Intermodalni transport, Education and Culture TEMPUS , Sarajevo 2004. 2. Perišić R.: Savremene tehnologije transporta I, Saobraćajni fakultet Beograd, 1994. 3. Perišić R.: Savremene tehnologije transporta II, Saobraćajni fakultet Beograd, 1995. 4. Marković I.: Nove tehnologije transporta, Fakultet prometnih znanosti Zagreb, 1985. 5. Terminologija u kombiniranom transportu: UN/ECE, Prevod Kiso F., Education and Culture TEMPUS, Sarajevo, 2004. 6. Kiso F., Karičić S.: Nastavni materijali, prezentacije i Skripta „Skladištenje"

Šifra predmeta: 24-25-3TRWES010305	**Naziv predmeta: NADZOR I REGULISANJE ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: I	**Godina: III**	**Semestar: V**	**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 područja nadzora i regulisanja željezničkog saobraćaja, analiza učinka upravljačkih funkcija na promjene parametara stanja u željezničkom saobraćaju.		
Tematske jedinice:	1. Elementi teorije saobraćajnih tokova u željezničkom saobraćaju. 2. Službena mjesta i uređaji na pruzi i u stanicama koji služe pri nadzoru i regulisanju saobraćaja vozova. 3. Regulisanje saobraćaja vozova na prugama. 4. Parametri sigurnosti i zaštite na prijelazima. 5. Identifikacija i analiza upravljanja saobraćajnim tokovima na signaliziranim prijelazima. 6. Senzori za mjerenje parametara saobraćajnog toka. 7. Procjena rizika i upravljanje rizicima 8. Modeli saobraćajnih tokova na signaliziranoj raskrsnici. 9. Video i druge vrste nadzora u željezničkom saobraćaju. 10. Upravljanje i nadzor u stanicama željezničkog saobraćaja. 11. Automatski sistem upravljanja tehnološkim procesom. 12. Kompjuterizirani saobraćajni sistem. 13. Model kompjuteriziranog saobraćajnog sistema. 14. Strategija upravljanja komjuteriziranim saobraćajnim sistemom. 15. Elementi centra za upravljanje željezničkim saobraćajem.		
Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i kompetencije za dizajniranje, razvoj i korištenje metoda nadziranja i upravljanja procesima u željezničkom saobraćaju. Vještine: Predmet Nadzor i reguliranje željezničkog saobraćaja treba osigurati potreban nivo znanja o metodama i postupcima nadziranja procesa u željezničkom saobraćaju te kreiranje i provođenje upravljačkih funkcija kako bi se povećala učinkovitost i sigurnost u željezničkom saobraćaju. Također predmet omogućava stjecanje znanja i vještina neophodnih za mjerenje, analizu i procjenu utjecaja upravljačkih funkcija i mjera provođenja nadzora na odvijanje željezničkog saobraćaja. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima.		
Cilj održivog razvoja (SDG):	SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 11 - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim, SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje, 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 i seminarskih radova. 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:	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 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 (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.* Turčinhodžić, F. *Kompjuterizirani saobraćajni sistemi,* Sarajevo, 1999. 2. Sokolija, K. *Traffic monitoring and control*, TEMUS, Fakltet za saobraćaj i komunikacije, Sarajevo, Politehnico di Torino, University of Soutampton, Sarajevo 2004. 3. Čabrić, N. „*Nadzor i regulisanje željezničkog saobraćaja",* Skripta. Fakultet za saobraćaj i komunikacije, Sarajevo 2021. Dopunska:

	1. Salketić, S., Kudumović, Dž., Branković, N. *„Osnove tehnologije željezničkog saobraćaja“,* Knjiga. Univerzitet u Sarajevu – Fakultet za saobraćaj i komunikacije, Sarajevo 2016. 2. Branković N., Čabrić N., Salketić S. „*Smjernice i EU standardi za certificiranje poslova i zadataka u željezničkom sistemu BIH“*, naučno - stručni časopis TEC, Scientific Journal of Traffic, Transport and Communications, Journal TEC 3, Godište 3, volumen 1, ISSN : 2303-5854, strana 64-78. Sarajevo, 2016. 3. Čabrić N., Đuričić R. „*Upravljanje rizicima u željezničkom sistemu*“, TIT - Transportna Infrastruktura i Transport, broj 7, godina 6, ISSN 2232-9676, strana 36, Sarajevo, 2016. 4. Haramina, H. „*Inteligentni transportni sustavi u željezničkom prometu“*. Autorizovana predavanja. Fakultet prometnih znanosti, Zavod za željeznički promet. Zagreb, 2017. 5. Kornakov, A. M. „Развязки железнодорожных линий в узлах“, Moskva, 1962. 6. Pachl, J. „Railway Operation and Control 4th edition“ VTD Rail Publishing. ISBN 978-0-9719915-6-9, Library of Congress Control No.: 2015930479. 7. PROVEDBENA UREDBA KOMISIJE (EU) 2019/773 od 16. svibnja 2019. o tehničkoj specifikaciji za interoperabilnost za podsustav odvijanja prometa i upravljanja prometom željezničkog sustava u Europskoj uniji i o stavljanju izvan snage Odluke 2012/757/EU 8. SAOBRAĆAJNI PRAVILNIK (Sl.gl.BiH br. 90/2015).

Šifra predmeta: 27TRWOS010306	**Naziv predmeta: SIGURNOST ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: I	**Godina: III**	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminar 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:	Sticanje edukacijskih oblika u realizaciji programa iz sigurnosti u željezničkog saobraćaja, te praktična mjerenje stepena sigurnosti u željezničkog saobraćaju, kao i analiza konkretnih saobraćajnih nezgoda, njihovih uzroka i posljedica.		
Tematske jedinice:	1. Elementi sigurnosti u željezničkom saobraćaju. 2. Sigurnost kretanja vozova-vlakova u uvjetima projektiranja pruge za velike brzine. 3. Elementi zaustavnog puta u uvjetima različitih sistema kočenja. 4. Teorija pouzdanosti i sigurnosti željezničkog saobraćajnog sistema. Sigurnosna analiza.		

	5. Prijevoz specijalnih tereta u željezničkom saobraćaju. 6. Elementi teorije sudara. 7. Klasifikacija udara dvaju tijela prema liniji sudara ili udara i kočnih formi proračuna. Elementi teorije i eksperimentalni rezultati kod analize procesa sudara dvaju tijela. 8. Metode i postupci pri analizi sudara. 9. Elementi ekspertiza željezničkih saobraćajnih nesreća. 10. Matematički modeli pouzdanosti. 11. Uticaj ljudskog faktora na sigurnost odvijanja željezničkog saobraćaja. 12. Logika upotrebe sigurnosnih elemenata. 13. Sistemi za podršku u upravljanju signalno-sigurnosnim uređajima. 14. Elementi sigurnosti željezničkih vozila. 15. Analiza sigurnosti na željezničkim prijelazima.
Ishodi učenja:	Znanje:Studenti stječu temeljno razumijevanje pravila, metoda i postupaka u saobraćajnoj prevenciji te uloga sigurnosnih mehanizama u željezničkom saobraćaju. Uče o analizi rizika, procjeni sigurnosnih prijetnji i procedurama upravljanja sigurnošću. Vještine:Razvijaju sposobnost analize i procjene sigurnosnih aspekata željezničkog saobraćaja kroz praktičan rad, laboratorijske vježbe. Uče kako identificirati i rješavati sigurnosne probleme te kako primijeniti preventivne mjere. Kompetencije:Studenti su osposobljeni za upravljanje sigurnosnim sistemima u željezničkom saobraćaju, analiziranje rizika, donošenje preventivnih odluka, te implementaciju učinkovitih sigurnosnih procedura i tehnologija
Cilj održivog razvoja (SDG):	SDG 3 - Osigurati zdravlje i blagostanje za sve ljude u svim uzrastima, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje, 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 i seminarskih radova. 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:	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/popravnom 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. J. BOŽIČEVIĆ: Prilog povećanju sigurnosti i brzine u tehnologiji željeznica, Fakultet prometnih znanosti, Zagreb, 1987. 2. T. MLINARIĆ: Savremeni pristup analizi sigurnosti i pouzdanosti u željezničkom prometu, Suvremeni promet, broj 2 i 3, Zagreb, 1985. Dodatna

	1. S. BEŠIREVIĆ: Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 1997.

Šifra predmeta: 28TRWOS010306	**Naziv predmeta: TEHNOLOGIJA ŽELJEZNIČKOG TRANSPORTA**		
Ciklus: I	**Godina: III**	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: obavezni predmet		**Ukupan broj kontakt sati: 90** Opciono razraditi distribuciju sati po tipu: Predavanja 45 Vježbe 30 Seminarski rad 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:	Sticanje edukacijskih oblika u realizaciji programa iz tehnologije željezničkog transporta, te praktična mjerenje iz tehnologije željezničkog transporta, kao i analiza konkretnih problema tehnologije željezničkog transporta.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući specifičnosti organizacionih jedinica)*	1. Faktori tehnologije željezničkog transporta. Pokazatelji eksploatacije. 2. Pokazatelji rada: vučnih vozila, putničkog saobraćaja, teretnog saobraćaja. Tehnologija manevarskog rada. Tehnologija rada stanica i čvorova. 3. Raspored i usklađivanje pokretnih sa stabilnim sredstvima. Usklađivanje vučnih i prijevoznih sredstava. 4. Analiza izvršenja plana prijevoza. Organizacija kolskih tokova. Organizacija putničkog saobraćaja. 5. Grafikon saobraćaja vozova. Kapaciteti u željezničkom saobraćaju koji karakterišu tehničku moć pruga. 6. Utvrđivanje kapaciteta pruga. 7. Prijevozna i propusna moć. Iskorištenje tehničke moći. 8. Metodološki postupak izrade voznog reda. 9. Organiziranje putničkog saobraćaja. 10. Organiziranje teretnog saobraćaja. 11. Izrada grafikona saobraćaja vozova. 12. Eksploatacioni pokazatelji voznog reda. 13. Operativno upravljanje željezničkim saobraćajem. 14. Bezbjednost i kontrola željezničkog saobraćaja. 15. Organizacija saobraćaja vozova u vanrednim i posebnim uvjetima.		
Ishodi učenja:	Studenti kroz nastavni proces predavanja, vježbe, laboratorijske vježbe i praktičan rad trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti tehnologije željezničkog transporta. Predmet tehnologija željezničkog transporta treba da osigura potreban nivo znanja o pravilima, metodama i postupcima tehnologije željezničkog transporta. Također predmet omogućava sticanje znanja i vještina		

	neophodnih za adekvatnu analizu, procjenu i upravljanje sistemima tehnologije željezničkog transporta.
Cilj održivog razvoja (SDG):	SDG 9: Industrija, inovacije i infrastruktura SDG 11: Održivi gradovi i zajednice SDG 12: Održiva proizvodnja i potrošnja SDG 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 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/praktični rad od 0 do 15 bodova (%);I parcijalni ispit/I test/ I provjera znanja/ od 0 do 35bodova (%); Ukupan broj bodova (%) koji student prema navedenom praćenju u toku nastave može ostvariti iznosi maksimalno 50 bodova (%). Završni ispit iznosi najviše 50 bodova 50 (%). Završni ispit se organizuje iz cjelokupnog pređenog gradiva u toku nastave.
Literatura:	Obavezna: 1. S. BEŠIREVIĆ: Organizacija željezničkog saobraćaja, Fakultet za saobraćaj i komunikacije, Sarajevo, 1997. 2. B. BOGOVIĆ: Tehnologija prijevoza robe u željezničkom prometu, Fakultet prometnih znanosti, Zagreb, 1988. Dopunska: 1. B. BOGOVIĆ: Organizacija željezničkog prometa, Fakultet prometnih znanosti, Zagreb, 1987.

Šifra predmeta: 29TRWOS010306	**Naziv predmeta: PLANIRANJE ŽELJEZNIČKOG SAOBRAĆAJA**		
Ciklus: I	**Godina** : III	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: obavezan predmet		**Ukupan broj sati: 150** Opciono razraditi distribuciju sati po tipu: Predavanja 45 Vježbe 30 Laboratorijske vježbe 15 Seminar 30 Samostalni rad 30	
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 oblasti planiranje željezničkog saobraćaja. Sticanje znanja i vještina iz planiranja željezničkog saobraćaja.		
Tematske jedinice: *(po potrebi plan izvođenja po sedmicama se utvrđuje uvažavajući*	R.b.	Nastavne cjeline	Broj sati (P+V+L+S+ Sr)

specifičnosti organizacionih jedinica)	1.	Osnove planiranja i projektovanja u saobraću i prevozu	3+2+1+2+2
	2.	Osnovni elementi saobraćajnih i prevoznih sistema u gradu relevantni za planiranje i projektovanje	3+2+1+2+2
	3.	Osnovni elementi saobraćajnih i prevoznih sistema u regiji i širim prostorima relevantni za planiranje i projektovanje	3+2+1+2+2
	4.	Potražnja za uslugama u saobraćaju i prevozu	3+2+1+2+2
	5.		3+2+1+2+2
	6.	Ponuda usluga u saobraćaju i prevozu	3+2+1+2+2
	7.	Mtodološke osnove planiranja u saobraćaju i prevozu	3+2+1+2+2
	8.		3+2+1+2+2
	9.	Priprema i izrada planova u saobraćaju	3+2+1+2+2
	10.	Nove tehnologije za izradu planova u saobraćaju i prevozu	3+2+1+2+2
	11.	Osnove projektovanja u saobraćaju i prevozu	3+2+1+2+2
	12.	Osnove plnairanja i projektovanja terminala u saobraćaju	3+2+1+2+2
	13.	Troškovi korisnika usluga saobraćajnih i prevoznih sistema	3+2+1+2+2
	14.	Vrednovanje planova i projekata u saobraćaju i prevozu	3+2+1+2+2
	15.	Odlučivanje i upravljanje u planiranju i projektovanju u saobraćaju i prevozu	3+2+1+2+2
Ishodi učenja: (Znanje; vještine; kompetencije)	Studenti kroz nastavni proces predavanja, vježbi i praktičan rad trebaju steći odgovarajuća znanja vezano za planiranje u saobraćaju. Izučavanje i praktična primjena, treba da osigura potreban nivo znanja za utvrđivanje karakteristika stanja saobraćajno-transportnih sistema na putnoj i uličnoj mreži, prognoza prevoznih zahtjeva individualnih i javnih vidova prevoza, formiranje varijanti razvoja saobraćajno-transportnih sistema na cestovnim gadskim i vangradskim saobraćajnicama, vrednovanje varijantnih rejšenja i izbor optimalnog plana razvoja saobraćajno-transportnog sistema, primjena i praćenje realizacije plana.		
Cilj održivog razvoja (SDG):	Za predmet koji se bavi planiranjem i projektovanjem u saobraćaju i 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, uključujući regionalnu i transgraničnu infrastrukturu, da bi se podržao ekonomski razvoj i ljudsko blagostanje, s fokusom na povoljan i ravnopravan pristup za sve. • 9.4 Do 2030. godine unaprijediti infrastrukturu i industrije da postanu održive, s povećanom učinkovitošću resursa i većim korištenjem čistih i ekološki prihvatljivih tehnologija i industrijskih procesa. Cilj 11: Održivi gradovi i zajednice Podciljevi: • 11.2 Do 2030. godine osigurati pristup sigurnim, pristupačnim i održivim transportnim sistemima za sve, s posebnim naglaskom na potrebe onih u ranjivim situacijama, žena, djece, osoba s invaliditetom i starijih osoba. • 11.3 Do 2030. godine povećati inkluzivnu i održivu urbanizaciju i kapacitete za participativno, integrisano i održivo planiranje i upravljanje ljudskim naseljima. Cilj 12: Održiva potrošnja i proizvodnja Podciljevi: • 12.2 Do 2030. godine postići održivo upravljanje i učinkovito korištenje prirodnih resursa. • 12.7 Promovirati održive prakse javne nabave, u skladu s nacionalnim politikama i prioritetima. Cilj 13: Klimatska akcija Podciljevi: • 13.2 Integrirati mjere klimatskih promjena u nacionalne politike, strategije i planiranje. Povezanost s nastavnim cjelinama: • Nastavne cjeline koje se bave osnovnim elementima saobraćajnih sistema u gradu i regiji (2, 3), planiranjem potražnje i ponude (4, 6), i vrednovanjem planova (14) su izravno povezane s ciljevima održive infrastrukture, urbanizacije i transporta. • Nove tehnologije (10) i metodološke osnove planiranja (7) su relevantne za inovacije i učinkovito korištenje resursa.

	• Priprema i izrada planova (9), kao i odlučivanje i upravljanje (15), su ključni za integraciju klimatskih mjera u transportne sisteme.
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., 2017. „Planiranje u saobraćaju, prevozu i komunikacijama “. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo. 2. Padjen J.: Osnove prometnog planiranja, Zagreb, 1986. Dopunska: 1. Padjen J.: Metode prostorno-prometnog planiranja Ekonomski institut, Zagreb, 1978. 2. Mehanović, M., 2011. „Planiranje ponude usluga u gradskom prometu putnika“. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo.

	3. Mehanović, M.: "Zadaci i primjeri iz teorije i prakse u javnom gradskom prevozu putnika", Fakultet za saobraćaj i komunikacije, Sarajevo, 2005. 4. Meyer, M.D. Miller, E.J.: Urban Transportation Planning, McGraw-Hill, 1984. 5. Kuzović, Lj.; Topolnik, D.: Kapacitet drumskih saobraćajnica, Građevinska knjiga Beograd, 1989. 6. Jovanović N.: Planiranje saobraćaja, Saobraćajni fakultet, Beograd, 1990. 7. Jović J.: Planiranje saobraćaja u gradovima-praktikum, Saobraćajni fakultet, Beograd, 1996. 8. HZDP Zagreb, Časopisi

Šifra predmeta: 30-31-1TRWES010306	**Naziv predmeta: DIJAGNOSTIKA I ODRŽAVANJE ŠINSKIH VOZILA**		
Ciklus: I	**Godina: III**	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: Izborni predmet		**Ukupan broj kontakt sati: 90** Predavanja: 45 Vježbe: 30 Seminar 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:	Sticanje znanja studenata o razvoju, značaju, ciljevima i tehnologiji postupaka dijagnostike i održavanja radi obezbjeđenja i očuvanja definisanog potrebnog nivoa kvaliteta tehničkog sistema.		
Tematske jedinice:	1. Uvod – pojam tehničke dijagnostike i održavanja tehničkog sistema. 2. Dimenzije kvaliteta tehničkog sistema. 3. Opće odredbe održavanja za sve vrste željezničkih vozila. 4. Posebne odredbe koje se odnose na održavanje vučnih vozila. 5. Posebne odredbe koje se odnose na održavanje vučenih vozila. 6. Održavanje vozila za željezničke svrhe. 7. Opći principi utvrđivanja stanja funkcionalnog sredstva. 8. Metode za utvrđivanje stanja tehničkog sistema. 9. Nedestruktivne metode ispitivanja materijala: vizuelna, penetrantska. 10. Nedestruktivne metode: ultrazvučna, radiografska, 11. magnetna. 12. Standardne destruktivne metode ispitivanja materijala. 13. Utvrđivanje podobnosti željezničkog vozila u eksploataciji. 14. Dijagnostika kvarova. Kategorije i prioriteti kvarova. 15. Dijagnostičke metode za utvrđivanje kvarova. Rezultati dijagnostike. 16. ECM - Tijelo zaduženo za održavanje željezničkih vozila		

Ishodi učenja:	Znanje: Studenti kroz nastavni proces predavanja i vježbi, te stručne posjete laboratorijama za ispitivanje materijala za elemente željezničke transportne tehnike, trebaju steći odgovarajuća znanja i iskustva za praktičnu primjenu u oblasti dijagnostike i održavanja željezničkih vozila. Vještine: Predmet Dijagnostika i održavanje šinskih vozila treba osigurati potreban nivo znanja o metodama održavanja željezničkih vozila kao i dijagnostičkim metodama za utvrđivanje kvarova kako bi se povećala učinkovitost i sigurnost u željezničkom saobraćaju. Također predmet omogućava upoznavanje studenata sa referentnom tehničkom dokumentacijom iz područja dijagnostike i održavanja, kao i sticanje znanja iz područja metoda za identifikaciju stanja funkcionalnog sredstva. Kompetencije: Aplikaciju stečenih znanja u konkretnim modelima
Cilj održivog razvoja (SDG):	SDG 3 - Osigurati zdravlje i blagostanje za sve ljude u svim uzrastima, SDG 9 - Izgraditi otpornu infrastrukturu, unaprijediti inovacije i promicati održivu industrijalizaciju, SDG 12 - Osigurati održive obrasce potrošnje i proizvodnje, 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 i seminarskih radova. 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:	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/popravnom 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. Gojković, B., Đuričić, R., Malčić, V. & Čabrić, N. 2021. Održavanje željezničkih vozila - dopunjeno izdanje. Tehnička knjiga – udžbenik. Saobraćajni fakultet Doboj. ISBN 978-99955-36-90-9. 2. Salihović,S., Dijagnostika i održavanje željezničkih vozila, skripta predavanja, Fakultet za saobraćaj i komunikacije Sarajevo, 2013. 3. PRAVILNIK 241, Pravilnik o održavanju željezničkih vozila u željezničkom sistemu BiH (Sl.glasnik BiH, broj 39/15). 4. Sebastijanović, S., Tufekčić,Dž., Održavanje, Fakultet elektrotehnike i mašinstva, Tuzla, 1999 Dopunska: 1. Avdić, H., Tufekčić, Dž., TEROTEHNOLOGIJA I, Udžbenik, Univerzitet u Tuzli, 2007, ISBN 978-9958-633-73-7 2. Strukovni odbor ERRI B 166/RP 3: Dijagnostika kvarova na željezničkim vozilima European rail Research Institute, Utrecht 1995. 3. HAYASHI, Yusuke & Tsunashima, Hitoshi & Marumo, Yoshitaka. (2008). Fault Detection of Railway Vehicle Suspension Systems Using Multiple-Model Approach. Journal

of Mechanical Systems for Transportation and Logistics. 1. 88-99. 10.1299/jmtl.1.88.
4. No-Geon Jung, et al, Analysis of Reliability and Availability Indicators in Railway Vehicle Ordering Specifications of the Operating Agencies of Various Countries, International Journal of Innovative Science, Engineering & Technology, Vol. 4 Issue 4, April 2017.
5. 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.
6. PROVEDBENA UREDBA KOMISIJE (EU) 2019/779 od 16. maja 2019. o utvrđivanju detaljnih odredbi o istemu izdavanja ovlaštenja subjektima nadležnima za održavanje vozila na temelju Direktive (EU) 2016/798 Europskog parlamenta i Vijeća te o stavljanju izvan snage Uredbe Komisije (EU) br. 445/2011.
7. Pravilnik za certifikaciju i nadzor tijela nadležnog za održavanje (ECM) i certifikaciju i nadzor funkcija sistema održavanja (Službeni glasnik BiH broj 53/22).

Šifra predmeta: 30-31-2TRWES010306	**Naziv predmeta:** **JAVNI GRADSKI PRIJEVOZ**		
Ciklus: I	**Godina: III**	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: izborni predmet		**Ukupan broj 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:	NE
Cilj (ciljevi) predmeta:	Sticanje edukacijskih oblika u realizaciji programa iz oblasti javni gradski prijevoz. Sticanje znanja i vještina iz javnog gradskog prijevoza.

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

R.br.	Nastavne cjeline	Broj sati (P+V+S+Sr)
1.	Razvoj javnog gradskog prijevoza	2+2+1+2
2.	Osnove javnog gradskog prevoza putnika	2+2+1+2
3.	Istraživanje i planiranje u javnom gradskom prevozu putnika	2+2+1+2
4.	Prevozni zahtjevi korisnika usluga u gradskom prevozu - potražnja	2+2+1+2
5.	Ponuda usluga u javnom gradskom prevozu	2+2+1+2

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<tr><td>6.</td><td>Modeliranje u javnom gradskom prevozu putnika</td><td>2+2+1+2</td></tr>
<tr><td>7.</td><td rowspan="6">Dizajn sistema javnog gradskog prevoza putnika
- struktura sistema javnog gradskog prevoza putnika
- linija i mreža linija
- vidovi prevoza i prevozna sredstva
- red vožnje
- sistem upravljanja prevozom
- tarifni sistem, sistem karata, sistem naplate
- informacioni sistem
- izmjeritelji rada prevoznog sistema
- izbor prevoznog sistema</td><td>2+2+1+2</td></tr>
<tr><td>8.</td><td>2+2+1+2</td></tr>
<tr><td>9.</td><td>2+2+1+2</td></tr>
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<tr><td>12.</td><td>2+2+1+2</td></tr>
<tr><td>13.</td><td>Planiranje u preduzećaima javnog gradskog prevoza putnika</td><td>2+2+1+2</td></tr>
<tr><td>14.</td><td>Organizacija preduzeća javnog gradskog prevoza putnika</td><td>2+2+1+2</td></tr>
<tr><td>15.</td><td>Ekonomski aspekti ponude usluga javnog gradskog prevoza putnika</td><td>2+2+1+2</td></tr>
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<tr><td>Ishodi učenja:
(Znanje; vještine; kompetencije)</td><td>Studenti kroz nastavni proces predavanja, vježbi i praktičan rad trebaju steći odgovarajuća znanja vezano za planiranje, organizaciju i upravljanje javnim gradskim prebozom putnika.
Izučavanje i praktična primjena, treba da osigura potreban nivo znanja za racionalnu organizaciju prevoza putnika u javnom gradskom putničkom prevozu u skladu sa saobraćajnim potrebama korisnika i interesima društvene zajednice i davaoca usluga.
Osposobiti studente za pravilno tretiranje, planiranje i rješavanje problematike javnog gradskog putničkog prevoza u gradovima.</td></tr>
<tr><td>Cilj održivog razvoja (SDG):</td><td>Ciljevi i podciljevi održivog razvoja (SDG) koji se mogu povezati 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,</td></tr>
</table>

	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, uključujući urbanu infrastrukturu, s fokusom na poboljšanje pristupačnosti i efikasnosti gradskih transportnih sistema. • 9.4 Do 2030. godine unaprijediti infrastrukturu i industrije da postanu održive, s povećanom učinkovitošću resursa i većim korištenjem čistih i ekološki prihvatljivih tehnologija u javnom gradskom prevozu. Cilj 11: Održivi gradovi i zajednice Podciljevi: • 11.2 Do 2030. godine osigurati pristup sigurnim, pristupačnim, pristupačnim cijenama i održivim transportnim sistemima za sve, s posebnim naglaskom na javni gradski prevoz, te na potrebe ranjivih grupa kao što su žene, djeca, osobe s invaliditetom i starije osobe. • 11.3 Do 2030. godine povećati inkluzivnu i održivu urbanizaciju, s fokusom na integraciju javnog gradskog prevoza u urbanističke planove i politike. Cilj 12: Održiva potrošnja i proizvodnja Podciljevi: • 12.2 Do 2030. godine postići održivo upravljanje i učinkovito korištenje resursa, posebno u kontekstu potrošnje energije i materijala u javnom gradskom prevozu. • 12.7 Promovirati održive prakse javne nabave, uključujući nabavku ekološki prihvatljivih vozila i tehnologija za javni gradski prevoz. Cilj 13: Klimatska akcija Podciljevi: • 13.2 Integrirati mjere klimatskih promjena u nacionalne i lokalne politike, strategije i planiranje, s fokusom na smanjenje emisija stakleničkih plinova iz javnog gradskog prevoza. Povezanost s nastavnim cjelinama: • Razvoj javnog gradskog prijevoza (1) i osnove javnog gradskog prevoza putnika (2) usklađeni su s ciljevima infrastrukture i urbanizacije. • Istraživanje i planiranje (3), modeliranje (6), te dizajn sistema javnog gradskog prevoza (7) su ključni za postizanje učinkovitog i održivog transportnog sistema. • Prevozni zahtjevi korisnika usluga (4) i ponuda usluga (5) povezani su s ciljem osiguranja pristupačnih i održivih usluga za sve. • Ekonomski aspekti ponude usluga (15) doprinose razumijevanju financijske održivosti i efikasnosti javnog

	gradskog prevoza, što je povezano s ciljevima održive potrošnje i klimatskih akcija.
Metode izvođenja nastave:	Predavanja, vježbe i izrada seminraskog rada sa praktičnim 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: 3. Mehanović, M., 2011. „Planiranje ponude usluga u gradskom prometu putnika“. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo. 4. Mehanović, M.: “Zadaci i primjeri iz teorije i prakse u javnom gradskom prevozu putnika”, Fakultet za saobraćaj i komunikacije, Sarajevo, 2005. 5. Banković, R.: Planiranje javnog gradskog putničkog prevoza, IRO Građevinska knjiga, Beograd, 1984. Dopunska: 1. Mehanović, M., 2017. „Planiranje u saobraćaju, prevozu i komunikacijama “. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo.

	2. Jović J.: Planiranje saobraćaja u gradovima- praktikum Saobraćajni fakultet, Beograd, 1996. 3. Vučić, V.: Urban Public Transportation, Sistems and Technology, Prentice Hall International England, 1981. 4. HZDP Zagreb, Časopisi

Šifra predmeta: 30-31-3TRWES010306	**Naziv predmeta: TRANSPORT I OKOLIŠ**		
Ciklus: I	**Godina: III**	**Semestar: VI**	**Broj ECTS kredita:** 6
Status: Izborni 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	**Nastavnici i saradnici izabrani na oblast kojoj predmet pripada/predmet**		
Preduslov za upis:	NE		
Cilj (ciljevi) predmeta:	Sticanje edukacijskih i praktičnih znanja u realizaciji programa iz oblasti transporta i okoliša. Sticanje znanja i vještina za adekvatno tretiranje problematike međuzavisnosti transporta i okoliša, te sposobnostima izrade praktičnih analiza i istraživanja.		
Tematske jedinice:	1. Multidimenzionalnost saobraćaja i okoliša 2. EU i BiH legislativa o zaštiti okoliša 3. Vrste i kvalitet goriva u funkciji zaštite okoliša 4. Cestovni saobraćaj i zagađenje zraka 5. Zračni saobraćaj i zagađenje zraka 6. Željeznički saobraćaj i zagađenje zraka 7. Informacijski sistem za zaštitu okoliša – CORINAIR, AE DEM 8. Zagađenje bukom i okoliš 9. Zagađenje bukom i cestovni saobraćaj, saobraćajni modeli cestovne buke 10. Zagađenje bukom i zračni saobraćaj 11. Zagađenje bukom i željeznički saobraćaj 12. Elementi i način izrade karte buke 13. Elementi izrade studija uticaja na okoliš 14. Zaštita okoliša ISO standardi 15. Vibracije od saobraćaja i uticaj na okoliš		
Ishodi učenja:	Znanje: Teorijska i praktična znanja iz oblasti uticaja transporta na okoliš. Osnovni propisi, pravila, metode i postupci u oblasti procjene i analize stanja okoliša u zavisnosti od transportnih aktivnosti. Vještine: Sposobnost primjene teorijskih i praktičnih znanja iz oblasti međuzavisnosti transporta i okoliša u funkciji očuvanja i zaštite okoliša sa jedne		

	strane, odnosno unaprijeđenja i razvoja 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 i procedura monitoringa (kvaliteta zraka i zagađenja bukom) u funkciji zaštite okoliša uz balansiran pristup unaprijđenja i razvoju transporta.
Ciljevi održivog razvoja (CDG):	SDG4 – Kvalitetno obrazovanje - Osigurati uključivo i kvalitetno obrazovanje, te promovirati mogućnosti cjeloživotnog učenja svih ljudi, svih životnih dobi SDG5-Rodna ravnopravnost - Postići rodnu ravnopravnost i osnažiti sve žene i djevojčice. SDG8-Dostojanstven rad i ekonomski rast - Promovirati uključiv i održiv ekonomski rast, zaposlenost i dostojanstven rad za sve. SDG9- Industrija, Inovacije i Infrastruktura -Izgraditi izdržljivu infrastrukturu, promovirati uključivu i održivu industrijalizaciju i poticati inovativnost. SDG11 – Održivi gradovi i lokalne zajednice - Učiniti gradove i naselja uključivim, sigurnim, prilagodljivim i održivim. SDG12-Održiva potrošnja i proizvodnja - Osigurati održive oblike potrošnje i proizvodnje. SDG13-Zaštita klime - Poduzeti hitne akcije u borbi protiv klimatskih promjena i njihovih posljedica SDG17- Partnerstvom do ciljeva- Uvrstiti globalno partnerstvo za održivi razvoj
Metode izvođenja nastave:	Usmeno iznošenje sa prezentacijom i prikazom različitih sistema i procesa iz oblasti međuzavisnosti transporta i okoliša, uz korištenje video i audio zapisa, te samostalno izlaganje pojedinih konkretnih problema uticaja transporta na okoliš na konkretnom području istraživanja. Iniciranje rasprava i diskusija o problemima iz prakse, pojedinačnih zapažanja iz različitih okruženja. Izrada samostalnih istraživanja i analiza iz oblasti međuzavisnosti transporta i okoliša u okviru laboratorije, na terenskim uslovima i drugim specifičnim uslovima proizvodnih i uslužnih procesa.
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,

<table>
<tr><td></td><td>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:
<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. Golubić, J., Promet i okoliš, Fakultet prometnih znanosti, Zagreb, 1999.
2. Lindov, O., Transport i okoliš, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2011.
3. Lindov, O., Saobraćajna kultura, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2012.
4. Lindov, O., Omerhodžić, A., Transport i okoliš, Skripta predavanja, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2013.
5. Lindov, O., Omerhodžić, A., Transport i okoliš, Skripta zadataka, testovi za polaganje, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2013.
6. Lindov, O., Pronello, C., Transport and environment air and noise pollution from transport activities, Politecnico di Torino, Department of Hydraulics, Transport and Civil Infrastructures, University of Sarajevo, Faculty of Traffic and Communications, University of Southampton, Department of Civil and Environmental Engineering, Transportation Research Group.
7. Lindov,O., Uticaj cestovnih vozila i cestovne infrastrukture na ekološke parametre, referat na međunarodnom skupu pod naslovom “Ekološki problemi suvremenog saobraćaja”, ANU BiH, 2006.godine.
Dopunska:</td></tr>
</table>

	1. Barth M., Norbeck, J.M., Ross, M., NCHRP Project 25-11: The Development of a Comprehensive Modal Emissions Model, 7th CRC On-road Vehicle emissions workshop, San Diego, California, April 9-11, 1997. 2. Lindov, O,. Noise modeling and vibrations, „I Transversal, South Longitudinal and XII Transverzal“ Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2010. 3. Lindov, O., Čekić, Š., Studija saobraćaja na području Kantona Sarajevo, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo 2005. 4. Lindov, O., Čaušević, S.,Studija Uticaj saobraćaja na okoliš na području Zeničko – dobojskog kantona, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2009. 5. Lindov, O., Sigurnost u cestovnom saobraćaju, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2008. 8. Lindov, O., Kazivanja o saobraćaju – Hronologija odabranih kazivanja u medijima 2002-2012, Institut za saobraćaj i komunikacije, Udruženje inžinjera u Bosni i Hercegovini, Sarajevo, 2013.

Opis silabusa na studijskom programu Željeznički saobraćaj na engleskom jeziku

Course code: 01ATCOS010101	**Course title: MATHEMATICS FOR ENGINEERS I**		
Level: I	**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 (Exercises) 45	
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 basic knowledge for continuing to follow higher-level mathematical disciplines that appear in the subjects: Mathematics for Engineering II and Applied Mathematics and Statistics, and in this way create prerequisites for applying mathematical tools in monitoring, understanding and studying phenomena that appear in professional subjects in the field traffic and communication.		
Topics covered (Units of study):	1. Mathematical logic: Logical operations with statements. Relations, sets and mappings.		

(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)	2. Sets of real and complex numbers: Natural numbers. Mathematical induction. Newton's binomial formula. Different forms of complex number 3. Linear algebra: Concept of matrix. Operations with matrices. The term determinant. Systems of linear equations: Gauss's method of elimination, Kramer's rule and Kronecker-Kapeli's theorem. 4. Linear algebra: Vector algebra. Operations with vectors. Scalar product. Vector product. Mixed product. 5. Analytical geometry of space: Plane in space. Rights in space. Distance of a point from a line. Mutual relationship of two lines in space. Interrelationship between line and plane. 6. Sequences and rows: Limes sequence. Convergence criterion. Monotonic sequences. An infinite queue. 7. Functions of a real variable: Properties of functions of one variable. Limit value of functions of one variable. 8. Differential calculus of functions of one variable: Continuity of functions. Elementary functions 9. Differential calculus of functions of one variable: The concept of derivatives of functions of one variable. The geometric meaning of the derivative. The mechanical meaning of the derivative. 10. Differential calculus of functions of one variable: Differentiability and differential of functions. Derivatives and differentials of higher order. Differentiation rules. 11. Differential calculus of functions of one variable: Application of differential calculus. Rolle's, Cauchy's and Lagrange's theorems. L'Hospital's rule. Taylor's formula. Maclaurin's formula. 12. Examining the functions of a real variable: Monotonicity of functions. Determination of local extreme values. Convexity, concavity and inflection points of functions. Flow test. Graphing functions. 13. Indefinite integral: Primitive function and indefinite integral. Properties of the indefinite integral. Integration rules. Integration methods. 14. Definite integral: Properties of the definite integral. Newton – Leibniz formula. Improper integral 15. Application of the definite integral in geometry: Application of the definite integral to the calculation of the area of a plane figure, the length of the arc of a curve in a plane, the volume of a body and the area of revolving surfaces.
Learning outcomes:	Knowledge: • solve and apply systems of linear equations, • define and solve problems described by vectors, applying operations with vectors, • demonstrate an understanding of the basic concepts of analysis: limit values, differentiation and integration of real functions with one real

	variable, • apply differentiation procedures in solving the problem of extremes, • draw graphs of functions based on the application of the first and second derivative for its analysis, • define and calculate the indefinite integral using the substitution and partial integration methods, • understand and apply procedures for integration of rational functions, use integration to calculate area and volume. Skills: encourages creativity, precision, systematicity, abstract thinking and critical thinking, which helps in noticing and solving problems, which is essential for continuing education. Competences: presentation and communication in mathematical language, logical thinking, argumentation and reasoning
Sustainable Development Goal (SDG):	SDG 4 – Quality education SDG 9 – Industry, innovation and infrastructure
Teaching methods:	Theoretical lectures with the use of multimedia tools, active learning and discussion techniques, practical teaching - exercises, and independent presentation and solving of specific specific problems.
Assessment methods with grading structure:	The criterion for evaluating the work and evaluating the student during classes is as follows: Tests during the semester from 0 - 15 points; 1st partial exam/1st test/1st knowledge test/ from 0 - 35 points (passed if more than 50% is won). The total number of points that a student can achieve according to the above-mentioned monitoring during classes is a maximum of 50 points. The final exam is organized from the entire material covered during the course and amounts to a maximum of 50 points, of which there is the II partial exam of 0 - 25 points (passed if over 50%) and Theory and tasks of 0 - 25 points, which lasts 60 min (students pass the theory and tasks they did not do in the partial exams). At the final exam, students can correct the I partial exam, if they did not pass it earlier. The same applies to the remedial exam period of the final exam and both dates of the autumn exam period. 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 (A) - exceptional success without mistakes or with minor mistakes, carries 95-100 points; b) 9 (B) - above average, with some errors, carries 85-94.9 points; c) 8 (C) - average, with noticeable errors, carries 75-84.9 points; d) 7 (D) - generally good, but with significant shortcomings, carries 65-74.9 points; e) 6 (E) - meets the minimum requirements, carries 55-64.9 points; f) 5 (F, FX) - does not meet the minimum conditions, 0 – 54.9 points. 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 and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations Points (%) Mini-tests during classes.....15 points (%) I Partial exam/Test/Knowledge check/.....35 points (%) Final exam (II Partial + Theory) .....50 points (%)
Literature:	Mandatory: 1. M. Uščumlić, P.Miličić, Zbirka zadataka iz više matematike I, Naučna knjiga, Beograd 2. Kostić, V. Hadžiabdić, M. Mehuljić, J. Bektešević, Matematika I – teorija sa urađenim zadacima, Mašinski fakultet Sarajevo, 2011. ISBN 978-9958-601-32-3. 3. Alma Omerspahić, Vahidin Hadžiabdić, Midhat Mehuljić, Jasmin Bektešević, Teorijske osnove i zbirka zadataka iz integralnog računa, Mašinski fakultet Sarajevo, 2012. Supplementary: 1. P. JAVOR: Matematička analiza I, Element, Zagreb,1996. 2. S. KUREPA: Matematička analiza 1 i 2, Tehnička knjiga, Zagreb, 1972.

Course code:	**Course title: GRAPHICS FOR ENGINEERS**		
Level: I (first)	**Year: I (first)**	**Semester: I (first)**	**Number of ECTS credits:** 6
Status: Mandatory course		**Total number of contact hours: 90** Lectures: 45 Tutorials: 45	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Training students for universal engineering communication, communicating with drawings, introducing students to the basics of technical drawing and design geometry, as well as the content and application of standards in the field of graphic communications and technical documentation. Training students to read and understand technical drawings and various technical situations, with special reference to traffic situations. Training students to create technical drawings using computer tools.		

Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	- Introduction – significance and application of graphic communications in technology. - Practical examples of drawings in the field of traffic and communications. - Computer programs and CAD systems in the field of traffic and communications. - Standardization in graphic communications. - Technical drawings, types of drawings, methods of their formation, drawing formats, headers and components. - Technical fonts and technical freehand sketching. - Types of lines and their use. - Construction of curved lines and circular arcs. - Scale. - Drawings of parts and situations on drawings with the basics of drawing geometry. - Projecting. Types of projections, axonometric projection, isometry, dimetry and oblique projection. - Orthogonal projection. - Sections, types of sections and hatching. - Dimensioning. - Drawing of basic standard elements in the field of traffic and communications. - Computer-aided creation of 3D models and technical documentation of products and situations. - Use and introduction of CAD systems in engineering practice. - Historical development of the CAD systems. - Basics of CAD system. - Principles of CAD system operation. - The difference between 2D and 3D CAD systems. - Basics of application of GIS (geographical information system) systems in the field of traffic and communications.
Learning outcomes:	**Knowledge:** Developing the ability to independently set up and solve simpler problems in the aforementioned areas. Adopts an engineering approach to problem solving. **Skills:** Ability to apply theoretical and practical knowledge in the field of engineering graphics. **Competencies:** Through the curriculum and examples from real situations, students should be able to present ideas graphically, as well as a universal, unambiguous understanding of technical documentation with the application of standard elements of graphic communication.
Sustainable Development Goal (SDG):	GOAL 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. GOAL 9: Build resilient infrastructure, promote inclusive and

	sustainable industrialization and foster innovation
Teaching methods:	Oral presentation with presentations and display of various problems with the use of certain didactic tools. Independent work of students on concrete problems in the field of engineering graphics.
Assessment methods with grading structure:	Criterion of student's progress and evaluation during classes and through partial, final and remedial exams. According to the following method: - Regular attendance at lectures and exercises ….. 10 points, - Project assignments ……. 25 points, - I Partial exam/test/knowledge check/ …… 30 points, - II Partial exam/test/knowledge check/ …….. 35 points. The total number of points that a student can achieve according to the above-mentioned monitoring during classes is a maximum of 100 points (%). Student is passed if he/she collects a minimum of 55 points according to the above criteria. The final and remedial exam is organized for students who have not passed first, second or both knowledge tests. A maximum of 60 points can be scored on the final and remedial exam, which with project assignments and points based on class attendance makes a total of 100 points. The final success of the student, after all the foreseen forms of knowledge testing, is evaluated and graded 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 errors, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with significant errors, 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 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 and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations Points Attendance at lectures and exercises... ..... 10 points (minimum 80% attendance in all forms of classes is mandatory and this

	is a condition for certification/signature of regular attendance) Project tasks ....……. 25 points I Partial exam/Test/Knowledge check/..... 30 points II Partial exam/Test/Knowledge check/..... 35 points Final exam (I and/or II partial) ..... 60 points Remedial exam (I and/or II partial) ..... 60 points
Literature:	Mandatory: 1. Milan Kljajin and Milan Opalić: Engineering graphics, Faculty of Mechanical Engineering in Slavonski Brod, 2020. Additional: 1. Samir Lemeš: Computer graphics and geometric modeling, Zenica, 2017.

Course code: 03ATCOS010101	**Course title:** **BASICS OF TRAFFIC AND COMMUNICATION SYSTEMS**		
Level: I	**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):	Acquisition of knowledge and skills necessary for understanding the structure and functions of transport, traffic and communication systems. Acquisition of basic knowledge about transport, traffic and communication processes, their development and management.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Concept and significance of traffic and communication system 2. Basic characteristics of the transport substrate 3. Transport devices 4. Manipulation means and transport equipment 5. Man as a component of traffic and transport system 6. Basic concept and functions of transport modes 7. Capacity and service level of the transport system 8. Basic characteristics and challenges of mobility 9. Mode of road transport 10. Mode of rail transport 11. Mode of air transport 12. Mode of water transport		

	13. Mode of pipeline transport 14. Postal and communication technologies 15. Information and communication technologies in transport
Learning outcomes:	Knowledge: The subject Basics of traffic and communication systems should provide the necessary level of knowledge about the basic components and functions of transport, traffic and communication systems and the specific characteristics of individual modes of transport and the way transport and communication processes unfold. Skills: The course Basics of traffic and communication systems enables the acquisition of skills necessary for measuring, analyzing and evaluating the efficiency, safety, environmental impact and economic benefits of the transport system and individual modes of transport. Competences: Through the teaching process of lectures, exercises, and seminar work, students should acquire appropriate competencies for analyzing the functions and characteristics of components of the transport and communication system and the possibility of using different modes of transport in order to take advantage of the advantages of each mode of transport.
Sustainable Development Goal (SDG):	"SDG3 - Health and well-being"; "SDG 9 Industry, innovation and infrastructure", "SDG11- Sustainable cities and communities", SDG 13- Climate protection"
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 2. study of the Faculty of Traffic and Communications Supplementary: 1. Bert van Wee, Jan Anne Annema: The Transport System and 2. Transport Policy, Edward Elgar, Massachusett s, 2013. 3. Milan Janić : Advanced Transport Systems, Springer, 4. London, 2014. 5. Mehrdad Ehsani, Fei-Yue Wang: Transportation 6. Technologies for Sustainability, Springer, London, 2012.

Course code: 04ATCOS010101	**Course title: COMPUTER SCIENCE AND INFORMATICS**		
Level: I	**Year: I**	**Semester: I**	**Number of ECTS credits: 6**

Status: Mandatory course	**Total number of contact hours: 90**
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 Computer Science and Informatics course is to acquire knowledge and master skills that contribute to the development of information literacy necessary for further study. Students should familiarize themselves with the basic characteristics of computers, the way they work and their capabilities, i.e. achieve an understanding of the architecture of computer systems, operating systems and application software.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	- Introduction to computing and informatics - Basic terms in computer science and computer science and computer development - Number systems and codes in computing - Computer architecture and components - Data storage devices - Operating systems - Application software - Computer networks and services - Wireless and mobile networks - Network multimedia services - Tools for creating web pages - Programming languages for software development - Databases - Cryptocurrencies - Artificial intelligence - Security in computing and informatics - The future in computing and informatics
Learning outcomes:	Knowledge: Students will acquire theoretical and practical knowledge about computing and informatics, and will be provided with a basic level of knowledge about hardware and software, as well as their application in various fields of traffic and communications. Skills: Students are expected to master the skills and tools used in computing and informatics. Competencies: Students will be trained to participate in activities related to computing and informatics in the context of traffic and communications.
Sustainable Development Goal (SDG):	SDG 4 – Quality education SDR 9 – Industry, innovation and infrastructure
Teaching methods:	The teaching is realized through lectures, exercises and the practical part

	of the teaching, which includes the creation of seminar papers. Lectures are carried out through oral presentation with presentation and presentation of examples from practice, and initiation of discussion. 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 by applying 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 obtain 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 obtained 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 assignment:..... 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.
Literature:	Mandatory: - Milosavljević, M., Veinović, M., Grubor, G.: „Informatika“, Univerzitet Singidunum, Beograd, 2009. - Kozić, M.: „Uvod u informatiku i računarstvo“, Mostar, 2006. - Baraković, S., Baraković Husić, J.: „Osnove modelovanja prijetnji u oblasti informaciono-komunikacijskih sistema“, Dobra knjiga, 2022. Supplementary: – Plazibat, B., Jerčić, S.: „Informatika“, Veleučilište u Splitu, Split, 2005. – Tanenbaum, A.S.: "Structured Computer Organization", 4 izdanje, Prentice Hall, 1999. – Mark Burel, „Fundamentals of Computer Architecture“, Palgrave Macmillan, 2003. – Hennessy J. L., Patterson D. J.: "Computer Architecture: A Quantitative Approach", Morgan Kaufman. – Tanenbaum, A.S.: „Računarske mreže“, prevod četvrtog izdanja, Mikro knjiga, 2005.

Course code: 05ATCOS010101	**Course title: ELECTRICAL ENGINEERING SYSTEMS IN TRAFFIC AND COMMUNICATIONS**		
Level: I	**Year:** I	**Semester: I**	**Number of ECTS credites:** 6
Status: mandatory 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):	The course aims to present students with the fundamental concepts of electrical systems in transport and communications, and their treatment through mathematical terms. Basic concepts of phenomena in electrical engineering, essential for the foundational training of future transport and communications engineers, will be covered. Students are expected to acquire knowledge related to scientific methodology and natural laws, allowing them to approach phenomena in electrical engineering from both qualitative and quantitative perspectives.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Electric Charge and Matter: Coulomb's law of force, distribution of electric charges. Electric field: definition, calculation examples. Gauss's theorem for the electric field in integral form. Electric potential: work of electric field forces, conservative nature of the electric field. Potential and potential difference, principle of superposition when calculating potential. Electric capacitance: system of charged conductors, isolated conductor. Definition of electric capacitance, calculation examples of capacitance. Capacitor connections. Electrostatic energy. Behavior and application of capacitors in direct and alternating current circuits. Dielectrics and material polarization. 2. Direct Current Electrical Circuits: Definition of electrical conductivity and steady electric currents, Ohm's law, electrical conductivity, electrical resistance, specific electrical resistance, series and parallel resistors. Joule's law. Energy exchange in an electric circuit. Kirchhoff's laws. The law of energy conservation in an electrical circuit. Methods of analysis for direct current electrical circuits. 3. Magnetic Field: Magnetic interaction, electricity and magnetism. Magnetic force on a moving electric charge, magnetic force on a current-carrying conductor. Sources of the magnetic field, Ampere’s law in its basic form, magnetic properties of materials: magnetic field generated by current, Biot–

	Savart law, electrodynamic force, magnetic properties of materials. Time-varying electric and magnetic fields: characteristics of the electromagnetic field, Faraday's law of electromagnetic induction, Lenz's principle, induced electromotive force. Application of Faraday's law: alternating current generators, electric motors. Self-induction, inductive electric circuit. 4. Electrical Circuits with Time-Varying Currents and Lumped Parameters: Basic electrical quantities: voltage, current, power. Kirchhoff's laws. Two-pole elements: resistor, current and voltage sources, short circuit and open circuit. Series and parallel connections. Basic dynamic circuits: inductors and capacitors: energy and initial conditions. First-order circuits (RC and RL) connected to direct current voltage. 5. Circuits in Steady-State Sinusoidal Operation: Periodic signals and effective value. Relationship between sinusoidal signals and phasors. Kirchhoff's laws in phasor representation. Impedance, admittance, reactance, and susceptance of two-pole elements in sinusoidal operation. Analysis of dynamic circuits in sinusoidal operation (RC, RL, and RLC). Active, reactive, and apparent power. 6. Three-Phase Systems: Delta and star connections, symmetric and asymmetric operation. Three-phase rotating field, principle of electric motor operation. 7. Transformers: Principle of operation, linear transformer. Basics of operation of commutator and asynchronous electric machines: principles and energy balance of electromechanical energy conversion. 8. Basic Measurements of Electrical Quantities: Basics of measurement techniques and error calculation. Basic measuring equipment. Analog and digital measuring instruments. Methods for measuring electrical quantities. 9. Analog Electronics: Electrical properties of semiconductors, electrons and holes. Donors and

	acceptors. Characteristics of the p-n junction: Open p-n junction. Diode (p-n junction) as a rectifier. Forward-biased p-n junction. Reverse-biased p-n junction. Static characteristic of the diode. Application of the diode's linear model. Principle of transistor operation. Transistor currents. Common-emitter configuration. Transistor operating regions. 10. Fundamentals of Digital Technology: Boolean algebra. Basic logic gates. Basic connections of AD and DA converters.
Learning outcomes: (Knowledge; Skills; Competencies)	Knowledge: Theoretical and practical knowledge in the field of electrical systems in transport and communications. Fundamental principles of electrical engineering and electronics, and their application in engineering. Skills: Upon successful completion of the course, the student will be able to apply the basic principles of electrical systems in their further studies. Competencies: The student will be capable of analyzing and proposing potential models and methods for solving problems in electrical systems.
Sustainable Development Goal (SDG):	SDG 4 – Quality Education; SDG 12 – Sustainable Consumption and Production
Teaching methods:	The course content is delivered through three activities: 1. Lectures: Conducted in the classroom for all students by the instructor, where theoretical aspects are presented along with the solving of numerical problems and practical examples. The lectures are supported by the use of video and audio recordings. 2. Exercises: These sessions involve solving additional numerical and practical problems, including solving past exam problems to enhance the understanding of the theoretical topics presented. 3. Laboratory Exercises: Students are introduced to practical measurements and the use of measurement equipment to demonstrate specific principles in the field of electrical engineering. Students are therefore expected to regularly participate in all forms of instruction and engage in continuous independent study.

Assessment methods with grading structure:	Criteria for Monitoring and Grading Student Performance During the Course are structured as follows:
	• Homework/Seminar Paper: 15 points (15%), passing with more than 50% of the points.
	• First Midterm Exam/Knowledge Check: 35 points (35%), passing with more than 50% of the points.
	• Final Exam: 50 points (50%), consisting of two parts:
	  o Second Midterm Exam/Knowledge Check: 35 points (35%), passing with more than 50% of the points.
	  o Oral Exam: 15 points (15%), with no minimum point threshold.
	
	The total number of points a student can earn during the course is a maximum of 50 points (50%), combined with the Final Exam to reach 100 points (100%).
	
	For students who did not pass the First Midterm Exam, the Final Exam (Comprehensive) covers the entire content taught during lectures and exercises and is worth 85 points (85%), which, combined with the seminar paper/practical work, makes up 100 points (100%).
	
	The final grade is determined based on the total number of points obtained through all forms of assessment, using the following grading scale:
	• A (10) – Outstanding performance with no or minimal errors, 95-100 points;
	• B (9) – Above average, with minor 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) – Satisfactory, meets minimum criteria, 55-64 points;
	• F/FX (5) – Fails to meet minimum criteria, fewer than 55 points.
	Total evaluation of all student obligations during the semester and the final exam is based on the total points (%) obtained through fulfilling pre-exam obligations and passing the midterm and final exams, with a maximum of 100 points. The evaluation is determined according to the following scale:
	Student Obligations — Points (%)
	Homework/Seminar Paper — 15 points (%)

	First Midterm Exam/Knowledge Check	35 points (%)
	Final Exam (Second Midterm/Oral Exam)	50 points (%)
	Final Exam (Comprehensive)	85 points (%)
Literature:	Required: 1. I. Turković: Bilješke i slajdovi sa predavanja i vježbi 2. E. Hot: Osnovi elektrotehnike, knjiga prva, Sarajevo, 1996. 3. E. Hot: Osnovi elektrotehnike, knjiga druga, Sarajevo, 1996. 4. D Milatović: Osnovi elektronike, Svjetlost, Sarajevo 1995.	

Course code: 06ATCOS010102	**Course title: MATHEMATICS FOR ENGINEERS II**		
Level: I	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: Mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 45 Exercises 45	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Students upgrade basic knowledge with mathematical thematic units of a higher level of understanding. In this way, students become trained to recognize the application of this general knowledge to concrete practical problems (which arise from the field of professional subjects), and to independently define and solve them.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Functions of several variables: Basic terms. Limit value and continuity 2. Differential calculus of functions of several variables: Differentiation. Tangent plane and normal to the spatial surface. Higher order pracial derivative. Higher order differential. Taylor's formula for functions of two variables 3. Differential calculus of functions of several variables: Extreme values of functions of several variables. Conditional extremum of a function of several variables. 4. Integral calculus of functions of several variables: Calculation of the double integral. Calculation of the triple integral.		

	5. Differential equations: Differential equations of the first order: Differential equation with a separated variable. Homogeneous equation. Linear differential equation. Bernoulli's equation. Riccati's equation. Kler's equation. Lagrange's equation. 6. Differential equations: Differential equations of a higher order that allow lowering of the order. Higher order linear differential equations. 7. Differential equations. Systems of differential equations. 8. Line integrals: Line integrals of type I and II (definition, properties, calculation). Independence of the line integral from the path. Green's formula in the plane. 9. Surface integrals: Surface integrals of type I and II (definition, properties, calculation). Gauss-Ostrogradsky formula. Stokes formula. 10. Elements of field theory and vector analysis: Scalar field and its basic characteristics. Vector field and its basic characteristics. Vector lines. 11. Elements of field theory and vector analysis: Divergence of a vector field. Green – Gauss-Ostrogradski theorem. Circulation of the vector field. Vector field rotor. Stokes theorem in vector form. Potential field, solidoid field, Laplace field. 12. Theory of queues: Number queues. Rows with positive members. Queues with complex members. 13. Series theory: Series and series of functions. Uniform convergence of the order. Degree order. 14. Series theory: Laurent's series. Fourier's order. 15. Laplace transformation.
Learning outcomes:	Knowledge: - Students master the differential calculus of functions of several variables, - set up and solve differential equations and apply them to specific problems, - solve and apply systems of differential equations, - apply differentiation procedures in solving the problem of extrema of multi-variable functions, - define and calculate double, triple, line and surface integrals with the possibility of recognizing their application to specific problems, - demonstrate an understanding of the basic concepts of vector analysis Skills: encourages creativity, precision, systematicity, abstract thinking and critical thinking, which helps in noticing and solving problems, which is essential for continuing education. Competences: presentation and communication in mathematical language, logical thinking, argumentation and reasoning.
Sustainable Development Goal (SDG):	SDG 4 – Quality education SDR 9 – Industry, innovation and infrastructure
Teaching methods:	Theoretical lectures with the use of multimedia tools, active learning and

	discussion techniques, practical teaching - exercises, and independent presentation and solving of specific specific problems.
Assessment methods with grading structure:	The criterion for evaluating the work and evaluating the student during classes is as follows: Tests during the semester 0 - 15 points; 1st partial exam/1st test/1st knowledge test/ from 0 - 35 points (passed if more than 50% is won). The total number of points that a student can achieve according to the above-mentioned monitoring during classes is a maximum of 50 points. The final exam is organized from the entire material covered during the course and amounts to a maximum of 50 points, of which there is the II partial exam of 0 - 25 points (passed if over 50%) and Theory and tasks of 0 - 25 points, which lasts 60 minutes (students pass the theory and tasks they did not do in the partial exams). At the final exam, students can correct the I partial exam, if they did not pass it earlier. The same applies to the remedial exam period of the final exam and both dates of the autumn exam period. 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 (A) - exceptional success without mistakes or with minor mistakes, carries 95-100 points; b) 9 (B) - above average, with some errors, carries 85-94.9 points; c) 8 (C) - average, with noticeable errors, carries 75-84.9 points; d) 7 (D) - generally good, but with significant shortcomings, carries 65-74.9 points; e) 6 (E) - meets the minimum requirements, carries 55-64.9 points; f) 5 (F, FX) - does not meet the minimum conditions, 0 – 54.9 points. 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 and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations Points (%) Mini-tests during classes.....15 points (%) I Partial exam/Test/Knowledge check/.....35 points (%) Final exam (II Partial + Theory) .....50 points (%)
Literature:	Mandatory: 1. J. Bektešević, V. Hadžiabdić, M. Mehuljić, E. Pilav Teorijske osnove i zbirka riješenih zadataka iz višestrukih, krivolinijskih i površinskih integrala, PMF, Sarajevo 2018. 2. P. Miličić, M. Uščumlić, Zbirka zadataka iz više matematike II, Nauka, Beograd, 1998

	3. A.Omerspahić, V.Hadžiabdić, M.Mehuljić, J.Bektešević, Teorijske osnove i zbirka zadataka iz integralnog računa, Mašinski fakultet Sarajevo, Sarajevo 2012. 4. D. Mihailović, D. Đ. Tošić, Elementi matematičke analize II, (Funkcije više promjenljivih, 5. vektorska analiza, višestruki integrali i teorija polja), Naučna knjiga, Beograd, 1976; 1988; 1991. 6. B.P. Demidovič: Zadaci I riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1963 Supplementary: 1. S. Kurepa: Matematička analiza 2 i 3, Tehnička knjiga, Zagreb, 1976. 2. A.Omerspahić, Matematika 3, Mašinski fakultet Sarajevo, Sarajevo 2012.

Course code: 07ATCOS010102	**Course title: TECHNICAL MECHANICS**		
Level: I	**Year: I**	**Semester: II**	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours: 90** Lectures 45 Exercises 45	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	Adoption of basic concepts and laws: Statics of rigid and solid bodies, Kinematics and Dynamics with the aim of training for successful monitoring and acquisition of knowledge from other professional subjects. Understanding of mechanical processes and application of acquired knowledge when solving problems related to the equilibrium conditions of rigid bodies, stress analysis and dimensioning of solid bodies, solving problems related to the geometry and kinematic characteristics of motion as well as problems that consider the causes of motion. Developing the ability to independently set up and solve simpler problems in the		

	aforementioned areas. Adopts an engineering approach to problem-solving.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction. Statics of rigid bodies. Connections and Connection Reactions. 2. Systems of interface forces. A static moment of force for a point. Coupling of forces 3. Reduction of force to a point. An arbitrary system of forces in a plane. 4. Beam supports in a plane 5. Friction. Center of gravity 6. Introduction to material resistance. External forces. Strain. Deformations 7. The relationship between stress and strain. Axial stress. 8. Shearing. Geometric characteristics of plane sections. 9. Bending. Twisting. 10. Introduction to kinematics. Kinematics of a particle. Straight-line harmonic oscillatory clipping. 11. Rigid body kinematics. Translational movement. 12. Rotation of the body around a fixed axis. Analysis of mechanisms 13. Introduction to dynamics. Laws of dynamics. Differential equations of motion of a point and their integration. 14. General laws of point dynamics Work and power 15. Forced motion of a point and Dalamber's principle, Impact theory
Learning outcomes:	Knowledge: Knowledge of basic terms and laws, such as statics of rigid and solid bodies, Kinematics and Dynamics. Skills: Ability to recognize problems related to equilibrium conditions of rigid bodies, stress analysis and dimensioning of solid bodies, solving problems related to geometry and kinematic characteristics of motion as well as problems that censider the causes of motion. Ability recognition basic characteristic scientific research and transmission conclusions and reasons which are up to them brought. Competencies: Through educational process lectures and exercises, the student will be able, at basis adopt knowledge that: – Understands and points out the causes that lead to changes in the state of rest and mechanical movement of the body in nature, to determine the kinematic and dynamic characteristics of movement. – Follows and acquires knowledge from other professional subjects. – Uses technical literature, manuals and tables from this field. – Independently set and solve simple problems in the mentioned areas

Sustainable Development Goal (SDG):	SGD4 – Quality educations; SDG12 – Responsible consumption and production
Teaching methods:	– Independent presentation – Discussion – Analysis of examples from practice (assignments, seminar papers)
Assessment methods with grading structure:	Assessment of creativity in classes and exercises with the creation of independent works, assessment of the partial test during the class as well as the assessment of the final exam. Criterion monitoring the work and evaluating the student during classes, according to the following method: – Homework/seminar work/practical work/ 15 points (%), passed if over 55% is won. – I Partial exam/test/knowledge check/35 points (%), passed if more than 55% is won. – Final exam (II Partial) 50 points (%), passed if over 55% is won. – Final exam (Integral) 85 points (%), passed if more than 55% is won. The total number of points (%) that a student can achieve according to the mentioned monitoring during classes is a maximum of 50 points (%), which with the Final (II partial) makes 100 points (%). For students who did not pass the 1st 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 work/practical work makes 100 points (%). The final success of the student, after all the foreseen forms of knowledge testing, is evaluated and graded 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 errors, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with significant shortcomings, 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 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 pre-exam obligations and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations _____Points (%) Attendance at lectures and exercises.....80 (%) Assignment/Seminar/Practice/.....15 points (%) I Partial exam/Test/Knowledge check/.....35 points (%) Final exam (II Partial) .....50 points (%) Final exam (Integral) .....85 points (%)
Literature:	Mandatory: 1. Dacić, S.: Mechanics in Traffic Engineering, Faculty of Traffic and Communications, Sarajevo, 2021. 2. Dacić, S.: Fundamentals of Mechanical Engineering, Faculty of Traffic and Communications, Sarajevo, 2007. 3. Dacić, S.: Selected chapters from the statics of rigid and solid bodies, kinematics and dynamics - script, Faculty of Traffic and Communications, Sarajevo, 2013. 4. Jurum-Kipke, J.: Mechanics in Traffic Engineering, Faculty of Traffic Sciences, Zagreb, 2001. 5. Kuzmanović, D., Kastratović, G., Vidanović, N.: Mechanics 1, University of Belgrade, Faculty of Communication, 2012. 6. Kuzmanović, D., Kastratović, G., Vidanović, N.: Mechanics 2, University of Belgrade, Faculty of Civil Engineering, 2012. Supplementary: 1. Rusov, L. Mechanics - Statics, Scientific book, Belgrade, 1992. 2. Rusov, L. Mechanics - Kinematics, Scientific book, Belgrade, 1992 3. Rusov, L. Mechanics - Dynamics, Scientific book, Belgrade, 1992 4. Beer, F., E. Russell, L., J. Kornwell. P., Vector Mechanics for Engineers, McGraw Hill, 2010. 5. Kuzmanović, D., Kastratović, G., Vidanović, N.: Collection of tasks from Mechanics 1, University of Belgrade, Faculty of Civil Engineering, 2012.

Course code: 08ATCOS010102	**Course title: TRAFFIC AND TRAFFIC SPACE**		
Level: I	**Year: I**	**Semester: II**	**Number of ECTS credits: 6**

Status: Mandtory 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):	Acquisition of educational knowledge in the field of traffic planning and practical analysis of urban, regional, and environmental traffic planning. Gaining knowledge in planning management, land use, spatial protection, setting long-term goals and measures for spatial development in line with the planned overall economic, social, and historical development of the area being addressed.
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 Spatial Planning 2. Key Characteristics of Environmental Issues 3. Measuring Levels of Social Development 4. Spatial Organization 5. Development of Spatial Planning and Spatial Organization in BiH 6. Environmental Impact Assessment 7. Legal Framework for Spatial Planning 8. Development Trends and New Approaches in Spatial Planning 9. Work Marketing 10. Elements of Sustainable Development 11. Spatial Models 12. Local Initiatives and Strategic Plans at the Local Level 13. New Dimensions of European Policy in Spatial Planning 14. Spatial Results Significant for Europe 15. Digital Technology in Spatial Planning
Learning outcomes:	Knowledge: Theoretical and practical knowledge in the field of spatial traffic planning. Basic regulations, rules, methods, and procedures in spatial planning within the context of traffic planning, as well as the analysis of traffic spatial plans. Skills: The ability to apply theoretical and practical knowledge in the field of spatial traffic planning. Competencies: The ability to independently understand and use regulations, utilize professional literature, apply methods and

	procedures, conduct measurements and research, prepare analyses, evaluations, and practical solutions for the realization and further improvement in spatial traffic planning.
Sustainable Development Goal (SDG):	"SDG3 – Good Health and Well-being"; "SDG9 – Industry, Innovation, and Infrastructure"; "SDG11 – Sustainable Cities and Communities"; "SDG13 – Climate Action"
Teaching methods:	Presentation with the demonstration of various systems and processes in the field of spatial traffic planning using video and audio recordings, and independent presentation of specific problems in a particular research area. Initiating discussions and debates on practical issues, individual observations from different environments, and the preparation of independent research and analysis of existing traffic spatial plans for the selected area.
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. Bublin, M., Traffic and Road Planning , Sarajevo, 2007. 2. Bublin, M., Spatial Planning and Environmental Protection, University Book, Sarajevo, 2010. 3. Bublin, M., Traffic and Traffic Space, University Book, Sarajevo, 2000. Supplementary: 1. Appleyard, D., Kerin, L., Majer, R., The View from the Road, Harvard. 2. Čekić, Š., Basics of Methodology and Technology of Scientific and Professional Work, Faculty of Traffic and Communications, Sarajevo, 1996. 3. Framework Traffic Strategy of Bosnia and Herzegovina, Sarajevo, 2016.

	4. The Study on the Transport Master Plan in Bosnia and Herzegovina, 2001. 5. Zelenika, R., Livio, J., Modern Transport Systems, Faculty of Economics Rijeka, Rijeka, 1995.

Course code: 09ATCOS010102	**Course title: INDUSTRIAL TRANSPORT**		
Level: I	**Year:** II	**Semester: IV**	**Number of ECTS credites:** 6
Status: mandatory course		**Total number of hours: 90** Optional breakdown of hours by type: Lectures 45 Tutorials 45	

Course participants:	Academic staff and associates selected in the field to which the course belongs/course
Prerequisite for enrollment:	No
Course goal (goals):	Acquistion of educational forms for implementing programs in industrial flow design and management.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	11. Introduction – Basics of Industrial Transport 12. Classification and Basic Characteristics of Transport Mechanization 13. Accessories and Auxiliary Devices 14. Basics of Hydraulic Systems 15. Continuous Transport Equipment 16. Discontinuous Transport Equipment 17. Handling Equipment in Industrial Transport 18. Graders, Elevators, Conveyors 19. Cable Cars 20. Curved, Vibrating, and Roller Conveyors 21. Dumpers and Tip Trucks 22. Belt Conveyors and Belt Conveyor Calculations 23. Pneumatic Transport 24. Hydraulic Transport 25. Labor Costs and Optimization of Industrial Transport
Learning outcomes: (Knowledge; Skills; Competencies)	Through the teaching process, including lectures, exercises, and practical work, students should acquire the necessary knowledge and experience for practical application in the field of design, selection, management, and maintenance of internal transport equipment. This course provides the knowledge needed for optimizing industrial flows.
Sustainable Development Goal (SDG):	Sustainable Development Goals (SDGs) and Targets that can be linked are:

	Goal 8: Promote Inclusive and Sustainable Economic Growth, Employment, and Decent Work for All *Sub-goals:* • 8.2: Achieve higher levels of economic productivity through diversification, technological advancement, and innovation. • 8.4: Improve global resource efficiency in consumption and production, and decouple economic growth from environmental degradation. • Industrial transport supports economic growth and productivity through efficient logistics processes, and it also contributes to sustainable practices in the economy by reducing resource costs and emissions. Goal 9: Build Resilient Infrastructure, Promote Inclusive and Sustainable Industrialization, and Foster Innovation *Sub-goals:* • 9.1: Develop quality, reliable, sustainable, and resilient infrastructure to support economic development and human well-being. • 9.4: Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource efficiency and greater adoption of clean and environmentally friendly technologies and industrial processes. • Industrial transport is crucial for supporting sustainable industrialization, as it enables the efficient movement of raw materials and products, contributing to overall economic productivity and reducing the negative impact on the environment. Goal 12: Ensure Sustainable Consumption and Production Patterns *Sub-goals:* • 12.2: Achieve sustainable management and efficient use of natural resources. • 12.4: Achieve environmentally sound management of chemicals and all forms of waste, and reduce their release into the air, water, and soil. • Industrial transport plays a key role in ensuring a sustainable supply chain, minimizing waste, and efficiently using resources in production and distribution processes. The connection of these goals with the subject "Industrial Transport" is reflected in the need for efficient, sustainable,

	and innovative transport solutions that support industrial processes, reduce environmental impact, and contribute to sustainable economic growth.
Teaching methods:	Lectures, tutorials and preparation of seminars with a practical focus.
Assessment methods with grading structure:	Evaluation and grading of students during the course are carried out as follows: • Attendance at lectures and exercises: 0 – 10 points (%) • Homework/seminar papers/practical work: 0 – 10 points (%) • First partial exam/test/knowledge check: 0 – 15 points (%) • Second partial exam/test/knowledge check: 0 – 20 points (%) The total number of points (%) that a student can achieve based on the above criteria during the course is a maximum of 55 points (%). The final exam is worth up to 45 points or 45 (%). The final exam covers the entire material studied during the course.
Literature:	Required: 3. Ahmić, A., Pretovarna i transportna mehanizacija, Univerzitetska knjiga, Sarajevo, 1996. 4. Marvin I., Prekrcajna mehanizacija, Zagreb, 1997. 5. Dedijer S., Osnovi transportnih uređaja, Građevinska knjiga, Beograd, 1989.

Course code: 10ATCOS010102	**Course title: LOGISTICS IN TRANSPORT AND COMMUNICATIONS**		
Level: I	**Year: I**	**Semester: II**	**Number of ECTS credits: 6**
Status: mandatory course		**Total number of contact hours: 90** **Lectures: 60** **Exercises: 30**	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	None		
Course goal (goals):	The main goal of the course "Logistics in Transport and Communications" is to acquire knowledge about logistics as a philosophy of service quality, technological changes in transportation and communications, requirements in logistics		

	development, structure, and needs for the development of modern logistics centers.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	– Concept, definition, and development of logistics as a scientific discipline used in logistics – Division and content of logistics according to areas of application – Concept, structure, and processes of logistics systems – Logistics operators – Warehousing – Warehousing processes – Transport chain in logistics systems, supply, and supply chain – Warehousing process in the supply chain – Inventory and types of inventory – Reverse logistics – Information and communication technologies in logistics – Logistics strategy – Determining the quality of logistics services – Quality management in logistics – Modern concepts of logistics center development and the logistics center as a strategically significant factor in improving service quality
Learning outcomes:	**Knowledge:** The course should ensure a level of competence and knowledge necessary to solve specific problems in the field of logistics, providing theoretical and practical knowledge related to logistics in transportation and communications. **Skills:** Developed abilities to apply theoretical and practical knowledge in the area of logistics processes in transportation and communications. **Competencies:** Developed abilities for independent understanding and use of knowledge required to solve specific problems in logistics and logistics processes.
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:	Teaching is conducted through oral presentations (ex-cathedra) and demonstrations of various systems and processes in the field of logistics in transportation and communications, using video and

	audio recordings, as well as individual presentations of specific problems in the area of logistics processes based on specific research areas. Initiating discussions and debates with students about practical issues, individual observations from various environments, conducting independent research and analyses in logistics and logistics systems.
Assessment methods with grading structure:	Criteria for monitoring and evaluating student performance during classes are as follows: 1. Homework/Seminar work/Practical work - max 15 points (%), passed if more than 50% is achieved. 2. First Partial Exam/Test/Knowledge Check - max 35 points (%), passed if more than 50% is achieved. 3. Final Exam - written - 20 points 4. Final Exam - oral - 30 points 5. Final Exam (Integral) - written - 40 points 6. Final Exam (Integral) - oral - 45 points To pass, a student must pass the oral part of the exam. The total number of points (%) that a student can achieve according to the monitoring during classes is a maximum of 50 points (%), which combined with the final (second partial) exam makes 100 points (%). For students who did not pass the first partial exam, the final exam (integral) is organized covering all material covered during classes and exercises, valued at 85 points (%), which combined with seminar/practical work makes 100 points (%). Final student performance is evaluated based on the total number of points (%) earned from fulfilling pre-exam obligations and passing the partial and final exams, according to the quality of knowledge and skills acquired, and contains a maximum of 100 points, evaluated as follows: a) 10 (A) - exceptional success with no errors or only minor errors, worth 95-100 points; b) 9 (B) - above average, with some errors, worth 85-94 points; c) 8 (C) - average, with noticeable errors, worth 75-84 points; d) 7 (D) - generally good, but with significant shortcomings, worth 65-74 points; e) 6 (E) - meets minimum conditions, worth 55-64 points; f) 5 (F, FX) - does not meet minimum conditions, less than 55 points.

	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 and passing the partial and final exams, according to the quality of knowledge and skills, with a maximum of 100 points, determined according to the following scale: Student Obligations _____points Attendance at lectures and exercises - attendance records are mandatory. Attendance in classes and exercises is not graded. Homework/Seminar/Practical work.....max 15 points First Partial Exam/Test/Knowledge Check.....max 35 points Final Exam - written.....max 20 points Final Exam - oral.....max 30 points Final Exam (Integral) - written.....max 40 points Final Exam (Integral) - oral.....max 45 points The final exam is organized so that students who passed the first knowledge check take only the final part of the exam (second part of the material), while students who did not pass the first knowledge check take both the final and the first partial exam (first part of the material). The exam is taken both in writing and orally. This grading scale is adopted according to the Study Regulations at the University of Sarajevo. **Note:** Students are required to attend all forms of teaching for at least 80% of the total hours. A student may, in justified cases (illness), be absent from classes, for which they must provide a medical excuse. Seminar and homework will be graded only if submitted by the defined deadlines. Late submissions will not be graded.
Literature:	**Mandatory:** 1. Lecture notes and slides (available for download on the Faculty's website). 2. BERKOVIĆ, M.: Lecture script, "Logistics in Transportation and Communications," Faculty of Transportation and Communications, 2024. 3. KOSOVAC, A.; Muharemović, E.: "Processes of Logistics Systems," Faculty of Transportation and Communications, 2022.

	4. ZELENIKA, R.: Logistics Systems, Faculty of Economics in Rijeka, Rijeka 2005. 5. ZELENIKA, R.: Foundations of Logistics Forwarding, Book One, University of Rijeka 2005. **Supplementary:** 1. ZELENIKA, R.: Transport Systems, Technology-Organization-Economics-Logistics-Management, University of Rijeka 2001. 2. OBLAC, H.: Macro-logistics Policy, Faculty of Economics and Business Maribor, 1996. 3. VASILJEVIĆ, M. R.: "Logistics in Transportation," University of East Sarajevo, Faculty of Traffic Engineering Doboj, Doboj 2015. 4. PERIŠIĆ, R.: Quality Systems of Services, Logistics, and Informatics, Institute of Technical Sciences SANU, Belgrade, 2002.

Course code: 11ATCOS010203	**Course title: APPLIED MATHEMATICS AND STATISTICS**		
Level: I	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: Mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 45 Tutorials 45	
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 for students to acquire knowledge in the field of applied mathematics and general statistics that are significant in traffic and communication scientific/scientific fields (error theory, basics of numerical algebra and analysis, probability and statistics, and the application of combinatorics and probability theory in statistics), as would better follow and master the structure of individual professional		

	subjects that make more extensive use of these important and meaningful areas of modern mathematics.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	• Introduction – basics of applied mathematics in engineering (traffic and communications). Errors of approximate values of numbers and functions • Numerical solution of linear equations and systems of linear equations, Gaussian algorithm • Solving systems of nonlinear transcendental equations. Localization of zeros of polynomials. Determining the minimum of functions • Method of least squares. Interpolations and approximations • Numerical differentiation and integration • Laws of large numbers • Elements of combinatorics • Introduction to probability theory - Basics of classical probability theory (three classical concepts of probability, basic theorems, formula of total probability and Bayesian formula) • General (axiomatic) definition of the concept of probability. Discrete and non-discrete probability spaces • Analysis of discrete and continuous random variables. Probability (density) function/law and probability distribution (distribution, theoretical distribution) function • Introduction to general and mathematical statistics. Concept, subject and significance of statistics (especially in technical sciences/sciences). • Statistical set and statistical units. Characteristics of statistical units. The concept of statistical research. Descriptive statistical analysis, processing and analysis of data and results (graphical presentation of statistical series, measures of variation/dispersion) • Method of statistical samples. Statistical (parametric and non-parametric) hypothesis testing • Concept and subject of regression analysis: regression and correlation • Dynamic analysis in statistics
Learning outcomes:	Knowledge: After completing the course, the student should: • have a developed sense of deductive reasoning; • understand basic concepts from the field of error theory, numerical mathematics, probability theory and statistics and thus be familiar with how intuitive concepts are translated into precise mathematical language; • master standard numerical, stochastic and statistical methods and their applications; • understand the role that the linearization process plays in the mathematical modeling of specific physical, traffic, communication and other engineering problems;

	• master the basic techniques of numerical algebra, numerical analysis, classic and contemporary probability theory and statistics; • deepen the understanding of basic problems in the field of engineering mathematics 1 and 2. Skills: it encourages creativity, precision, systematicity, abstract thinking and critical thinking, which helps in noticing and solving problems, which is essential for continuing education. Competencies: showing and communicating in mathematical language, logical thinking, argumentation and reasoning.
Sustainable Development Goal (SDG):	SDG4 – Quality Education, SDG9 - Industry, innovation and infrastructure
Teaching methods:	Lectures are conducted by the teacher during which theoretical aspects are presented along with solving numerical problems and practical examples. Lectures take place with the use of video and audio recordings. The exercises include solving numerical and practical problems, which also includes solving problems from previous exams with the aim of achieving a better understanding of the presented theoretical topics.
Assessment methods with grading structure:	The criteria for evaluating the student's work and evaluation during classes is as follows: Tests during the semester (or practical task) from 0 - 15 points; 1st partial exam/1st test/1st knowledge test/ from 0 - 35 points (requirement 50%). The total number of points that a student can achieve according to the above-mentioned monitoring during classes is a maximum of 50 points. The final exam is organized from the entire material covered during the course and amounts to a maximum of 50 points, of which there is the II partial exam of 0 - 25 points (requirement 50%) and the final - theory and tasks of 0 - 25 points, which lasts 60 minutes (students pass the theory and tasks they did not do in the partial exams). At the final exam, students can correct the I partial exam, if they did not pass it earlier. The same applies to the exam period for the remedial final exam and both dates of the autumn exam period. The final success of the student, after all the foreseen forms of knowledge verification, is evaluated and evaluated by the grading system as follows: a) 10 (A) - exceptional success without mistakes or

	with minor mistakes, carries 95-100 points; b) 9 (B) - above average, with some errors, carries 85-94.9 points; c) 8 (C) - average, with noticeable errors, carries 75-84.9 points; d) 7 (D) - generally good, but with significant shortcomings, carries 65-74.9 points; e) 6 (E) - meets the minimum requirements, carries 55-64.9 points; f) 5 (F, FX) - does not meet the minimum conditions, 0 – 54.9 points. 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 and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations _ Points (%) Activity / Mini tests / Tasks / Seminar paper .....15 points (%) I Partial exam/Test/Knowledge check/.....35 points (%) Final exam (II Partial + Theory) .....50 points (%)
Literature:	Mandatory: 7. Blažić, M. R., Opšta statistika - Osnovi i analiza, Savremena administracija, Beograd, 1982. 8. Carnahan, B. , H. A. Luther, H. A. , Wilkes, J. O., Applied Numerical Methods, John Wiley &Sons, 1969. 9. Elezović, N., Teorija vjerojatnosti, zbirka zadataka, Element, Zagreb, 1995. 10. Fatkić, H., Vjerovatnoća i statistika, I . dio, The Soros Foundations, FOD BiH, Sarajevo, 1997; Corons, Sarajevo, 2000. 11. Fatkić, H., Hasković, A., Čolaković, A., Avdagić, E., Primjenjena matematika i statistika, Predavanja i vježbe, Slajdovi i bilješke, Sarajevo, 2012, http://www.fsk.unsa.ba/ 12. Hadžć, O., Numeričke i statističke metode u obradi eksperimentalnih podataka,Institut za matematiku, Novi Sad, 1989. Supplementary: 1. Ivanšić, I., Numerička matematika, Element, Zagreb, 1998. 2. Johnson, R. A. , Bhattacharyya, G. K., Statistics: Principles and Methods, Wiley, New York, 5th edition, 2006. 3. Lučić, B., Statistika, Ekonomski fakultet, Sarajevo, 1996.

Course code: 12ATCOS010203	**Course title: SYSTEM ENGINEERING**		
Level: I	**Year: II**	**Semester: III**	**Number of ECTS credits: 6**
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures: 30 Tutorials: 30 Seminars: 10 Fieldwork: 10 Laboratory Tutorials: 10 Practice	
Course participants:	**Academic staff and associates selected in the field to which the course belongs/course**		
Prerequisite for enrollment:	No		
Course goal (goals):	The aim of the course is to master traffic processes and establish common traffic parameters that enable better integration into a unified traffic network. By achieving adequate interaction between the components of the traffic system throughout its life cycle, an overview of individual phases of technological processes in transportation and communications will be provided.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – terms and definitions 2. Systems approach to studying traffic (Structure of the traffic system; System modeling of traffic) 3. Fundamental system concepts (General definitions and interpretations of the term system; System classification) 4. Analogy, homomorphy, and isomorphy. State and state space. Systems analysis. Systems architecture. Life cycle of the system. 5. System diagrams and tools (Objectogram and funciogram; ER diagrams; DFD diagrams; GPSS block diagrams; Petri net) 6. Behavior of open dynamic systems (Types of system behavior; Transient processes; Static and dynamic characteristics of systems) 7. System definition and development (Primary phases of systems engineering; Defining system requirements) 8. Systems and processes of road traffic (System definition of road traffic; System design of the road network) 9. Road traffic technology (System description of passenger and freight transport technology in road traffic) 10. Systems and processes of railway traffic (Defining and describing railway systems; Systems approach to choosing railway vehicles)		

	11. Systems and processes of air traffic (System definition of air traffic; System development of network infrastructure; Air traffic technology) 12. Systems and processes of telecommunications traffic (System definition of telecommunications traffic; System development of telecommunications networks) 13. Technological processes of Intelligent Networks 14. Systems and processes of postal traffic (System definition of postal traffic; Development of postal networks and technology; Postal traffic technology) 15. Development of intelligent transport systems (ITS concept and services; ITS development)
Learning outcomes:	**Knowledge**: Through lectures and exercises, as well as through practical work, students will master the course material and gain theoretical and practical knowledge in the field of systems engineering. **Skills**: The ability to apply theoretical and practical knowledge in the field of system engineering. **Competencies**: The ability to monitor technological processes with the aim of creating a quality traffic system structure that results in quality, safe, timely, and environmentally friendly traffic services.
Sustainable Development Goal (SDG):	SDG 9 – Industry, Innovation, and Infrastructure SDG 11 – Sustainable Cities and Communities SDG 12 – Responsible Consumption and Production SDG 13 – Climate Action
Teaching methods:	Oral presentation method, discussion method, demonstration method, group work method.
Assessment methods with grading structure:	Evaluation of creativity during lectures and exercises through independent work, assessment of partial tests during the course, as well as evaluation of the final exam. The criteria for monitoring student work and evaluation during the course are as follows: • Homework/seminar paper/practical work: 15 points (%), passed if at least 55% is achieved. • First partial exam/test/knowledge assessment: 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 can take the exam on the material they have not successfully completed during the semester. A successful exam result requires at least 55% of the points from the maximum number of points on the partial

	and final exams, and it is sufficient if the total sum of points (from: homework, attendance, partial and final exams) is 55. Homework is organized through writing assignments and projects. Homework cannot be corrected. For students who have not successfully completed the partial exam, the final exam consists of the entire material covered during the course. The retake exam is organized in the same way as the final exam. The student's final success after all the prescribed forms of knowledge assessment is evaluated and graded according to the following grading system: a) 10 (A) – Excellent without or with minor mistakes, 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 evaluation of all student obligations during the semester, or the grade on the exam, is based on the total number of points (%) the student has earned by fulfilling pre-exam obligations and passing the partial and final exams, and is determined according to the following scale: **Student Obligations | Points (%)** Attendance at lectures and exercises... | - Homework/Seminar/Practice/… | 15 points (%) First partial exam/Test/Knowledge assessment… | 35 points (%) Final exam (Second Partial) | 50 points (%) Final exam (Comprehensive) | 85 points (%)
Literature:	Mandatory: 1. Čaušević S, Bošnjak I, **System Engineering in Transport and Communications**, University of Sarajevo, Faculty of Transport and Communications, Sarajevo, 2006. 2. Lecture notes and slides.

Course code: 13ATCOS010203	**Course title: ECONOMICS IN TRAFFIC AND COMMUNICATIONS**		
Level: I	**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):	Acquisition of basic knowledge in the field of economics in transportation and communications, aimed at creating an economically efficient and high-quality transportation and communication system.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. The concept and significance of economics in transportation and communication models 2. The role of transportation in social reproduction 3. Characteristics of production of transportation and communication services 4. Supply and demand as market elements 5. Shaping and determining the value of transportation and communication services 6. Costs of transportation and communication processes 7. Analysis of cost dynamics 8. Cost residuals and factors of residual costs in transportation and communications 9. Prices of transportation and communication services and the factors they depend on 10. Tariffs and tariff policy 11. Principles of business economics in transportation and communications 12. Investments in transportation and communications 13. Methods for evaluating investment projects in transportation and communication systems 14. Basic features of the tax system and tax policy in transportation and communication systems 15. Factors relevant to managing business economics in transportation and communication systems
Learning outcomes:	Knowledge: Students will acquire knowledge in the field of economics in transportation and communications aimed at creating an economically efficient and high-quality transportation and communication system. Skills: Understanding economic principles and qualitative-quantitative analysis of economic processes that occur in transportation enterprises and the transportation market.

	Competencies: Application of acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 4: Ensure inclusive and quality education and promote lifelong learning opportunities for all. SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 10: Reduce inequality within and among countries. SDG 12: Ensure sustainable consumption and production patterns.
Teaching methods:	During the course delivery, the instructor presents individual thematic units (ex cathedra), provides students with access to educational videos (DVDs, video presentations) related to the subject matter, and organizes discussions on assigned topics (interactive teaching). In practical sessions, examples and tasks are analyzed and solved according to theoretical topics, students are assisted in independently solving tasks, and in preparing programs and seminar papers. Case Study, Workshop.
Assessment methods with grading structure:	Criteria for evaluation and grading of student work during the course: Homework: 0 to 5 points Seminar Paper / Project Assignment: 0 to 10 points First Test / Knowledge Check / First Partial Exam: 0 to 35 points The total number of points a student can earn during the course is up to 50 points. The final exam covers the material that the student did not pass in the partial exam, meaning it includes the second part of the material (Second Partial Exam), worth 50 points, or it consists of the entire material, i.e., both the First and Second Partial Exams. The overall assessment of all student responsibilities during the semester, and the exam grade, is based on the total number of points (%) the student has earned by completing pre-exam obligations, passing the partial exam, and the final exam. Students can earn up to 100 points based on the following scale: Grading Structure Points (%) Homework: 5 points (%) Seminar Paper / Project Assignment: 10 points (%) First Test / Knowledge Check (First Partial Exam): 35 points (%) Final Exam (Second Partial Exam): 50 points (%) Requirements for Passing the Exam:

	Total score of 55 points, with at least 55% in each part of the exam (activity, partial exam, final exam). To pass the exam, students must achieve the following minimum scores: Homework: 3 points Activity (Seminar Paper / Project Assignment): 6 points First Test / 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 (not covered in the partial exam) in the final exam. Students who have not passed the partial exam will take the entire material, with the grading criteria remaining the same. The final exam may be organized as a written and/or oral exam. Activity can be monitored through homework, seminar papers, project assignments, or quizzes. Note: Students are required to attend all forms of teaching at least 80% of the total hours, and attendance is a condition for confirming regular attendance. Students may be absent due to justified reasons (e.g., illness), for which they must provide a medical excuse. Seminar papers and homework will only be graded if submitted by the specified deadlines. Late submissions will not be graded. Final Evaluation and Grading Scale: a) 10 - Outstanding performance with no or 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 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. Ferizović, A., Kalem, A., *Economics in Transportation and Communications (Script I part)*, Faculty of Traffic and Communications, Sarajevo, 2020. 2. Ferizović, A., Kalem, A., *Economics in Transportation and Communications (Script II part)*, Faculty of Traffic and Communications, Sarajevo, 2020. 3. Čekić, Š., *Economics in Transport and Communications*, University of Sarajevo, Faculty of Traffic and Communications, Sarajevo, 2005. 4. Novaković, S., *Traffic Economics*, Belgrade.

	5. Perić, T., Radačić, Ž., Šimulčik, D., *Economics of the Traffic System*, University of Zagreb, Faculty of Traffic Sciences, Zagreb, 2000. 6. Perović, D., *Cost Theory*, Belgrade. 7. Samuelson, P., Nordhaus, D., *Economics*, Mate, 1992. **Supplementary:** 1. Petrović-Vujačić, J., *Fundamentals of Economics*, Traffic Faculty, Belgrade, 2010. 2. Šunjić-Beus, M. et al., *Business Economics*, electronic edition, Faculty of Economics, Sarajevo, 2009. 3. Martinović, D., *Break-Even Point as a Business Decision Tool*, Faculty of Economics, Sarajevo, 2013. 4. Thompson, A., *Economics of the Firm: Theory and Practice*, Fifth Edition, New Jersey. 5. Tatić, K., *Managerial Economics*, Faculty of Economics, Sarajevo, 2008. 6. Somun-Kapetnović, R., Arnaut-Berilo, A., Šehić, E., Kahvić, E., *Quantitative Methods in Economics and Management*, Faculty of Economics, Sarajevo, 2009.

Course code: 14ATCOS010203	**Course title: INFORMATION SYSTEMS IN TRAFFIC AND COMMUNICATIONS**		
Level: I	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
Status: mandatory 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:	No		
Course goal (goals):	Acquiring knowledge about information systems, their applications, components, technologies, and development principles, with the aim of equipping students to address tasks and problems related to the planning, development, and analysis of information systems in transportation and communications.		
Topics covered (Units of study):	1. The concept of systems and information systems (IS) 2. Infrastructure and architecture of information systems 3. Information and communication technologies 4. Database management systems 5. Software solutions for IS development 6. Communication technologies for IS development 7. The life cycle of information systems development (SDLC) 8. Organization of information systems development 9. Application of CASE tools for IS design		

	10. Planning of information systems development 11. Process modeling and reengineering: Workflow, DFD, BPR 12. Modeling of structure, database, and behavior of IS 13. Implementation of information systems 14. Analysis of information systems 15. Security and quality of information systems
Learning outcomes:	**Knowledge:** Students will acquire theoretical and practical knowledge about the types and components of information systems, their design methods, and their application possibilities in transportation and communications. **Skills:** Students will master the skills and tools used in the design and development of information systems, such as CASE tools. **Competencies:** Students will be equipped to participate in the planning and development of information systems, particularly those intended for the fields of transportation and communications.
Sustainable Development Goal (SDG):	SDG 9 – Industry, Innovation, and Infrastructure
Teaching methods:	The course is delivered through lectures and practical exercises. Lectures are conducted through oral presentations with slides and practical examples. During the course, discussions are initiated on issues related to the planning, analysis, design, and development of information systems, with a special focus on systems used in transportation and communications. Various methods are used, including: oral presentations, discussions, demonstrations, individual and group work.
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/or seminar papers and/or project tasks, as well as a partial exam. The final/exam includes material not covered in the partial exam, which means it includes the second part of the material (not covered in the partial exam) and is worth 50 points for students who have passed the partial exam, or it covers the entire material worth 80 points for students who did not pass the partial exam. Student activity is monitored and assessed through participation in class discussions, completion of assignments, seminar papers, project tasks, or quizzes. The final/exam can be conducted as a written and/or oral test. 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**: • Assignments/Class Participation: 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 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 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: – Alem Čolaković, "Traffic Information Systems (LECTURE NOTES)," Faculty of Traffic and Communications, Sarajevo, 2023. Supplementary: – Ralph M. Stair, George W. Reynolds, „*Fundamentals of Information Systems*," Cengage Learning, 2016. – Alan Dennis, Barbara Haley Wixom, Roberta M. Roth, „*Systems analysis and design*," Wiley, 2015. – Patricia Wallace, „*Introduction to Information Systems*," Pearson Education, 2015. – Richard T. Watson (editor), „*Information Systems*," Global Text Project (Creative Commons Attribution 3.0 License), 2017. – Arthur M. Langer, „*Analysis and Design of Information Systems, Springer-Verlag*," 2008. – John Wang, „*Innovations in Supply Chain Management for Information Systems*," Business Science Reference, 2010. – Anita Pickerden, „*Planning and Managing your Work Based Projects*," bookboon.com, 2015.

	– Terra Vanzant Stern, „*Lean and Agile Project Management*," Taylor & Francis Group, 2017. – Andrew Stellman & Jennifer Greene, „*Learning Agile*," O'Reilly Media, 2015. – Christos Kalloniatis: "*Modern Information Systems*," InTech Croatia, 2012. – Poliščuk Jaroslav: „*Projektovanje informacionih sistema*," Podgorica, 2007. – Kelly R. Jr, Efraim T.: „*Uvod u informacione sisteme*," Data Status, 2009. – Information Security Management Systems (ISMS) standards, ISO/IEC 27000 – ISO 9000 family of quality management systems (QMS) standards

Course code: 15-1ATCES010203	**Course title: ELEMENTS OF TRANSPORT VEHICLES AND DEVICES**		
Level: I	**Year: II**	**Semester: III**	**Number of ECTS credits:** 6
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:	No		
Course goal (goals):	The aim of the course is to acquaint the student with rational structural forms, work principles, calculation bases and principles of material selection, elements and devices of transport and handling devices.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	– Introduction. Connecting elements. Welded, soldered, glued joints. Joints with rivets. – Bolted joints. Joints with studs. streaming. Stokes theorem – Elastic joints. – Elements for circular movement. Shaft and axles. – Couplings. Bearings. – Power transmission elements. Friction gears. – Gear transmissions. – Transmission belts. – Characteristics of power transmissions and their application on transport and handling vehicles. – Elements for conducting fluids (liquids) and gases (pipes, pipe closures and others).		

	– Introduction. The first main law of thermodynamics – Calorific properties of gases. Mixtures of gases – Changes in the state of gases. Circular processes. – The second main law of thermodynamics – Heat engines. Compressors. Motors SUS. Turbines
Learning outcomes:	Knowledge: Knowledge of basic structural forms, principles of operation, basis of calculations and selection of materials for elements and devices of transport and handling equipment. Skills: The application of acquired knowledge from the above-mentioned field will enable the student to make the most of the exploitation characteristics of elements and devices that are built into transport and handling vehicles during practical work and make the correct selection of elements. Acquired knowledge from this subject is necessary for easier monitoring and understanding of other professional subjects in the continuation of studies. Competencies: Through the teaching process of lectures, exercises and doing homework, the student will be able, based on the acquired knowledge, to: – understand the basic principles of operation of compressors, sus engines and gas turbines. – analyzes the elements and devices that are included in the composition of transport and transshipment means and to make the correct selection and replacement of the necessary elements. – set up and define mechanical-mathematical models of power transmission from the drive to the working part of transport and transshipment systems and make a proper selection of the necessary equipment and the power of the power unit.
Sustainable Development Goal (SDG):	SDG12 – Responsible consumption and production
Teaching methods:	– Independent presentation – Discussion – Analysis of examples from practice (assignments, seminar papers)
Assessment methods with grading structure:	Assessment of creativity in classes and exercises with the creation of independent works, assessment of the partial test during the class as well as the assessment of the final exam. Criterion monitoring the work and evaluating the student during classes, according to the following method: – Homework/seminar work/practical work/ 15 points (%), passed if over 55% is won. – I Partial exam/test/knowledge check/35 points (%), passed if more than 55% is won. – Final exam (II Partial) 50 points (%), passed if over 55% is won.

	– Final exam (Integral) 85 points (%), passed if more than 55% is won. The total number of points (%) that a student can achieve according to the mentioned monitoring during classes is a maximum of 50 points (%), which with the Final (II partial) makes 100 points (%). For students who did not pass the 1st 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 work/practical work makes 100 points (%). The final success of the student, after all the foreseen forms of knowledge testing, is evaluated and graded 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 errors, carries 85-94 points; c) 8 (C) - average, with noticeable errors, carries 75-84 points; d) 7 (D) - generally good, but with significant shortcomings, 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 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 pre-exam obligations and passing the partial and final exam, and according to the quality of acquired knowledge and skills, and contains a maximum of 100 points, and is determined according to the following scale: Student obligations _____Points (%) Attendance at lectures and exercises.....80 (%) Assignment/Seminar/Practice/.....15 points (%) I Partial exam/Test/Knowledge check/.....35 points (%) Final exam (II Partial) .....50 points (%) Final exam (Integral) .....85 points (%)
Literature:	Mandatory: 1. Perše, S., Višnjić, V.: Traffic Engineering, Faculty of Traffic Sciences, Zagreb, 2000. 2. Decker, KH: Elements of machines, Technical book, Zagreb, 1975. 3. Vrhovski, D., Nikšić. M.: Fundamentals of mechanical engineering - a collection of solved problems, FPZ, Zagreb, 1998. Supplementary: 1. Šelmić, R.: Elements of transport means and devices, Faculty of Transport, Belgrade, 2005.

	2. Šelmić, R, Mijailović, D., Perišić, D.: Elements of transport means and devices - Praktikum Saobračajni fakultet, Belgrade, 2006. 3. Šelmić, R.: Technical thermodynamics, Faculty of Transportation, Belgrade, 2006.

Course code: 15-2ATCES010203	**Course title: INFORMATION AND COMMUNICATIONS**		
Level: I	**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 Fieldwork: Laboratory Tutorials: 15 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):	Students acquire basic theoretical knowledge necessary for studying modern digital telecommunications systems: basic theoretical and partially practical knowledge in the field of information theory and communications, in a scope corresponding to an introductory course in these areas, and the basics of information and IP networks.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	**Information:** Random events. Definition of information, mathematical interpretation, properties of information at the syntactic, semantic, and programmatic levels. Content of information. Logic, syntax, and semantics. Formal systems, methods, and techniques. Information sources and types. **Discrete Information Sources:** Amount of information, entropy. Properties of entropy. Entropy of continuous sources. Conditional entropies, mutual information. Sources with memory - Markov sources, ergodic sources. Entropy of Markov sources, higher-order sources. **Source Coding:** Basic concepts, prefix codes, Kraft inequality. Statistical coding. Optimal statistical coding, extended source coding. The first Shannon theorem. Shannon-Fano code, Huffman code. **Statistical Channel Model:** Discrete channel, basics of error-correcting coding. Shannon's coding theorem.		

	Signals: Concept, classification. Deterministic signals: signal processing in the frequency domain. Fourier series. Fourier transform. **Random Processes:** Autocorrelation function. Power spectral density. Noise signals. Gaussian noise. **Continuous Channel:** Concept, continuous channel with additive Gaussian noise, channel capacity. **Analog-to-Digital Conversion:** Discrete representation of a continuous signal. Amplitude quantization. PCM. **Specificities of Digital Signal Transmission:** Telecommunication system model, baseband transmission. **Specificities of Digital Signal Transmission in Transposed Band:** Linear digital modulation: ASK, FSK, PSK, QAM. Multiple access. **Networks:** Information network. Telecommunications network. Network characteristics. OSI and IP network models. **Internet Networks:** IP protocol. TCP/IP protocol family. IP addressing. **Internet Communications:** Principles, advanced Internet applications, and communication techniques, web organization. **Telecommunication Networks:** Division, specifics of wired and wireless networks. Quality of service in networks (QoS). **Advanced Telecommunication Techniques and Multiple Access:** Spread spectrum, multicarrier systems.
Learning outcomes:	**Knowledge**: Basic theoretical and partially practical knowledge in the field of information theory and communications in a scope corresponding to an introductory course in these areas and the basics of information and IP networks. **Skills**: Ability to apply theoretical and practical knowledge in the field of modern digital telecommunications systems. **Competencies**: Ability to independently analyze basic parameters relevant to information theory, design and analyze system characteristics of discrete and continuous channels, ability to use basic analytical methods in the analysis of information and IP networks.
Sustainable Development Goal (SDG):	• SDG4 – Quality Education • SDG5 – Gender Equality • SDG9 – Industry, Innovation, and Infrastructure • SDG17 – Partnerships for the Goals
Teaching methods:	The teaching is conducted through lectures, exercises, and laboratory exercises. The following methods are used: oral presentation method, discussion method, demonstration method, graphical works method, drawing method, and group work method. During lectures, theoretical concepts and principles are covered with descriptive examples and the solving of certain tasks. Additional examples are considered and solved

	through exercises and laboratory exercises, enabling continuous work and preparation for independent problem solving. Homework/seminar/practical work aims to develop skills for individual and team work, as well as the organization and realization of practical projects.
Assessment methods with grading structure:	The criteria for monitoring the work and evaluation of the student are carried out as follows: • Homework: 0 to 15 points (%); • First Partial Exam: 0 to 35 points (%); • Final Exam: Second Partial (0 to 50 points (%)) and/or remedial First Partial (0 to 35 points (%)); • The final exam is organized as written and/or oral. The student may take the exam material that was not covered and/or successfully completed during the semester. The required condition for successfully passing the exam is achieving at least 55% of the maximum number of points in the first partial and the final (second partial) part of the exam, and the sufficient condition is that the sum of achieved points (homework/practical work + first partial + second partial) is 55. • Homework is realized through doing homework assignments and quizzes or practical work. Points achieved on quizzes and submitted homework cannot be improved. • For students who did not successfully complete the first partial exam, the final exam consists of the entire covered material during the teaching period. The remedial exam is organized in the same way as the final exam. The final success of the student after all the provided forms of knowledge assessment is evaluated and graded using the following grading system: a) 10 (A) - outstanding performance with no or minor errors carries 95-100 points; b) 9 (B) - above average with some errors carries 85-94 points; c) 8 (C) - average with noticeable errors carries 75-84 points; d) 7 (D) - generally good but with significant shortcomings carries 65-74 points; e) 6 (E) - meets minimum criteria carries 55-64 points; f) 5 (F FX) - does not meet minimum criteria less than 55 points.
Literature:	**Mandatory**:

	1. Lecture notes and slides 2. K. Suruliz i M. Hadžialić, Statistička teorija telekomunika- cija, Elektrotehnički fakultet u Sarajevu, 2009, ISBN 978-9958-629-27-3. 3. B. P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press, New York 998. **Supplementary**: 5. V. Sinković, Informacijske mreže, Školska knjiga, Zagreb, 1994. 6. Bažant i dr, Osnovne arhitekture mreža, Element, 2004. 7. M. Schwartz, Telecommunications Network: Protocols, Modelling and Analysis, Adisson-3. Wesley PC, Reading, Massachusetts, 1987. 8. J. F. Kurose, K.W. Ross, Internet and Communication Networks, Mc Graw-Hill, 2003.

Course code: 16TRWOS010204	**Course title: RAILWAY VEHICLES**		
Level: I	**Year: II**	**Semester: IV**	**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 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 students' knowledge about the development, importance, goals and technology of diagnostic and maintenance procedures in order to ensure and preserve the defined necessary level of quality of the technical system		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – Basic concepts of railway traffic 2. Classification of railway vehicles 3. Characteristics of traction types 4. Comparative advantages of different traction types 5. Diesel – Diesel-electric locomotives 6. Power transmission systems 7. Electric locomotives 8. Control of traction electric motors 9. Trailed vehicles 10. Freight cars 11. Passenger cars		

	12. Braking systems of rail vehicles 13. Motor trains and other railway vehicles 14. New concepts of rail vehicles 15. Trends in the development of rail vehicles in Europe and worldwide
Learning outcomes:	**Knowledge:** The subject "Rail Vehicles" provides students with knowledge about the classification and characteristics of railway vehicles, the methodology for selecting them according to transportation and facility needs, as well as an introduction to modern trends in vehicle development. **Skills:** Students acquire practical skills through fieldwork and exercises, applying the acquired knowledge to real-world problems. **Competencies:** Application of the acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 3: Ensure healthy lives and promote well-being for all at all ages. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Ensure sustainable consumption and production patterns. 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 course, the instructor presents individual thematic units (ex cathedra), allows students to watch videos with educational content (DVDs, video presentations) related to the subject matter, and organizes discussions on assigned topics (interactive teaching). The exercises involve reviewing and solving examples and tasks in accordance with the theoretical material, assisting students in independently solving tasks, and in the preparation of programs and seminar papers. In laboratory exercises/fieldwork/practical training, skills necessary for individual and team work will be developed to accomplish tasks within the given subject area.
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. Gačanin, E., *Rail Vehicles – Script*, Faculty of Traffic and Communications, Sarajevo, 2008. 2. dalla Chiara B., Gačanin, E., *Railway Transport Systems – Improving Capacity through Innovation and Automation*, Politecnico di Torino, Turin (Italy), Faculty

	of Traffic and Communications, Sarajevo (Bosnia and Herzegovina), University of Southampton, Southampton (United Kingdom), 2004. 3. Dinić, D., *Electric Railway Vehicles*, Faculty of Traffic, Belgrade. **Supplementary:** 1. Pajić, D., *Traction Vehicles*, Institute for Publishing, Belgrade. 2. Valter, Z., *Diesel-Electric Locomotives*, Zagreb. 3. Vainhal, V., *Brakes and Train Braking*, Belgrade.

Course code: 17TRWOS010204	**Course title: TRAFFIC FLOWS THEORY**		
Level: I (First)	**Year: I (Second)**	**Semester: IV (Fourth)**	**Number of ECTS credits: 6 (Six)**
Status: mandatory 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:	Attendance and active participation in lectures and exercises are mandatory, as well as the preparation of a seminar paper and independent exercise tasks.		
Course goal (goals):	The curriculum covered by the content aims to provide students with an introduction to the basics of Traffic Flow Theory and the fundamental methods of traffic engineering calculations. The objective is to equip students with the theoretical and professional foundation for the design of traffic infrastructure, which represents an essential element in traffic planning		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. The subject and tasks of traffic flow theory, Technical basis of road traffic 2. Basics of routing and design of roadways 3. Movement of individual vehicles, Defining traffic flow parameters 4. Characteristics of traffic flows, Theoretical relationships between basic traffic flow parameters, Characteristic values of basic traffic flow parameters 5. Empirical models of interdependence between basic traffic flow parameters		

	6. Mathematical models describing vehicle movement laws in road traffic flows 7. Monitoring and control of road traffic flows 8. Pedestrian flows 9. Capacity analysis and dimensioning of parts of the traffic network under prevailing traffic conditions 10. Freight and passenger flows on railways 11. Tracks and track installations, locomotives, railway cars, operation of the railway network, and determination of the capacity and transport capability of railway lines 12. Turnover of wagons and speeds in railway traffic, operation of locomotives, locomotive turnover, required number of locomotives, train traffic diagrams 13. Capacity planning in air traffic, aircraft operation, air traffic routes, execution of the transport process, air route exploitation 14. Traffic flows at airports 15. Models for assessing air transport demand, travel distribution models, multimodal models, flight frequency, time losses, alignment of transport capacities with passenger requirements, traffic distribution on the network.
Learning outcomes:	Through lectures, exercises, and practical work, students are expected to acquire the necessary knowledge and experience for practical application in the field of traffic infrastructure planning and its alignment with demand, as well as with current and future needs in various modes of transportation. The course on Traffic Flow Theory aims to provide the required level of knowledge about the rules, methods, and procedures for monitoring and determining the laws governing vehicle movement in traffic flows. Additionally, the course equips students with the knowledge and skills necessary for monitoring and managing traffic flows, with the goal of educating them on aligning existing and planned infrastructure with the demands of modern transportation.
Sustainable Development Goal (SDG):	Specific sustainable development goals related to the course syllabus are: – SDG 9: Industry, Innovation, and Infrastructure – SDG 11: Sustainable Cities and Communities – SDG 13: Climate Protection The connection of thematic units with the mentioned sustainable development goals is explained in detail below. **SDG 9: Industry, Innovation, and Infrastructure** Sub-goal 9.1 addresses the development of sustainable, reliable, and resilient infrastructure, including transport infrastructure.

	Sustainable transportation requires efficient traffic flow systems to reduce congestion and emissions of harmful gases. Traffic flow theory examines how vehicle flow impacts transportation infrastructure and how efficiency can be improved. The application of traffic flow theory can assist in better road design and the optimization of vehicle flow, which directly contributes to sustainable transport and pollution reduction, as outlined in the sustainable development goals. **SDG 11: Sustainable Cities and Communities** Sub-goal 11.2 highlights the need for safe, accessible, and sustainable transportation systems, with a particular emphasis on expanding public transportation. Optimizing traffic flows can increase capacity and reduce congestion in public transport, thereby improving efficiency and safety. Traffic flow theory can aid in the better organization of traffic systems, such as roundabouts or adaptive traffic signals, which helps reduce congestion and pollution, enabling sustainable transport. **SDG 13: Climate Action** Sub-goal 13.2 calls for the integration of climate change measures into national policies and strategies, including transportation. Traffic flow theory contributes to reducing harmful gas emissions through the optimization of traffic flows and the reduction of traffic congestion, which in turn reduces the transport sector's impact on climate change. Traffic flow theory can be a tool used to enhance sustainable urban mobility, reduce gas emissions, and improve the quality of life in urban areas, in line with the sustainable development goals.
Teaching methods:	The course is delivered through lectures, exercises, and practical work, which includes the creation of project assignments. Lectures are conducted through oral presentations, accompanied by slides and examples from practice. Discussions on issues related to the planning and design of traffic infrastructure are encouraged. Students will be required to create and present seminar papers and/or project tasks. Various teaching methods are used, including oral presentations and discussions, demonstrations of examples, graphical and video illustrations, and promoting group work using appropriate methodological approache
Assessment methods with grading structure:	Evaluation criteria and grading during the course are as follows: Attendance at lectures and exercises will be recorded; attendance is mandatory as a condition for taking the exam, with a maximum of 20% unexcused absences allowed. Regular attendance will not be awarded additional points. Homework/seminar paper/practical

	work is graded from 0 to 15 points, and only students who fulfill over 50% of these requirements will be evaluated. During the course, only one knowledge check will be organized – a partial exam in the 7th or 8th week of classes, worth 35 points, and only students who pass over 50% of this partial exam will be graded. The final exam is worth up to 50 points.
Literature:	Mandatory: 1. Kuzović Lj.: Traffic Flow Theory, Građevinska knjiga, Belgrade, 1987. 2. Kuzović Lj., Bogdanović V.: Traffic Flow Theory, FTN Publishing Novi Sad, 2010. 3. Kovačević P.: Railway Operations, Publishing and Propaganda Institute of JŽ, Belgrade, 1986. 4. Kiso Fahrudin., Kiso Fadila: Airports, Faculty of Transport and Communications Sarajevo, 2000. 5. Teodorović D.: Models in Air Transport, Traffic Faculty Belgrade, 1988. 6. Kiso F.: Flows in Railway Traffic, Lecture Notes, 2009. 7. Kiso F.: Flows in Air Traffic, Lecture Notes, 2012. 8. Mussone L.: Instruments for Monitoring Road Traffic Flows, Education and Culture TEMPUS, Sarajevo, 2004. 9. Highway Capacity Manual 2010, Transportation Research Board, National Research Council, Washington D.C., 2010.

Course code: 18TRWOS010204	**Course title: MATERIALS AND FREIGHT IN TRANSPORT**		
Level: I	**Year:** II	**Semester: IV**	**Number of ECTS credites:** 6
Status: mandatory course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 60 Tutorials 30	
Course participants:	Academic staff and associates selected in the field to which the course belongs/course		
Prerequisite for enrollment:	None		
Course goal (goals):	The primary objective of the course "Materials and Goods in Transport" is to acquire knowledge about the technical-technological, economic-commercial, and transport aspects of the study of materials science; classification, standardization, and identification of products. The course aims to provide knowledge of a new conceptual approach to the quality of materials, goods, and services through familiarization with and elaboration of key concepts. It also aims to introduce the fundamental characteristics of materials		

	used in transport technology and materials that appear as goods in transport, with the goal of preserving their utility value in all phases of the transport process.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction. Basic concepts of materials and goods. Transport aspect. 2. Division and classification of materials, goods, and services. 3. General concepts of standardization and related activities (accreditation, certification, testing, metrology, calibration). 4. Product quality and quality control. Foundations and principles of European transport policy in relation to quality. 5. Technical-technological elements of the quality of materials, goods, and services. 6. Economic-commercial elements of the quality of materials, goods, and services. 7. Methods for determining the quality of materials and goods. 8. Labeling and identification of materials and goods. Documents for goods in transport. 9. Bulk handling, packaging, and packing of materials and goods. 10. Materials for transport technology: classification, properties, control. 11. Methodology for selecting materials for transport technology. 12. Materials as goods in transport - transporting materials. 13. Classification and properties of transported goods: hazardous materials, bulk cargo, live animals. 14. Official controls of transported goods. 15. Concluding considerations.
Learning outcomes: (Knowledge; Skills; Competencies)	Knowledge: The subject of study should ensure a level of competence and knowledge necessary for solving specific problems in the field of transport of goods and materials. Theoretical and practical knowledge in the area of materials and goods in transport is essential. Additionally, the proposed program should highlight a scientific approach to the problems of transporting various materials and goods. Skills: Developed abilities to apply theoretical and practical knowledge regarding the behavior of goods and materials in transport. Competencies: Developed abilities for independent understanding and application of knowledge necessary to address specific problems related to the behavior of goods and materials in transport.
Sustainable Development Goal (SDG):	SDG8 – Decent Work and Economic Growth SDG9 – Industry, Innovation and Infrastructure SDG12 – Responsible Consumption and Production
Teaching methods:	The teaching is conducted through oral presentations (ex cathedra) and demonstrations of various processes related to the behavior of goods and materials in transport, utilizing video and audio recordings, as well as

	independent presentations of specific problems in the area of product identification. The course encourages discussions and debates with students about practical issues, individual observations from different environments, and the development of independent research and analyses on the behavior of goods and materials in transport.
Assessment methods with grading structure:	Criteria for Monitoring and Evaluating Student Performance During the Course: 1. Homework/Seminar Paper/Practical Work: max 15 points (%), passing if over 50% is achieved. 2. First Partial Exam/Test/Knowledge Check: max 35 points (%), passing if over 50% is achieved. 3. Final Exam - Written: 20 points. 4. Final Exam - Oral: 30 points. 5. Final Exam (Integrated) - Written: 40 points. 6. Final Exam (Integrated) - Oral: 45 points. To pass the exam, the student must pass the oral part of the exam. The total number of points (%) that a student can achieve according to the outlined criteria during the course is a maximum of 50 points (%), which, combined with the Final Exam (II partial), totals 100 points (%). For students who did not pass the First Partial Exam, the Final Exam (Integrated) will be organized based on the entire material covered during the course and exercises, and will be graded out of 85 points (%), which combined with the seminar paper/practical work totals 100 points (%). The final success of the student after all planned knowledge assessments is evaluated and graded using the following grading system: a) 10 (A) - Exceptional success with no errors or minor errors, worth 95-100 points; b) 9 (B) - Above average, with some errors, worth 85-94 points; c) 8 (C) - Average, with noticeable errors, worth 75-84 points; d) 7 (D) - Generally good, but with significant deficiencies, worth 65-74 points; e) 6 (E) - Meets minimum requirements, worth 55-64 points; f) 5 (F, FX) - Does not meet minimum requirements, less than 55 points. The overall evaluation of all student obligations during the semester, and the grade on the exam, is based on the total number of points (%) that the student earned by fulfilling pre-exam obligations and passing the partial and final exams, according to the quality of acquired knowledge and skills, totaling a maximum of 100 points, and is determined according to the following scale: Student Obligations _____ points Attendance at lectures and exercises - attendance records must be kept. Attendance at classes and exercises is not graded. Homework/Seminar/Practical/..... max 15 points

	First Partial Exam/Test/Knowledge Check/..... max 35 points Final Exam - Written ..... max 20 points Final Exam - Oral ..... max 30 points Final Exam (Integrated) - Written..... max 40 points Final Exam (Integrated) - Oral..... max 45 points The final exam is organized so that students who have passed the first knowledge check only take the final part of the exam (II part of the material), while students who have not passed the first knowledge check will take both the first partial exam (I part of the material) and the final exam together. The exam is conducted in written and oral formats. The specified scale is adopted according to the Rules of Study at the University of Sarajevo. Note: Students are required to attend all forms of classes for a minimum of 80% of the total hours. A student may, in justified cases (illness), be absent from classes, for which they are required to submit a medical excuse. The seminar paper and homework will only be graded if submitted by the defined deadlines. Late submissions will not be graded.
Literature:	Required: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. BERKOVIĆ, M.: skripta predavanja, „Materijali i robe u transportu, Univerzitet u Sarajevu - Fakultet za saobraćaj i komunikacije, 2024. godine. 3. BEHMEN, A., SALIHOVIĆ, S., Materijali i robe u transportu, Knjiga I - klasifikacija, standardizacija, identifikacija, Fakultet za saobraćaj i komunikacije Sarajevo, 2007. 4. BEHMEN, A., SALIHOVIĆ, S., Materijali i robe u transportu, Knjiga II – kvalitet: osnove, principi, kontrola, Fakultet za saobraćaj i komunikacije Sarajevo, 2008. 5. ŠPAGNUT, D., Tehnološke osobine roba u transportu, Saobraćajni fakultet, Beograd, 1989. 6. DŽANIĆ, H., Tehnologija materijala u prometu, Fakultet prometne znanosti, Zagreb, 1989. 7. DŽANIĆ, H., Tehnologija materijala za prometnu tehniku, Fakultet prometne znanosti, Zagreb, 1995. 8. ŠTRUMBERGER, N., Tehnologija materijala, Fakultet prometne znanosti, Zagreb, 1996. 9. Međunarodni/evropski Pravilnici o prijevozu opasnih materija:RID, ADR, IATA, IMDG, AND 10. BAS/EN/ISO/IEC standardi Supplementary: 1. Grupa autora: TRANSPORT OPASNIH MATERIJA, Univerzitet u Sarajevu Fakultet za saobraćaj i komunikacije, 2023.

Course code: 19-20-1TRWES010204.	**Course title: LOGISTICS SYSTEMS**		
Level: I	**Year:** II	**Semester: IV**	**Number of ECTS credites:** 6
Status: elective 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:	None		
Course goal (goals):	The primary goal of the elective course "Logistics Systems" is to acquire and master fundamental theoretical knowledge about logistics systems in transportation and traffic, as well as to apply this knowledge through practical exercises and the development of independent seminar papers. The course aims to provide an understanding of the role and function of logistics systems in the modern economy, along with a detailed exploration of technical concepts. Students will become familiar with the basic characteristics of logistics systems during the phases of planning, implementation, and control of efficient flows and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customer demands.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction to "Logistics Systems": Concept, Structure, and Mission of the Logistics System; Trends 2. Basic Concepts of Logistics and Distribution: Structure of General and Universal Logistics Systems 3. Commodity and Information Flows in the Logistics Chain: Distribution Channels, Operations, and Supply Chain Management 4. Basic Characteristics and Functions of Logistics Systems: Modalities of Managing Commodity Flows in Logistics Systems 5. Logistics Networks: Functional (Sub) Systems of the Logistics System 6. Warehouses in the Logistics Network: Warehouse Logistics Systems; Concept and Mission of Warehouse Logistics 7. Concept, Function, and Mission of Information Logistics Systems		

	8. Concept of Transportation Logistics Systems: Structure, Mission, and Management of Transportation Logistics Systems 9. Handling Logistics Systems: Inventory Management; Control of the Logistics System 10. Warehouse Information Systems and Management of Warehouse Logistics Systems 11. Concept and Importance of Distribution Logistics Systems: Designing Distribution Systems 12. Analysis of the Logistics System: Physical Internet; Structure, Mission, and Management of Logistics Distribution Systems 13. Concept, Characteristics, Structure, and Mission of Educational Logistics Systems 14. Logistics Business Service Systems: Systems for Legal, Accounting, Market, and Other Business Activities in Logistics 15. Concluding Considerations
Learning outcomes: (Knowledge; Skills; Competencies)	Knowledge: Through the instructional process of lectures, exercises, seminars, and practical work, students should acquire the relevant knowledge and experience in the field of logistics systems. The course of study should ensure a critical level of competencies and knowledge necessary to address specific problems within logistics systems. Additionally, the curriculum should highlight a scientific approach to the issues related to logistics systems. Skills: Developed abilities to apply theoretical and practical knowledge in the field of logistics systems. Competencies: Developed capabilities for independent understanding and utilization of knowledge needed to solve specific problems in the field of logistics systems.
Sustainable Development Goal (SDG):	SDG 8: Decent Work and Economic Growth SDG 9: Industry, Innovation, and Infrastructure SDG 12: Responsible Consumption and Production
Teaching methods:	The course is conducted through lectures and practical exercises. Lectures are delivered through oral presentations accompanied by visual aids, showcasing relevant examples. Discussions on issues related to the management and organization of logistics systems are initiated. Students will be required to prepare and present seminar papers. Various teaching methods are employed, including oral presentations and discussions, demonstrations of examples, video presentations, and encouraging independent work through

	appropriate methodological approaches.
Assessment methods with grading structure:	The following criteria will be used to monitor and evaluate student performance throughout the course: 1. Homework/Seminar Paper/Practical Work: max 15 points (%), passed if over 50% is achieved. 2. First Partial Exam/Test/Knowledge Check: max 35 points (%), passed if over 50% is achieved. 3. Final Exam - Written: max 20 points. 4. Final Exam - Oral: max 30 points. 5. Final Exam (Comprehensive) - Written: max 40 points. 6. Final Exam (Comprehensive) - Oral: max 45 points. To pass the course, students must pass the oral component of the exam. The total number of points (%) that students can earn during the course amounts to a maximum of 50 points (%), which combined with the Final Exam (II Partial) makes a total of 100 points (%). For students who did not pass the first Partial Exam, the Final Exam (Comprehensive) will cover all material taught during the course and will be graded out of 85 points (%), which together with the seminar paper/practical work totals 100 points (%). The final success of the student, after all prescribed forms of knowledge assessment, will be evaluated and graded using the following system: a) 10 (A) - Outstanding achievement with no errors or only minor errors, worth 95-100 points; b) 9 (B) - Above average, with some errors, worth 85-94 points; c) 8 (C) - Average, with noticeable errors, worth 75-84 points; d) 7 (D) - Generally good, but with significant shortcomings, worth 65-74 points; e) 6 (E) - Meets minimal requirements, worth 55-64 points; f) 5 (F, FX) - Does not meet minimal requirements, less than 55 points. The overall assessment of all student obligations during the semester, or the exam grade, is based on the total number of points (%) that the student earned by fulfilling pre-exam obligations and passing the partial and final exams, according to the quality of knowledge and skills acquired. This totals a maximum of 100 points, determined according to the following scale: **Student Obligations** _____Points Attendance at lectures and exercises - attendance records will be maintained. Attendance is not scored. Homework/Seminar Paper/Practical Work ..... max 15 points

	First Partial Exam/Test/Knowledge Check ..... max 35 points Final Exam - Written ..... max 20 points Final Exam - Oral ..... max 30 points Final Exam (Comprehensive) - Written ..... max 40 points Final Exam (Comprehensive) - Oral ..... max 45 points The final exam will be organized so that students who have passed the first knowledge check will only take the final part of the exam (II part of the material), while students who did not pass the first knowledge check will take both the final and the first partial exam (I part of the material). The exam will be both written and oral. This grading scale is adopted in accordance with the Study Regulations at the University of Sarajevo. **Note:** Students are required to attend all forms of classes for a minimum of 80% of the total hours. A student may be absent from class for justified reasons (e.g., illness), for which they must provide a medical excuse. Seminar papers and homework will only be graded if submitted by the defined deadlines. Late submissions will not be graded.
Literature:	Required: 1. Bilješke i slajdovi s predavanja (moći će se preuzeti na WEB site-u Fakulteta). 2. Berković, M.: skripta predavanja, „Logistički sistemi, Fakultet za saobraćaj i komunikacije, 2024. godine, 3. Berković, M.: skripta predavanja, „Logistika u saobraćaju i komunikacijama, Fakultet za saobraćaj i komunikacije, 2024. godine. Supplementary: 1. Perišić, R., Sistem kvaliteta usluga, logistika i informatika, Institut tehničkih nauka SANU, Beograd, 2002. 2. Zelenika, R., Prometni sustavi, Tehnologija-organizacija-ekonomika-logistika-menadžment, Sveučilište u Rijeci 2001.

Course code: 19-20 2TRWES010204	**Course title: FREIGHT FORWARDING BUSINESSES**		
Level: I	**Year: II**	**Semester: IV**	**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 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):	Acquisition of the necessary knowledge in the field of forwarding to adopt basic procedures, techniques, and processes for organizing international trade and goods transport flows.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Basic characteristics of freight forwarding and freight forwarders 2. Functions of freight forwarding in international trade 3. Types of freight forwarding 4. International freight forwarding as a system 5. Professional organizations for international freight forwarding 6. FIATA documents 7. Basic tasks of an international freight forwarder 8. Routing 9. Legal position of freight forwarders in customs procedures 10. Transport insurance 11. Special tasks of an international freight forwarder 12. Legal position of freight forwarders in the world and Bosnia and Herzegovina 13. Obligations, rights, and responsibilities of freight forwarders from the forwarding contract 14. Incoterms 15. The role of freight forwarders in the application of Incoterms
Learning outcomes:	Knowledge: Through lectures, exercises, and practical work, students acquire relevant knowledge and experience for practical application in the field of international trade and freight forwarding operations. Skills: By applying the acquired knowledge, students will be equipped to shape, organize, and execute international goods flows and perform all tasks related to logistics and forwarding. Competencies: Application of the acquired knowledge in specific models.
Sustainable Development Goal (SDG):	SDG 4: Quality Education - Ensure inclusive and 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.

Teaching methods:	During the program, the instructor presents individual thematic units (lecturing ex cathedra), allows students to view educational video content (DVDs, video presentations) related to the subject area, and organizes discussions on assigned topics (interactive teaching). In the exercises, examples and tasks related to the theoretical topics are reviewed and solved, students are assisted in independently solving tasks, and they are guided in the preparation of programs and seminar papers. Case studies and workshops are also conducted.
Assessment methods with grading structure:	Criteria for assessing and grading students' work during the course are as follows: Homework: 0 to 5 points, passed if over 50% is achieved Seminar Paper / Project Task: 0 to 10 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 (%) Homework: 5 points (%) Seminar Paper / Project Task: 10 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 (Homework): 2.5 points Activity (Seminar Paper / Project Task): 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. Zelenika, R., *International Freight Forwarding*, Faculty of Economics, Rijeka, 1996. 2. Zelenika, R., *Fundamentals of Logistics Forwarding*, Faculty of Economics, Rijeka, 2005. 3. F. Jašarević, V. Peulić, *Logistics and Forwarding*, Banja Luka, 2005. **Supplementary:** 1. Ivaković, Č., Stanković, R., Šafran, M., *Freight Forwarding and Logistic Processes*, Faculty of Transport and Traffic Sciences, Zagreb, 2010. 2. Kilibarda, M.J., *Freight Forwarding and Agency Business*, Faculty of Transport and Traffic Engineering, Belgrade, 2009. 3. Mađarić, J., *International Freight Forwarding*, Faculty of Transport and Traffic Sciences, Zagreb, 1991. 4. M. Kilibarda, M. Andrejić, V. Pajić, *Freight Forwarding and International Logistics*, Belgrade, 2022. 5. M. Kilibarda, M. Andrejić, V. Pajić, *Practicum in Freight Forwarding*

Course code: 19-20-3TRWES010204	**Course title: VERTICAL TRANSPORT**		
Level: I	**Year:** II	**Semester: IV**	**Number of ECTS credites:** 6

Status: elective course	**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 45 Tutorials 45
Course participants:	Academic staff and associates selected in the field to which the course belongs/course
Prerequisite for enrollment:	No
Course goal (goals):	Acquistion of educational forms for implementing programs in the field of selection, management, and modernization of vertical transport.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Types of Vertical Transport Devices 2. Classification of Elevators 3. Wire Rope Traction Elevators 4. Slow-Speed, High-Speed, and Express Elevators 5. Freight Elevators 6. Facade Elevators 7. Hydraulic Elevators 8. Hydraulic Elevator Drives 9. Hydraulic Elevator Calculations 10. Escalators 11. Cable Cars 12. Platforms 13. Maintenance, Servicing, and Testing of Elevators 14. Modernization of Elevators 15. European Directives on Elevators
Learning outcomes: (Knowledge; Skills; Competencies)	Through lectures, tutorials and practical work, students should acquire the necessary knowledge and experience for practical application in the field of design, selection, management, and maintenance of vertical transport systems.
Sustainable Development Goal (SDG):	Sustainable Development Goals (SDGs) and Targets that can be linked are: Goal 7: Ensure Access to Reliable, Sustainable, and Modern Energy at Affordable Prices for All *Sub-goals*: • 7.3: Double the global rate of improvement in energy efficiency by 2030. • Modern vertical transport systems, such as energy-efficient elevators, contribute to reducing overall energy consumption in buildings, supporting energy efficiency goals. Goal 9: Build Resilient Infrastructure, Promote Inclusive and

	Sustainable Industrialization, and Foster Innovation *Sub-goals:* • 9.1: Develop quality, reliable, sustainable, and adaptable infrastructure to support economic development and human well-being. • 9.4: Upgrade infrastructure and retrofit industries to become sustainable, with increased resource efficiency and broader adoption of clean and environmentally friendly technologies and industrial processes. • Vertical transport, including elevators, escalators, and similar systems, is crucial for the efficient functioning of modern buildings and infrastructure. Its proper implementation contributes to the development of sustainable infrastructure that enhances the quality of life in urban environments. Goal 11: Make Cities and Human Settlements Inclusive, Safe, Resilient, and Sustainable *Sub-goals:* • 11.2: Provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety, primarily by expanding public transportation, with special attention to the needs of vulnerable groups, including women, children, persons with disabilities, and the elderly. • 11.6: Reduce the negative environmental impact of cities, including decreasing energy consumption through efficient vertical transport systems. • Vertical transport plays a role in enabling accessibility and improving the quality of life for all residents, while sustainable systems reduce energy consumption and emissions. The connection between these goals and the subject "Vertical Transport" is reflected in the need to develop and maintain vertical transport systems that are energy-efficient, safe, and accessible to all users, while simultaneously supporting broader goals of sustainable urban development and infrastructure.
Teaching methods:	Lectures, tutorials and preparation of seminars with a practical focus.
Assessment methods with grading structure:	Evaluation and grading of students during the course are carried out as follows: • Attendance at lectures and exercises: 0 – 10 points (%)

	• Homework/seminar papers/practical work: 0 – 10 points (%) • First partial exam/test/knowledge check: 0 – 15 points (%) • Second partial exam/test/knowledge check: 0 – 20 points (%) The total number of points (%) that a student can achieve based on the above criteria during the course is a maximum of 55 points (%). The final exam is worth up to 45 points or 45 (%). The final exam covers the entire material studied during the course.
Literature:	Required: 1. Šelendić B., Vertikalni, kosi i horizontalni transport, Delta pres, Beograd 1973. 2. Strakosch G., Vertical transportation, New Jersey, 2010. Supplementary: 1. European Standards EN 81, EN 115. 2. Regulations and Directives on Elevators

Course code: 21TRWOS010305	**Course title: TECHNOLOGY MARKETING**		
Level:I	**Year:III**	**Semester:V**	**Number of ECTS credits:** 6
Status: Mandatory Course		**Total number of contact hours: 90** Optionally detail the distribution of hours by type: Lectures: 60 Exercises, Seminars, and Project Tasks: 15 Laboratory Exercises / Field Work / Practical Training: 30	
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:	NE		
Course goal (goals):	Students should acquire the necessary knowledge and experience for practical application in the field of high-tech marketing through the instructional process, including lectures, exercises, laboratory work, and practical work.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Traffic as a Field of Material Production: Conceptual Understanding of Traffic. 2. Social Division of Labor in the Transport Market: Marketing as the Conceptual Foundation of Market Business. 3. Concept, Definition, and Development of Marketing. The Role and Importance of Marketing in Market Operations and the Formation of Business Policy in Transport Companies, High-Tech Marketing.		

	4. Basic Elements of the Marketing Mix in Transport Companies, Additional Tools of High-Tech Marketing. 5. Characteristics of the Transport Market as the Basis for Formulating Business Policy in Transport Processes. 6. Organization and Methods of Determining Market Elements for Business Policy Planning. Methods of Forecasting and Planning Business Policy in Transport Companies. 7. Organization of the Marketing Function in Transport Companies. 8. Costs and Prices as Instruments of Marketing Business Policy in Transport Companies. 9. Selection and Management of Marketing Channels in Transport. 10. Management of Service Operations and Additional Services. 11. Creating a Communication and Promotional Marketing Strategy. 12. Creating Direct Marketing Programs in Transport Systems. Planning the Marketing Function in Transport Companies. 13. Organization and Application of the Marketing Function in Transport Companies. 14. Evaluation and Control of the Marketing Function Execution in Transport. 15. Developing, Testing, and Launching New Services in Transport.
Learning outcomes:	Knowledge: Theoretical and practical knowledge in the field of high-tech marketing in transport. The subject should ensure a level of competence and knowledge necessary for solving everyday problems in this area. Skills: The ability to apply theoretical and practical knowledge in the field of high-tech marketing in transport. Competencies: The ability to independently understand and use knowledge needed to solve specific problems in the field of high-tech marketing in transport.
Sustainable Development Goal (SDG):	SDG 4 – "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." SDG 5 – "Achieve gender equality and empower all women and girls." SDG 8 – "Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all." SDG 9 – "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation." SDG 10 – "Reduce inequality within and among countries." SDG 11 – "Make cities and human settlements inclusive, safe, resilient, and sustainable."
Teaching methods:	Instruction is delivered through lectures, exercises, laboratory work/fieldwork/practical sessions/workshops. The following methods are employed: oral presentation, discussion, demonstration, graphical work, drawing, and group work. In lectures, theoretical concepts and principles are covered, accompanied by descriptive examples and problem-solving tasks. Additional examples are discussed and resolved through exercises, laboratory work/fieldwork/practical sessions, which allows for continuous work and preparation for independent problem-solving.

	In laboratory work/fieldwork/practical sessions/workshops, skills necessary for individual and team work are developed to accomplish tasks in the given field.
Assessment methods with grading structure:	Assessment includes creativity in lectures and exercises, as well as the evaluation of independent work, partial tests during the course, and the final exam. The criteria for tracking and evaluating student performance during the course are as follows: • Homework/Seminar/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): 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 earn during the course amounts to a maximum of 50 points (%), which combined with the Final (Second Partial) makes up 100 points (%). For students who have not passed the First Partial Exam, the Final Exam (Comprehensive) is organized covering all material from lectures and exercises, and is worth 85 points (%), combined with the seminar/practical work to total 100 points (%). The final grade after all forms of knowledge assessment is evaluated according to the following grading system: • 10 (A): Outstanding performance with no or negligible errors, 95-100 points. • 9 (B): Above average, with a few errors, 85-94 points. • 8 (C): Average, with noticeable errors, 75-84 points. • 7 (D): Generally good, but with significant deficiencies, 65-74 points. • 6 (E): Meets minimum requirements, 55-64 points. • 5 (F, FX): Does not meet minimum requirements, less than 55 points. The overall evaluation of student obligations during the semester, and the exam grade is based on the total number of points (%) earned by the student from completing pre-exam obligations and taking the partial and final exams, with a maximum of 100 points, assessed according to the following scale: Student Obligations | Points (%) • Attendance at 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. Š. Čekić, I. Bošnjak : Tehnologijski marketing u transportu i komunikacijama, Univerzitet u Sarajevu, Fakultet za saobraćaj i komunikacije, Sarajevo, 2011. 2. I. Bošnjak: Tehnologijski marketing, Fakultet prometnih znanosti, Zagreb, 1996.

	3. P.Kotler: Upravljanje marketingom, Zagreb,2006. 4. B.Tihi : Istraživanje marketinga,Sarajevo,2007. 5. Š. Čekić, I. Bošnjak: Menadžment u transportu i komunikacijama, Fakultet za saobraćaj i komunikacije- Fakultet prometnih znanosti, Sarajevo-Zagreb, 2000. 6. Grupa autora- B.Tihi: Osnovi marketinga, Sarajevo,1999.

Course code: 22TRWOS010305	**Course title: INTELLIGENT TRANSPORT SYSTEMS**		
Level: I	**Year: III**	**Semester: V**	**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):	Acquiring the knowledge and skills necessary in the realization of programs in the field of intelligent transport systems, analysis of the effect of ITS functionality on changes in the state parameters of the classical transport system. Use of ITS functionality in the management of traffic processes.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Defining basic concepts and the role of ITS 2. Scientific and technological framework of ITS development 3. Artificial intelligence in the ITS system 4. Measuring the performance and benefits of ITS 5. Architecture of ITS 6. European ITS architecture 7. Intelligent vehicles 8. Intelligent transport infrastructure 9. Intelligent terminals 10. Intelligent cargo and transport equipment 11. Standardization of Functional Areas of ITS 12. Communication technologies in the ITS system 13. Digitization of transport 14. Planning and managing the development of the ITS system 15. Security and protection of the ITS system		
Learning outcomes:	Knowledge: The Intelligent Transport Systems subject should provide the necessary level of knowledge about technologies, functions and students of ITS, methods of their planning, development and		

	implementation. Skills: The ITS subject enables the acquisition of skills necessary for measuring, analyzing and evaluating the efficiency, safety, environmental impact and economic benefits of the implementation of ITS services. Competences: Through the teaching process of lectures, exercises, and seminar work, students should acquire appropriate competencies for designing, developing and managing intelligent transport systems.
Sustainable Development Goal (SDG):	"SDG3 - Health and well-being"; "SDG 9 Industry, innovation and infrastructure", "SDG11- Sustainable cities and communities", SDG 13-Climate protection"
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. Ezgeta, D.: Intelligent transport systems, Faculty of traffic and communications of the university in Sarajevo, Sarajevo, 2018. 2. Bošnjak, I. : Intelligent transport systems, University of Zagreb, Faculty of Transport Sciences, Zagreb, 2006. Supplementary: 1. Ghosh, S., Lee, T.: Intelligent Transportation Systems - New Principles and Architectures, CRC Press, London, 2000. 2. Miles, J. Chen, K.: ITS Handbook, 2nd edition, PIRAC, 2004. 3. Meng Lu: Evaluation of Intelligent Road Transport Systems – Methods and Results. Institution of Engineering and Technology, London. 2016. 4. Meneguette, R.I., De Grande, R., Loureiro, A. F.: Intelligent Transport System in Smart Cities, Springer, Ontario, 2018. 5. Sładkowski, A.: Wiesław Pamuła: Intelligent Transportation Systems – Problems and Perspectives, Springer, Katowice, 2016. 6. Perallos, A.: Intelligent transport systems – technologies and applications. Wiley & Sons, Bilbao, 2016. 7. Chow, Y.J.: Informed urban transport systems, Elsever, Amaterdam, 2018. 8. Dimitrakopoulos, G., Uden, L.: The Future of Intelligent Transport Systems, Elsever, Amaterdam, 2020.

Course code:	**Course title: RAILWAY TRAFFIC INFRASTRUCTURE**
22TRWOS010305	

Level: I	**Year: III**	**Semester: V**	**Number of ECTS credits: 6**
Status:mandatory subject		**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** Subject teacher**: Prof.dr. Nedžad Branković** Subject assistant: mr.sc. Esad Jalovčić, dipl.ing.saob.	
Prerequisite for enrollment:		No	
Course goal (goals):		Acquisition of basic theoretical knowledge required in the field of railway infrastructure: basic building elements of railway infrastructure and types of railway infrastructure. Contact networks, signaling and communication devices used for the management and exploitation of the railway infrastructure. European Union directives and interoperability as well as domestic legislation and regulatory authorities.	
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*		1. Building elements of the railway infrastructure - Part I: Classification of railways according to the number of tracks and according to the width of the tracks. Parameters affecting the railway track.. 2. Building elements of the railway infrastructure – Part II: Main parts of the railway line. Upper machine and lower machine 3. Construction elements of the railway infrastructure - Part III: Length of the railway and track length. Overhang of the outer rail in a circular curve. Slope of track and rail. 4. Building elements of railway infrastructure - Part IV: Types of railway sleepers. Track fastening accessories and connecting accessories. Embankments, cuts and tunnels. 5. Building elements of the railway infrastructure - Part V: Culverts and railway stations. Crossings and bypasses. Division of tracks in stations. Parent track and pull-out track. Chestnut međik. 6. Building elements of the railway infrastructure - Part V: Track spacing. Useful track length. Buildings and facilities at passenger stations. Buildings and facilities for freight traffic. 7. Building elements of railway infrastructure - Part VI: Technical-passenger stations and technical-field stations. Thrust zone on the descent, acceleration zone on the descent and braking zone on the descent.	

	8. Contact networks - Part I: Significance and purpose of stable electric traction installations. Purpose and parts of contact network. Types and arrangement of catenary poles. Contact network portals types and applications 9. Contact networks - Part II: Equipment for hanging the contact line. Rotating console and tram contact train line. Chain contact catenary. 10. Contact networks - Part III: Method of tensioning the catenary catenary line. Return train lines on electrified railways. Longitudinal electrical continuity and how it is achieved. Types of catenary sectioning and how they are realized. 11. Contact networks - Part IV: Purpose and importance of pantographs. Purpose and purpose of EVP – a. Earthing pole and polygonation. Division of signal-safety devices and signals. 12. Contact networks – Part V: Colors on the main signals. Turnout and its parts. Significance of the traffic light at the turnout. Switchboard management. Robel locks. 13. EU transport policy in the field of railway transport: EU Directives. The purpose and significance of interoperability in railway traffic. 14. Domestic legislation in the field of railway traffic - Part I: Legal regulations that define the structure of the railway sector in BiH and by-laws from the mentioned field. 15. Domestic legislation in the field of railway transport - Part II: Purpose and significance of the Agreement on the establishment of the Bosnia and Herzegovina Public Railway Corporation (BHŽJK). The role and significance of the Regulatory Board of Bosnia and Herzegovina and its powers.
Learning outcomes:	**Knowledge:** Knowledge of the basic building elements of the railway infrastructure, its functions and significance. **Skills:** Knowledge of elements of railway infrastructure, application and functions of railway infrastructure, management and exploitation of railway infrastructure. Assess the need for integration and liberalization of internal traffic flows by following the European traffic policy in its traffic flows, as well as the traffic policy of the surrounding countries. **Competencies:** Ability to independently understand and use the knowledge needed to solve specific problems in the field of management and exploitation of railway infrastructure.

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. Doc. dr. Nedžad Branković, Railway Traffic Infrastructure, UNIVERSITY OF SARAJEVO, Faculty of Traffic and Communications, May 2010. 2. Piero Soave, Brief guide to the European Union, European Parliament, October 2016.

	3. Marc Thomas, A Brief Guide to the European Union, European Parliament, September 2016. Supplementary: 1. DIRECTIVE 2012/34/EU OF THE EUROPEAN PARLIAMENT AND COUNCIL of 21 November 2012 on the establishment of a single European railway proctor 2. DIRECTIVE (EU) 2016/797 OF THE EUROPEAN PARLIAMENT AND COUNCIL of May 11, 2016 on the interoperability of the railway system in the European Union 3. DIRECTIVE (EU) 2016/798 OF THE EUROPEAN PARLIAMENT AND COUNCIL of May 11, 2016 on railway safety, 4. 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 5. REGULATION (EC) no. 1371/2007 OF THE EUROPEAN PARLIAMENT AND COUNCIL of October 23, 2007 on the rights and obligations of passengers in rail traffic. 6. DIRECTIVE 2007/59/EC OF THE EUROPEAN PARLIAMENT AND COUNCIL of 23 October 2007 on the authorization of train drivers operating locomotives and trains on the Community railway system 7. REGULATION (EU) 913/2010 OF THE EUROPEAN PARLIAMENT AND COUNCIL of September 22, 2010 on the European rail network for the competitive transport of goods. 8. 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) 9. Beata Tuszynska and Frederic Gouarderes, A Brief Guide to the European Union, European Parliament, October 2016.

Course code: 24-25-1TRWES010305	**Course title: TECHNICAL EXPLOITATION OF RAILWAY VEHICLES**		
Level: I	**Year: III**	**Semester: V**	**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 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):	Mastering the knowledge of rational exploitation of railway vehicles and transport resources in railway traffic. The focus is on the analysis and calculation of the technical and operational characteristics of railway vehicles, which serves as the foundation for selecting optimal vehicles for specific operational conditions. This includes establishing dynamic models of railway vehicles in the processes of traction and braking to determine the necessary data for analyses and expertise related to traffic accidents.
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Ground vehicles and their motion 2. Equations of motion for railway vehicles 3. Analysis of railway vehicle motion 4. Resistance to vehicle motion 5. I-V diagram and Q-V diagram 6. Equation of train motion 7. Train motion diagram 8. Realization of traction and braking forces 9. Traction characteristics of vehicles 10. Characteristics of braking devices and systems 11. Traction-energy testing of vehicles 12. Consumption of propulsion energy 13. Traction, braking, and supplementary calculations 14. Vehicle motion simulations 15. Optimization of operational parameters
Learning outcomes:	**Knowledge:** Students will gain a deep understanding of the technical and operational characteristics of rail vehicles, including design, performance, and maintenance. They will understand the analysis of dynamic characteristics of vehicles in the context of traction, braking, and stability. **Skills:** They will be equipped to select rail vehicles correctly based on specific operational conditions. Students will develop skills in conducting dynamic analyses, utilizing software tools for modeling and simulation, and applying knowledge from technical literature. **Competences:** Students will be competent in managing technical systems of rail vehicles, making informed decisions regarding operational optimization, identifying and solving safety issues, and collaborating with other professionals in the field of railway transport.
Sustainable Development Goal (SDG):	SDG 3: Ensure healthy lives and promote well-being for all at all ages. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Ensure sustainable consumption and production patterns. 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 course, the instructor presents individual thematic units (ex cathedra), allows students to watch videos with educational content (DVDs, video presentations) related to the subject matter, and organizes

	discussions on assigned topics (interactive teaching). The exercises involve reviewing and solving examples and tasks in accordance with the theoretical material, assisting students in independently solving tasks, and in the preparation of programs and seminar papers. In laboratory exercises/fieldwork/practical training, skills necessary for individual and team work will be developed to accomplish tasks within the given subject area.
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. D. Tadić: Vehicle Motion Theory, Traffic Faculty, Sarajevo. 2. H. Bratić: Collection of Problems in Vehicle Motion Theory, Traffic Faculty, Sarajevo, 1986. 3. D. Dinić: Train Traction, Institute for Press and Publishing JŽ, Belgrade, 1986. Supplementary: 1. J. Zavada: Railway Vehicles and Train Traction, Faculty of Transport Sciences, Zagreb, 1991.

Course code: 24-25-2TRWES010305	**Course title: MULTIMODAL TRANSPORT**		
Level: I	**Year: III**	**Semester: V**	**Number of ECTS credits: 6**
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:	Attendance and active participation in lectures and exercises are mandatory, as well as the preparation of a seminar paper and independent exercise tasks.		
Course goal (goals):	The course content should enable students to become familiar with modern transport chains, the basics of technological design and optimization of transport processes, as well as with contemporary technological solutions offered within individual multimodal transport technologies, and applying logistics principles and the possibilities provided by new information and telecommunication technologies.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Basic characteristics of modern technological changes in society, industry, and transport. 2. Transport chains. Classic transport chain technologies. Industrial transport. 3. Systemic approach to the analysis of the transport process as a complex technological system 4. Pallet transport system 5. Container transport system 6. Typical technologies for implementing the container transport chain 7. “Vehicle-to-Vehicle” systems		

	8. Integral land-sea transport systems. 9. Integral sea-river transport systems. Multimodal transport systems in passenger transport. 10. Container terminals, HUCKE – PACK terminals, RO-RO terminals 11. Cargo transport centers (RTC) 12. Introduction of logistics principles into the planning of transport chains 13. Technological functions of the marketing logistics subsystem, logistics from the perspective of modern transport and forwarding organizations 14. Warehouse systems, inventory theory 15. Specific research and design of modern logistics and transport chains
Learning outcomes:	Through lectures, exercises, and practical work, students should acquire relevant knowledge and experience for practical application in the field of modern cargo transport technologies. The course also enables the acquisition of knowledge and skills necessary for adequate analysis, assessment, and management of transport flows based on logistics principles.
Sustainable Development Goal (SDG):	Specific sustainable development goals related to the course syllabus are: – SDG 8: Decent Work and Economic Growth – SDG 9: Industry, Innovation, and Infrastructure – SDG 11: Sustainable Cities and Communities – SDG 12: Responsible Consumption and Production – SDG 14: Life Below Water The connection of thematic units with the mentioned sustainable development goals is explained in detail below. "SDG 8": Technological functions in marketing logistics can improve the efficiency and competitiveness of businesses. The implementation of advanced technologies can enhance working conditions and stimulate economic growth through innovation and optimization. (Sub-goal "SDG 8.2": Achieve higher levels of productivity through technological advancement and innovation) "SDG 9": Modern technological changes, such as digitization, automation, and artificial intelligence, can enhance industrial productivity and foster innovation. A systemic approach allows for the analysis and improvement of the entire transport process. Identifying and integrating all components into a single system can help optimize resources, reduce costs, and improve energy efficiency. The container transport system allows for standardization and automation, improving efficiency and reducing costs. These technologies support global trade and can help reduce emissions through optimized transport routes. RTCs serve as key points for optimizing and distributing goods; they support sustainable industrialization and more efficient resource use (Sub-goal "SDG 9.1": Build resilient infrastructure and promote sustainable

	industrialization; Sub-goal "SDG 9.5": Enhance research and development in technology within the industry) "SDG 11": Classic transport chain technologies include traditional modes of transport such as trucks, trains, and ships. These technologies can be improved to be more environmentally friendly and efficient, contributing to reduced pollution and improved access to sustainable transport in urban areas. Integrating different systems can reduce congestion, and emissions, and improve transport accessibility. (Sub-goal "SDG 11.2": Ensure that road infrastructure supports safe and efficient transportation) "SDG 12": Effective management of transport chains can help reduce waste and emissions, optimize resources, and minimize environmental impact. The pallet transport system improves efficiency in storage and transport, reduces packaging needs, and minimizes waste. More efficient transport systems can significantly reduce pollution. Technologies such as automated warehouses and loading robots can improve efficiency and reduce the need for manual labor, which decreases the risk of errors and waste. This contributes to reducing harmful environmental impacts. Efficient warehouse and inventory management can reduce waste and improve sustainability through better resource control and reduced product surplus. (Sub-goal "SDG 12.4": Manage chemicals and waste throughout their lifecycle and reduce their environmental impact; Sub-goal "SDG 12.5": Substantially reduce waste generation through prevention, reduction, recycling, and reuse; Sub-goal "SDG 12.6": Encourage companies to adopt sustainable practices and report on them) "SDG 14": Integral land-sea transport systems allow for more efficient use of maritime routes and reduce impacts on the coast and marine ecosystems. Effective integration can reduce emissions and decrease pollution from transport. (Sub-goal "SDG 14.1": Reduce marine pollution, including plastic waste and other forms of pollution)
Teaching methods:	Teaching is conducted through lectures, exercises, and practical parts of the course, including project tasks. Lectures are delivered through oral presentations with examples from practice. Students will be required to prepare and present seminar papers and/or project tasks. Various methods are used in teaching, including oral presentations and discussions, demonstration of examples, graphical and video presentations, and group work using appropriate methodological approaches.
Assessment methods with grading structure:	Evaluation criteria and grading during the course are as follows: Attendance at lectures and exercises will be recorded; attendance is mandatory as a condition for taking the exam, with a maximum of 10% unexcused absences allowed. Regular attendance will not be awarded additional points. Homework/seminar paper/practical work is graded from 0 to 15 points, and only students who fulfill over 50% of these requirements will be evaluated. During the course, only one knowledge check will be organized – a partial exam in the 8th or 9th week of classes,

	worth 35 points, and only students who pass over 50% of this partial exam will be graded. The final exam is worth up to 50 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 Transport Technologies I, Faculty of Traffic Engineering Belgrade, 1994. 3. Perišić R.: Modern Transport Technologies II, Faculty of Traffic Engineering Belgrade, 1995. 4. Marković I.: New Transport Technologies, Faculty of Traffic Sciences Zagreb, 1985. 5. Terminology in Combined Transport: UN/ECE, Translation Kiso F., Education and Culture TEMPUS, Sarajevo, 2004. 6. Kiso F., Karičić S.: Teaching Materials, Presentations, and Script "Warehousing"

Course code: 24-25-3TRWES010305	**Course title: RAILWAY TRAFFIC MONITORING AND REGULATION**		
Level: I	**Year: III**	**Semester: V**	**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 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):	Acquisition of educational forms in the implementation of programs in the field of railway traffic supervision and regulation, and analysis of the impact of management functions on changes in the state parameters in railway traffic.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Elements of traffic flow theory in railway transport. 2. Official places and devices on the railway and in stations used for train traffic supervision and regulation. 3. Regulation of train traffic on railways. 4. Safety and protection parameters at crossings. 5. Identification and analysis of traffic flow management at signalized crossings. 6. Sensors for measuring traffic flow parameters. 7. Risk assessment and risk management. 8. Traffic flow models at signalized intersections. 9. Video and other types of surveillance in railway transport. 10. Management and supervision in railway stations. 11. Automatic system for managing technological processes. 12. Computerized traffic system. 13. Model of a computerized traffic system.		

	14. Strategy for managing a computerized traffic system. 15. Elements of a railway traffic management center.
Learning outcomes:	Knowledge: Through the teaching process of lectures, exercises, laboratory sessions, and practical work, students should acquire the necessary knowledge and competencies for designing, developing, and utilizing methods for monitoring and managing processes in railway transport. Skills: The course " Railway Traffic Monitoring and Regulation " should provide the required level of knowledge about methods and procedures for supervising processes in railway transport, as well as the creation and execution of management functions to enhance the efficiency and safety of railway operations. The course also enables the acquisition of knowledge and skills necessary for measuring, analyzing, and assessing the impact of management functions and supervisory measures on the operation of railway transport. Competencies: Application of acquired knowledge in specific 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. SDG 16: Promote peaceful and inclusive societies, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
Teaching methods:	During the course, the instructor presents individual thematic units (ex cathedra), allows students to watch videos with educational content (DVDs, video presentations) related to the subject matter, and organizes discussions on assigned topics (interactive teaching). The exercises involve reviewing and solving examples and tasks in accordance with the theoretical material, assisting students in independently solving tasks, and in the preparation of programs and seminar papers. In laboratory exercises/fieldwork/practical training, skills necessary for individual and team work will be developed to accomplish tasks within the given subject area.
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. Turčinhodžić, F. Kompjuterizirani saobraćajni sistemi. Sarajevo, 1999. 2. Sokolija, K. Traffic Monitoring and Control. TEMUS, Faculty of Traffic and Communications, Sarajevo, Politecnico di Torino, University of Southampton, Sarajevo, 2004. 3. Čabrić, N. Nadzor i regulisanje željezničkog saobraćaja. Script. Faculty of Traffic and Communications, Sarajevo, 2021.. **Supplementary:** 1. Salketić, S., Kudumović, Dž., Branković, N. Osnove tehnologije željezničkog saobraćaja. Book. University of Sarajevo – Faculty of Traffic and Communications, Sarajevo, 2016. 2. Branković N., Čabrić N., Salketić S. Guidelines and EU Standards for Certification of Jobs and Tasks in the Railway System of BiH, Scientific Journal of Traffic, Transport, and

	Communications, Journal TEC 3, Year 3, Volume 1, ISSN: 2303-5854, pp. 64-78. Sarajevo, 2016. 3. Čabrić N., Đuričić R. Risk Management in the Railway System, TIT - Transport Infrastructure and Transport, No. 7, Year 6, ISSN 2232-9676, pp. 36, Sarajevo, 2016. 4. Haramina, H. Intelligent Transport Systems in Railway Traffic. Authorized lectures. Faculty of Transport Sciences, Department of Railway Traffic. Zagreb, 2017. 5. Kornakov, A. M. Развязки железнодорожных линий в узлах. Moscow, 1962. 6. Pachl, J. Railway Operation and Control 4th Edition. VTD Rail Publishing. ISBN 978-0-9719915-6-9, Library of Congress Control No.: 2015930479. 7. COMMISSION IMPLEMENTING REGULATION (EU) 2019/773 of 16 May 2019 on the technical specification for interoperability relating to the 'operation and traffic management' subsystem of the rail system in the European Union and repealing Decision 2012/757/EU. 8. TRAFFIC RULEBOOK (Official Gazette of BiH No. 90/2015).

Course code: 27TRWOS010306	**Course title: RAILWAY TRAFFIC SAFETY**		
Level: I	**Year: III**	**Semester: VI**	**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 acquisition of educational methods in the implementation of railway traffic safety programs includes practical measurements of safety levels in railway traffic, as well as the analysis of specific traffic accidents, their causes, and consequences.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Elements of safety in railway traffic 2. Security of train movement in high-speed track design conditions 3. Elements of stopping distance in various braking system conditions 4. Reliability theory and safety of railway traffic systems. Safety analysis 5. Transportation of special cargo in railway traffic 6. Elements of collision theory 7. Classification of collisions of two bodies according to the collision line or impact and braking form calculations. Elements of theory and experimental results in the analysis of the collision process of two bodies		

	8. Methods and procedures in collision analysis 9. Elements of railway traffic accident expertise 10. Mathematical models of reliability 11. Impact of the human factor on railway traffic safety 12. Logic of the use of safety elements 13. Systems for support in managing signal and safety devices 14. Safety elements of railway vehicles 15. Safety analysis at railway crossings
Learning outcomes:	Knowledge: Students gain a fundamental understanding of the rules, methods, and procedures in traffic prevention, as well as the role of safety mechanisms in railway traffic. They learn about risk analysis, safety threat assessment, and safety management procedures. Skills: Students develop the ability to analyze and assess safety aspects of railway traffic through practical work, lab exercises. They learn how to identify and solve safety issues and how to apply preventive measures. Competencies: Students are trained to manage safety systems in railway traffic, analyze risks, make preventive decisions, and implement effective safety procedures and technologies.
Sustainable Development Goal (SDG):	SDG 3: Ensure healthy lives and promote well-being for all at all ages. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Ensure sustainable consumption and production patterns. 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 course, the instructor presents individual thematic units (ex cathedra), allows students to watch videos with educational content (DVDs, video presentations) related to the subject matter, and organizes discussions on assigned topics (interactive teaching). The exercises involve reviewing and solving examples and tasks in accordance with the theoretical material, assisting students in independently solving tasks, and in the preparation of programs and seminar papers. In laboratory exercises/fieldwork/practical training, skills necessary for individual and team work will be developed to accomplish tasks within the given subject area.
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. J. Božićević: Contribution to Increasing Safety and Speed in Railway Technology, Faculty of Traffic Sciences, Zagreb, 1987. 2. T. Mlinarić: Modern Approach to Safety and Reliability Analysis in Railway Transport, Contemporary Transport, Nos. 2 and 3, Zagreb, 1985. Supplementary: **1.** S. Beširević: Organization of Railway Traffic, Faculty of Traffic and Communications, Sarajevo, 1997.

Course code 28TRWOS010306	**Course title:**	**RAILWAY TRANSPORT TECHNOLOGY**	
Level: I	**Year:** III	**Semester:** VI	**Number of ECTS credits:** 6
Status: mandatory course		**Total number of contact hours:** Optional breakdown of hours by type: 90 Lectures. 45 Tutorials. 45	
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):	Acquisition of educational forms in the realization of programs in railway transport technology, and practical measurement in railway transport technology, as well as analysis of concrete problems of railway transport technology		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Factors of railway transport technology. Indicators of exploitation. 2. Performance indicators: towing vehicles, passenger traffic, freight traffic. Technology of maneuver work. Cell and node operation technology. 3. Arrangement and coordination of movable and fixed assets. Alignment of towing and transport means. 4. Analysis of the execution of the transport plan. Organization of traffic flows. Organization of passenger traffic. 5. Train traffic chart. Capacities in railway traffic that characterize the technical power of railways. 6. Determining the capacity of railways. 7. Transport and bandwidth. Use of technical power. 8. Methodological procedure for making the timetable. 9. Organizing passenger traffic. 10. Organization of freight traffic. 11. Creation of train traffic charts. 12. Operational indicators of the timetable. 13. Operational management of railway traffic. 14. Safety and control of railway traffic. 15. Organization of train traffic in extraordinary and special conditions.		

Learning outcomes:	Through the teaching process of lectures, exercises, laboratory exercises and practical work, students should acquire appropriate knowledge and experience for practical application in the field of railway transport technology. The subject of railway transport technology should ensure the necessary level of knowledge about the rules, methods and procedures of railway transport technology. The subject also enables the acquisition of knowledge and skills necessary for adequate analysis, assessment and management of rail transport technology systems.
Sustainable Development Goal (SDG):	SDG 9: Industry, Innovation, and Infrastructure SDG 11: Sustainable Cities and Communities SDG 12: Responsible Consumption and Production SDG 16: Peace, Justice, and Strong Institutions
Teaching methods:	During the course of the program, the teacher presents individual thematic units (ex chair), enables students to watch videos with educational content (DVD, video presentations) from the subject area and organizes discussions on the given topic (interactive teaching). As part of the exercises, consideration and solving of examples and tasks is carried out in accordance with the theoretical topic, students are helped in solving tasks independently, in creating programs and seminar papers.
Assessment methods with grading structure:	The criterion for evaluating the work and evaluating the student during classes is as follows: seminar paper/practical work from 0 to 15 points (%); I partial exam/I test/I knowledge check/ from 0 to 35 points (%); The total number of points (%) that a student can achieve according to the mentioned monitoring during classes is a maximum of 50 points (%). The final exam is worth a maximum of 50 points 50 (%). The final exam is organized from the entire material covered during the class.
Literature:	Mandatory: 1. S. BEŠIREVIĆ: Organization of Railway Traffic, Faculty of Traffic and Communications, Sarajevo, 1997. 2. B. BOGOVIĆ: Technology of goods transportation in railway transport, Faculty of Transport Sciences, Zagreb, 1988 Supplementary: 1. B. BOGOVIĆ: Organization of railway traffic, Faculty of Transport Sciences, Zagreb, 1987.

Course code:	**Course title: RAILWAY TRAFFIC PLANNING**
29TRWOS010306	

<table>
<tr><td>Level: I</td><td>Year: III</td><td>Semester: VI</td><td>Number of ECTS credits: 6</td></tr>
<tr><td colspan="2">Status: mandatory subject</td><td colspan="2">Total number of contact hours: 150
Optionally elaborate the distribution of hours by type:
Lectures 45
Exercises 30
Laboratory exercises 15
Seminar 30
Independent work 30</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">Acquiring educational forms in the implementation of programs in the field of railway traffic planning . Acquiring knowledge and skills in railway traffic planning .</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">
<table>
<tr><th>Sn</th><th>Educational units</th><th>Number of hours (P+L+L+S+Sr)</th></tr>
<tr><td>1.</td><td>Basics of planning and designing in traffic and transport</td><td>3+2+1+2+2</td></tr>
<tr><td>2.</td><td>Basic elements of traffic and transportation systems in the city relevant for planning and design</td><td>3+2+1+2+2</td></tr>
<tr><td>3.</td><td>Basic elements of traffic and transport systems in the region and wider areas relevant for planning and design</td><td>3+2+1+2+2</td></tr>
<tr><td>4.</td><td rowspan="2">Demand for traffic and transportation services</td><td>3+2+1+2+2</td></tr>
<tr><td>5.</td><td>3+2+1+2+2</td></tr>
<tr><td>6.</td><td>Offer of services in traffic and transportation</td><td>3+2+1+2+2</td></tr>
<tr><td>7.</td><td rowspan="2">Methodological basis of planning in traffic and transportation</td><td>3+2+1+2+2</td></tr>
<tr><td>8.</td><td>3+2+1+2+2</td></tr>
<tr><td>9.</td><td>Preparation and creation of traffic plans</td><td>3+2+1+2+2</td></tr>
<tr><td>10.</td><td>New technologies for creating traffic and transportation plans</td><td>3+2+1+2+2</td></tr>
<tr><td>11.</td><td>Basics of design in traffic and transportation</td><td>3+2+1+2+2</td></tr>
<tr><td>12.</td><td>Basics of planning and designing terminals in traffic</td><td>3+2+1+2+2</td></tr>
<tr><td>13.</td><td>Costs of traffic and transport system service users</td><td>3+2+1+2+2</td></tr>
</table>
</td></tr>
</table>

	<table><tr><td>14.</td><td>Evaluation of plans and projects in traffic and transport</td><td>3+2+1+2+2</td></tr><tr><td>15.</td><td>Decision-making and management in planning and designing in traffic and transportation</td><td>3+2+1+2+2</td></tr></table>
Learning outcomes:	Through the teaching process of lectures, exercises and practical work, students should acquire appropriate knowledge related to traffic planning. Study and practical application should ensure the necessary level of knowledge to determine the characteristics of the state of traffic and transport systems on the road and street network, the forecast of transport requirements of individual and public modes of transport, the formation of variants of the development of traffic and transport systems on road Gad and non-urban roads, the evaluation of variants solutions and selection of the optimal plan for the development of the traffic and transport system, implementation and monitoring of the implementation of the plan.
Sustainable Development Goal (SDG):	For the course that deals with planning and design in traffic and transportation, the goals and sub-goals of sustainable development (SDG) are: Goal 4: Quality education (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all) • 4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university • 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship • 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development Goal 9: Industry, innovation and infrastructure Sub-goals: • 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

	• 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities Goal 11: Sustainable cities and communities Sub-goals: • 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons • 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries Goal 12: Responsible consumption and production Sub-goals: • 12.2 By 2030, achieve the sustainable management and efficient use of natural resources • 12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities Goal 13: Climate action Sub-goals: • 13.2 Integrate climate change measures into national policies, strategies and planning Connection with teaching units: • Course units dealing with the basic elements of transport systems in the city and region (2, 3), demand and supply planning (4, 6), and evaluation of plans (14) are directly related to the goals of sustainable infrastructure, urbanization and transport. • New technologies (10) and methodological bases of planning (7) are relevant for innovation and efficient use of resources. • The preparation and development of plans (9), as well as decision-making and management (15), are crucial for the integration of climate measures into transport systems.
Teaching methods:	Lectures, exercises and preparation of a seminar paper with a practical review. Analytical and demonstrative approach.
Assessment methods with grading structure:	Student work is monitored by assigning points for each form of activity and knowledge test during the semester, as well as on the final exam after the end of the semester according to the following monitoring elements:

	• Homework/seminar work/practical work/ 15 points (%), evaluated if over 50% is passed • 1st partial exam/1st test/1st knowledge test/35 points (%), evaluated if more than 50% are passed • Final exam (II Partial) 50 points (%), is evaluated if more than 50% are passed. • Final exam (Integral) 85 points (%), evaluated if more than 50% are passed. The total number of points (%) that a student can achieve according to the mentioned monitoring during classes is a maximum of 50 points (%), which with the Final (II partial) makes 100 points (%). For students who did not pass the 1st 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 work/practical work makes 100 points (%). The final success of the students, after all the foreseen forms of knowledge testing, is evaluated and evaluated using the evaluation 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 errors, carries 85-94.99 points; c) 8 (C) - average, with noticeable errors, carries 75-84.99 points; d) 7 (D) - generally good, but with significant shortcomings, carries 65-74.99 points; e) 6 (E) - meets the minimum requirements, carries 55-64.99 points; f) 5 (F, FX) - does not meet the minimum requirements, less than 55 points.
Literature:	Mandatory: 6. Mehanović, M., 2017. "Planning in traffic, transport and communications". Faculty of Traffic and Communications in Sarajevo, Sarajevo. 7. Padjen J.: Basics of traffic planning, Zagreb, 1986. Supplementary: 1. Padjen J.: Spatial-traffic planning methods, Economic Institute, Zagreb, 1978. 2. Mehanović, M., 2011. "Planning the offer of services in urban passenger traffic". Faculty of Traffic and Communications in Sarajevo, Sarajevo . 3. Mehanović, M.: "Tasks and examples from theory and practice in public urban passenger transport", Faculty of Traffic and Communications, Sarajevo, 2005. 4. Meyer, MD Miller, EJ: Urban Transportation Planning, McGraw-Hill, 1984.

	5. Kuzović, Lj.; Topolnik, D.: Capacity of road traffic , Construction book Belgrade, 1989. 6. Jovanović N.: Traffic planning, Faculty of Traffic, Belgrade, 1990. 7. Jović J.: Traffic planning in cities-practicum, Faculty of Transportation, Belgrade, 1996. 8. HZDP Zagreb, Journals

Course code: 30-31-1TRWES010306	**Course title: DIAGNOSTICS AND MAINTENANCE OF RAILWAY VEHICLES**		
Level: I	**Year: III**	**Semester: VI**	**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 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 students' knowledge about the development, importance, goals and technology of diagnostic and maintenance procedures in order to ensure and preserve the defined necessary level of quality of the technical system		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Introduction – the concept of technical diagnostics and technical system maintenance. 2. Dimensions of technical system quality. 3. General maintenance provisions for all types of railway vehicles. 4. Special provisions related to the maintenance of towing vehicles. 5. Special provisions related to the maintenance of towed vehicles. 6. Maintenance of vehicles for railway purposes. 7. General principles of determining the condition of a functional asset. 8. Methods for determining the state of the technical system. 9. Non-destructive methods of testing materials: visual, penetrating. 10. Non-destructive methods: ultrasonic, radiographic, 11. magnetic. 12. Standard destructive methods of testing materials. 13. Determining the suitability of the railway vehicle in operation. 14. Fault diagnosis. Categories and priorities of failures. 15. Diagnostic methods for determining malfunctions. Diagnostic results. 16. ECM - The body responsible for the maintenance of railway vehicles		

Learning outcomes:	Knowledge: Through the teaching process of lectures and exercises, as well as professional visits to laboratories for testing materials for elements of railway transport technology, students should acquire appropriate knowledge and experience for practical application in the field of diagnostics and maintenance of railway vehicles. Skills: The subject Diagnostics and maintenance of rail vehicles should ensure the necessary level of knowledge about the methods of maintenance of railway vehicles as well as diagnostic methods for determining faults in order to increase efficiency and safety in railway traffic. Also, the course enables students to familiarize themselves with reference technical documentation in the field of diagnostics and maintenance, as well as to acquire knowledge in the field of methods for identifying the state of a functional asset. Competences: Application of acquired knowledge in concrete models
Sustainable Development Goal (SDG):	SDG 3: Ensure healthy lives and promote well-being for all at all ages. SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. SDG 12: Ensure sustainable consumption and production patterns. 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 course, the instructor presents individual thematic units (ex cathedra), allows students to watch videos with educational content (DVDs, video presentations) related to the subject matter, and organizes discussions on assigned topics (interactive teaching). The exercises involve reviewing and solving examples and tasks in accordance with the theoretical material, assisting students in independently solving tasks, and in the preparation of programs and seminar papers. In laboratory exercises/fieldwork/practical training, skills necessary for individual and team work will be developed to accomplish tasks within the given subject area.
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. Gojković, B., Đuričić, R., Malčić, V., & Čabrić, N. 2021. *Rail Vehicle Maintenance - Revised Edition*. Technical Book – Textbook. Faculty of Transport Doboj. ISBN 978-99955-36-90-9.

	2. Salihović, S. *Diagnostics and Maintenance of Rail Vehicles*, Lecture Notes, Faculty of Transport and Communications Sarajevo, 2013. 3. *REGULATION 241*, Regulation on the Maintenance of Rail Vehicles in the Railway System of BiH (Official Gazette of BiH, No. 39/15). 4. Sebastijanović, S., Tufekčić, Dž., *Maintenance*, Faculty of Electrical Engineering and Mechanical Engineering, Tuzla, 1999. **Supplementary:** 1. Avdić, H., Tufekčić, Dž., *Terotechnology I*, Textbook, University of Tuzla, 2007, ISBN 978-9958-633-73-7. 2. Professional Committee ERRI B 166/RP 3: *Fault Diagnostics on Rail Vehicles*, European Rail Research Institute, Utrecht, 1995. 3. Hayashi, Yusuke & Tsunashima, Hitoshi & Marumo, Yoshitaka. (2008). *Fault Detection of Railway Vehicle Suspension Systems Using Multiple-Model Approach*. Journal of Mechanical Systems for Transportation and Logistics. 1. 88-99. 10.1299/jmtl.1.88. 4. No-Geon Jung, et al., *Analysis of Reliability and Availability Indicators in Railway Vehicle Ordering Specifications of the Operating Agencies of Various Countries*, International Journal of Innovative Science, Engineering & Technology, Vol. 4 Issue 4, April 2017. 5. Čabrić N., Blagojević A., *"Interoperability and Safety - The Main Drivers of Market Opening"*, International Symposium Rail Transport in The Modern World (1; 2019; Belgrade), ISBN 978-86-81101-33-9, Proceedings p. 102-107. 6. *COMMISSION IMPLEMENTING REGULATION (EU) 2019/779* of 16 May 2019 laying down detailed provisions on a system of authorizations for entities in charge of vehicle maintenance under Directive (EU) 2016/798 of the European Parliament and of the Council and repealing Commission Regulation (EU) No 445/2011. 7. *Regulation on the Certification and Supervision of the Body Responsible for Maintenance (ECM) and the Certification and Supervision of Maintenance System Functions* (Official Gazette of BiH No. 53/22).

Course code: 010306TRTECUPT	**Course title: PUBLIC TRANSPORTATION IN CITIES**		
Level: I	**Year: III**	**Semester: VI**	**Number of ECTS credites:** 6
Status: elective course		**Total number of contact hours: 90** Optional breakdown of hours by type: Lectures 45 Tutorials 30 Seminars 15 Independent work 30	
Course participants:	Academic staff and associates selected in the field to which the course belongs/course		
Prerequisite for enrollment:	No		
Course goal (goals):	To acquire educational forms in the implementation of the public urban transport program. To gain knowledge and skills in public urban transport.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Development of Urban Public Transport 2. Basics of Urban Public Transport 3. Research and Planning in Urban Public Transport 4. Transport Service User Demands in Urban Transport 5. Supply of Services in Urban Public Transport 6. Modeling in Urban Public Transport 7. Design of Urban Public Transport Systems 8. Structure of Urban Public Transport Systems 9. Line and Network of Lines. Modes of Transport and Vehicles 10. Timetable. Transport Management System 11. Fare System, Ticketing System, Payment System. Information System 12. Performance Indicators of Transport System. Selection of Transport System 13. Planning in Urban Public Transport Companies 14. Organization of Urban Public Transport Companies 15. Economic Aspects of Service Provision in Urban Public Transport		
Learning outcomes: (Knowledge; Skills; Competencies)	Through lectures, tutorials and practical work, students should acquire the necessary knowledge related to the planning, organization and management of urban public transport. Study and practical application should ensure the required level of knowledge for the rational organization of passenger transport in urban public transport, in accordance with the traffic needs of users and the interest of the community and service providers.		

	The goal is to enable students to properly address, plan and solve issues related to urban public transport in cities.
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: • Development of Urban Public Transport (1) and Basics of Urban Public Passenger Transport (2) align with the goals of infrastructure and urbanization. • Research and Planning (3), Modeling (6), and Design of Urban Public Transport Systems (7) are key to achieving an efficient and sustainable transport system. • Transport Service User Demands (4) and Provision of Services (5) are linked to the goal of ensuring accessible and sustainable services for all. • Economic Aspects of Service Provision (15) contribute to understanding the financial sustainability and efficiency of urban public transport, which is related to the goals of responsible consumption 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. 3. Banković, R.: Planiranje javnog gradskog putničkog prevoza, IRO Građevinska knjiga, Beograd, 1984. Supplementary: 5. Mehanović, M., 2017. „Planiranje u saobraćaju, prevozu i komunikacijama “. Fakultet za saobraćaj i komunikacije u Sarajevu, Sarajevo. 6. Jović J.: Planiranje saobraćaja u gradovima- praktikum Saobraćajni fakultet, Beograd, 1996. 7. Vučić, V.: Urban Public Transportation, Sistems and Technology, Prentice Hall International England, 1981. 8. HZDP Zagreb, Časopisi

Course code: 30-3TRWES010306	**Course title: TRANSPORT AND ENVIRONMENT**		
Level: I	**Year: 2024**	**Semester: VI**	**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):	Acquisition of educational and practical knowledge in the implementation of programs in the field of transport and environment. Acquiring knowledge and skills for adequate treatment of the problems of interdependence of transport and the environment, as well as the ability to make practical analyses and research.		
Topics covered (Units of study): *(if necessary, the weekly implementation plan is established taking into account the specificities of organizational units)*	1. Multidimensionality of transport and the environment 2. EU and BiH environmental legislation 3. Types and quality of fuels in the function of environmental protection 4. Road Traffic and Air Pollution 5. Air Traffic and Air Pollution 6. Rail Transport and Air Pollution 7. Environmental Information System – CORINAIR, AE DEM 8. Noise pollution and the environment 9. Noise Pollution and Road Traffic, 10. Traffic Models of Road Noise Noise Pollution and Air Traffic Noise Pollution and Rail Transport 11. Elements and Method of Making a Noise Map 12. Elements of Preparing an Environmental 13. Impact Study Environmental 14. Protection ISO Standards 15. Vibrations from traffic and the impact on the environment		
Learning outcomes:	Knowledge: Theoretical and practical knowledge in the field of environmental impact of transport. Basic regulations, rules, methods and procedures in the field of assessment and analysis of the state of the environment depending on transport activities.		

	Skills: Ability to apply theoretical and practical knowledge in the field of interdependence of transport and the environment in the function of preserving and protecting the environment on the one hand, or improving and developing transport on the other. Competencies: Ability to independently understand and use regulations, use professional literature, apply methods and procedures, measure and research, make analyses, assessments and practical solutions, preventive action, and procedures and procedures for monitoring (air quality and noise pollution) in the function of environmental protection with a balanced approach to the improvement and development of transport.
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 systems and processes in the field of interdependence of transport and the environment, with the use of video and audio recordings, and independent presentation of certain specific problems of the impact of transport on the environment in a specific field of research. Initiating discussions and discussions on problems from practice, individual observations from different environments. Preparation of independent research and analyses in the field of interdependence of transport and the environment within the laboratory, on field conditions and other specific conditions of production and service 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 of 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.

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✓ 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>
<tr><td>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)</td><td>0 points</td></tr>
<tr><td>Seminar</td><td>15 points (%)</td></tr>
<tr><td>I Partial Exam / Test / Knowledge Assessment /</td><td>35 points (%)</td></tr>
<tr><td>Final exam (II partial)</td><td>50 points (%)</td></tr>
<tr><td>Final exam (Integral)</td><td>85 points (%)</td></tr>
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<tr>
<td>Literature:</td>
<td>Mandatory:

Golubić, J., Promet i okoliš, Fakultet prometnih znanosti, Zagreb, 1999.
Lindov, O., Transport i okoliš, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2011.
Lindov, O., Saobraćajna kultura, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2012.

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	4. Lindov, O., Omerhodžić, A., Transport i okoliš, Skripta predavanja, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2013. 5. Lindov, O., Omerhodžić, A., Transport i okoliš, Skripta zadataka, testovi za polaganje, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2013. 6. Lindov, O., Pronello, C., Transport and environment air and noise pollution from transport activities, Politecnico di Torino, Department of Hydraulics, Transport and Civil Infrastructures, University of Sarajevo, Faculty of Traffic and Communications, University of Southampton, Department of Civil and Environmental Engineering, Transportation Research Group. 7. Lindov,O., Uticaj cestovnih vozila i cestovne infrastrukture na ekološke parametre, referat na međunarodnom skupu pod naslovom "Ekološki problemi suvremenog saobraćaja", ANU BiH, 2006.godine. Supplementary: 1. Barth M., Norbeck, J.M., Ross, M., NCHRP Project 25-11: The Development of a Comprehensive Modal Emissions Model, 7th CRC On-road Vehicle emissions workshop, San Diego, California, April 9-11, 1997. 2. Lindov, O,. Noise modeling and vibrations, „I Transversal, South Longitudinal and XII Transverzal" Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2010. 3. Lindov, O., Čekić, Š., Studija saobraćaja na području Kantona Sarajevo, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo 2005. 4. Lindov, O., Čaušević, S.,Studija Uticaj saobraćaja na okoliš na području Zeničko – dobojskog kantona, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2009. 5. Lindov, O., Sigurnost u cestovnom saobraćaju, Fakultet za saobraćaj i komunikacije Univerziteta u Sarajevu, Sarajevo, 2008. 6. Lindov, O., Kazivanja o saobraćaju – Hronologija odabranih kazivanja u medijima 2002-2012, Institut za saobraćaj i komunikacije, Udruženje inžinjera u Bosni i Hercegovini, Sarajevo, 2013.