

UNIVERSITY OF SPLIT

FACULTY OF ELECTRICAL ENGINEERING, MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE

DETAILED PROPOSAL OF THE STUDY PROGRAMME

UNDERGRADUATE UNIVERSITY STUDY IN ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY

SPLIT, February 2022

1.1. List of mandatory and elective courses

List of courses									
Year of study: 1.									
Semester: I.									
OTATUO	CODE	COURSE	НО	URS	IN SE	MEST	ER	ECTS	
STATUS	CODE	COURSE	L	S	AE	LE	DE	ECIS	
Mandatany	FEMX01	Mathematics 1	45	0	45	0	0	7	
Ivianualor y	L = lectures	s, S = seminars, AE = auditory excercise, LE = labora	tory exc	ercise,	DE = (design	excerci	se	

List of courses									
Year of study: 1.									
Semester: II.									
STATUS	CODE	COURSE	HO	URS	IN SEI	MEST	ER	ECTS	
STATUS CODE COURSE L S AE LE					LE	DE	ECIS		
Mandatory -	FEMX02	Mathematics 2	45	0	45	0	0	7	
	L = lectures	, S = seminars, AE = auditory excercise, LE = labora	tory exc	ercise,	DE = c	design	excerci	se	

	List of courses									
Year of study: 2.										
Semester: II	Semester: III.									
STATUS	CODE	COURSE	HO	URS	IN SE	MEST	ER	ECTS		
51A105	CODE	COURSE	L	S	AE	LE	DE	ECIS		
	FEMX03	Mathematics 3	30	0	30	0	0	5		
Mandatory	FEMA02	Physics 2	45	0	30	15	0	7		
	FETA01	Economics and Production Organization	30	0	0	0	0	3		
	L = lectures	s, S = seminars, AE = auditory excercise, LE = labora	tory exc	ercise,	DE = 0	design	excerci	se		

	List of courses									
Year of study: 2.										
Semester: IV.										
Mandatory	CODE	COURSE	HO	URS	IN SEI	MEST	ER	ECTS		
	CODE	COURSE	L	S	AE	LE	DE	ECIS		
	FELA09	Systems Theory	45	0	0	15	0	5		
	FELA02	Electrotechnical Materials and Technology	30	0	0	15	0	4		
	L = lectures	s, S = seminars, AE = auditory excercise, LE = labora	tory exc	ercise,	DE = 0	design	excerci	se		

Specialisation: Control and Systems

	List of courses									
Year of study: 3.										
Semester: V										
	CODE COURSE HOURS IN SEMESTER							ECTS		
	CODE	COURSE	L	S	AE	LE	DE	ECIS		
Mandatory	FELA10	Electronic Circuits	30	0	15	15	0	5		
Mandatory	FELA13	Object Oriented Programming	30	0	0	30	0	5		
Elective	FELA40	Computer and Data Security	30	0	0	30	0	5		
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise									

	List of courses									
Year of study: 3.										
Semester: V	Ί.									
	CODE COURSE HOURS IN SEMESTER							FCTS		
	CODE COURSE		L	S	AE	LE	DE	2010		
Mandatory	FELA20	Digital Instrumentation 1	30	0	0	15	0	5		
Elective	FELB08	<u>Databases</u>	30	0	0	30	0	6		
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise									

Specialisation: Electronics and Computer Engineering

		List of courses							
Year of study: 3.									
Semester: V	Semester: V.								
	CODE	COURSE	НО	URSI	N SEN	MEST	ER	ECTS	
Mandatory	CODE	COURSE	L	S	AE	LE	DE	LUIS	
	FELA10	Electronic Circuits	30	0	15	15	0	5	
	FELA17	Computer Architectures	30	0	0	30	0	5	
	FELA13	Object Oriented Programming	30	0	0	30	0	5	
Elective	FELA14	Internet Programming	30	0	0	30	0	5	
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise								

	List of courses										
Year of study: 3.											
Semester: V	Semester: VI.										
	CODE		HO	URSI	N SEI	MEST	ER	ГОТО			
Mondotory	CODE	COURSE	L S /	AE	LE	DE	LOIS				
Manualory	FELA27	Operating systems	45	0	0	15	0	5			
	FELA20	Digital Instrumentation 1	30	0	0	15	0	5			
Elective	FENA25	Diagnostic methods in vehicle	30	0	0	15	0	5			
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise										

Specialisation: Electrical Engineering

	List of courses									
Year of study	Year of study: 3.									
Semester: V.										
	CODE	COURSE	НО	URSI	N SEI	MEST	ER	ECTS 6 6 5		
	CODE	COURSE	L	S	AE	LE	DE			
STATUS	FENA08	Elements of Electrical Power Switchgears	45	0	0	15	0	6		
UIAIOO	FENA09	Power Electronics	30	0	0	30	0	6		
	FENA10	Control Engineering	45	0	0	15	0	5		
	Total		210	0	15	90	0	30		
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise									

	List of courses									
Year of study: 3.										
Semester: VI.										
STATUS	CODE	COURSE	HC	OURS	IN SE	MEST	FER	ECTS		
	CODE	COORSE	L	S	AE	LE	DE	LOID		
	Total		60	0	15	45	0	22		
	FENA15	Electrical Distribution Networks	30	0	0	15	0	4		
Elective	FENA20	Marine Electrical Engineering	30	0	0	15	0	4		
	FENA25	Diagnostic methods in vehicles	30	0	0	30	0	5		
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise									

Specialisation: Communication and Information Technology

List of courses										
Year of study 3.										
Semester: V.	Semester: V.									
STATUS	CODE	DDEDMET	HO	URS	IN SEI	MEST	ER	ECTS		
	CODE	FREDMET	L	S	AE	LE	DE	ECIS		
	FELA13	Object Oriented Programming	30	0	0	30	0	5		
	FELA17	Computer Architectures	30	0	0	30	0	5		
	L = lecture	s, S = seminars, AE = auditory excercise, LE = labora	tory exc	ercise,	DE = 0	design	excerci	se		

List of courses									
Year of study: 3.									
Semester: VI.									
STATUS	CODE	COURSE	HO	URS I	N SEN	MEST	ER	ECTS	
31A103	CODE COURSE	L	S	AE	LE	DE	1013		
Mandatory	FELA32	Electromagnetic Fields	30	0	15	15	0	5	
Mandatory	FELA29	Digital signal processing	30	0	0	15	0	5	
	L = lectures, S = seminars, AE = auditory excercise, LE = laboratory excercise, DE = design excercise								

1.2. Course description

NAME OF THE COURSE	MATHEMATICS 1						
Code	FEMX01	Year of study	1				
Course teacher	Ivan Slapničar, Ph.D., Full Professor, Anita Matković, Ph.D., Associate Professor, Josipa Barić, Ph.D., Assistant Professor.	Credits (ECTS)	7				
Associate teachers	Ph.D. Nevena Jakovčević Stor, Irena Bego, Anita Carević, Marija Čatipović, Lea Dujić, Ivana Grgić, Lana Periša, Marina Mandić, Dajana Radišić, Mirjana Strukan, Stjepan Vedran Vukasović, Vanja Županović.	z Stor, Irena ja Čatipović, Type of instruction adišić, (number of Vedran hours)			LE	DE	
Status of the course	obligatory	Percentage of application of e- learning	10				
	COURSE DESCRIP	TION					
Course objectives	 Training students for: application of mathematical conce vector calculus, analytic geometry of real variable, sequences and engineering problems. 	pts and tools fron , diferential calculu series of number	n the a us, ana s and	area of lir alysis of r functions	ear al eal fur s, to s	gebra, ictions solving	
Course enrolment requirements and entry competences required for the course	Good knowledge of High School mathematics and passed State Exam in Mathematics.						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: state definitions and theorems from the enitre course, reproduce proofs of basic theorems, illustrate theorems with examples, solve systems of linear equations, apply vector calculus to analytical geometry of space, interpret derivatives mathematically, geometrically and physically, analyse functions of one variable, test convergence of sequences and series of numbers and functions 						
	Course content			L or S hours	AE	hours	
	1. Introduction. Relations. Functions. S numbers, trigonometric form of con formulas.	ets of numbers, co mplex number, I	omplex Moivre	3		3	
Course content	 Matrices. Basic operations with mat of system of linear equations. Gaus independence and rank of a matrix. Kro 	rices. Matrix form sian elimination. onecker-Capelli the	ulation Linear eorem.	3		3	
broken down in detail by weekly	 Inverse matrix. Determinants subdeterminants. Laplace expansion Cramer's rule. 	s. Submatrices on of a detern	and ninant.	3		3	
(syllabus)	4. Vectors. Basic operations with vect Unit vector and cosines of directions. vectors and basis of a space. Scala product and mixed product.	ors. Coordinate s Linear independe ar (dot) product,	ystem. nce of vector	3		3	
	5. Equations of a line. Equations of a analytic geometry.	a plane. Applicati	ons of	3		3	
	6. Functions of a real variable: definin of functions. Limits and continuity. elementary functions.	g function, classif Asymptotes. Rev	ication iew of	3		3	

	 Derivatives. Ta approximate comput 	angent ation.	and nor	mal.	Differential	and	3	3
	8. Higher derivatives function. Theorems Cauchy, Lagrange). forms.	and diff of diff L'Hospi	ferentials. E ferential ca tal's rule ar	Deriva alculu: Id limit	tve of a para s (Fermat, ts of undeter	metric Rolle, mined	3	3
	9. Monotonicity. N extrema. Geometrica	lecessa al extrer	ry and si na.	ufficie	nt conditior	ns for	3	3
	10. Curvature. Suffic Necessary and su Examining functions	cavity. points.	3	3				
	11. Sequences of real numbers. Basic inequality o convergence. Accumulation point and sub-sequence Boundedness, monotonicity and convergence. Properties o limits. Cauchy series. Some important limits.						3	3
	12. Series of re convergence. Conv Alternating series.	ergence	mbers. S e criteria.	ufficie Absol	nt conditio ute converç	n for gence.	3	3
	 13. Sequences of functions. Series of functions. Power series and convergence radius. Differentiating series of functions. Taylor series and applications. 						3	3
	List of laboratory or design exercises						LE or DE hours	
Format of instruction	 ☑ lectures ☑ seminars and workshops ☑ exercises ☑ on line in entirety ☑ partial e-learning ☑ field work 				ents			
Student responsibilities								
Screening student	Class attendance	3	Research			Practic	al training	J
proportion of ECTS	Experimental work		Report			Self st	udy	3.6
credits for each activity so that the total number of	Essay		Seminar essay				(Other)	
ECTS credits is	Tests	0.2	Oral exam	n			(Other)	
equal to the ECTS value of the course)	Written exam	0.2	Project				(Other)	
Grading and evaluating student work in class and at the final exam	During semester two mid-term exams are held. The first exam is scheduled after 7 weeks of lectures, and the second in the week following the lectures. At each mid- term exam students can get 40 points, while the remaining 20 points are attained through assignements during lectures and excercises. The condition for passing the course is minimum 20 points on each mid-term exams and a total of at least 50 points. After semester, two final exams and a correction exam are held. Students which did not pass one mid-term exam, can take only this part of the exam during final exams. Student which did not pass any mid-term exam, take the final exam with comprehensive course content. In that case, masimum numbers of available points is 80. The condition for passing the course is minimum 40 points in the final exam and a total of at least 50 points. The grade is formed after the second final exam according to article 75 of the Statute of FESB: 15% of the best students get the mark excellent (5), next 35% students get the mark very good (4), next 35% students get the mark sufficient (2)							

	Students who did not pass the course after final exams, and have obtained total of at leat 10 points, can attend the correction exam. On the correction exam maximal number of points is 100, and the minimum requirement for a passing grade is 50 points. Mid-term exams, final exams and correction exams are held according to the exam						
	Title	Title Number of copies in the library					
Required literature (available in the library and via other media)	I. Slapničar, Matematika 1, FESB, Split, 2002.	20	http://www.fesb. unist.hr/mat1				
	I. Slapničar, J. Barić, M. Ninčević, Matematika 1 – zbirka zadataka, FESB, Split, 2010.	20	http://www.fesb. unist.hr/mat1				
	Lecture materials on FESB e-learning portal.		httpd://elearning. fesb.unist.hr				
Optional literature (at the time of submission of study programme proposal)	 Petar Javor, Matematička analiza 1, Element, Zagreb, 2001. Luka Krnić i Zvonimir Šikić, Račun diferencijalni i integralni, I. dio, Školska knjiga, Zagreb, 1993. S. Pavasović i ostali, Matematika - riješeni zadaci, Građevinski fakultet, Split, 1999. B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na 						
Quality assurance methods that ensure the acquisition of exit competences Other (as the	 homework short tests quizzes mid-term exams final exam student questionnaires 						
proposer wishes to add)							

NAME OF THE	MATHEMATICS 2							
Code	FEMX02	Year of study	1					
Course teacher	Ivan Slapničar, Ph.D., Full Professor, Anita Matković, Ph.D., Associate Professor, Josipa Barić, Ph.D., Assistant Professor.	Credits (ECTS)	7					
	Ph.D. Nevena Jakovčević Stor,			S	AF	ΙF	DF	
Associate teachers	Irena Bego, Anita Carević, Marija Čatipović, Lea Dujić, Ivana Grgić, Lana Periša, Marina Mandić, Dajana Radišić, Mirjana Strukan, Stjepan Vedran Vukasović, Vanja Županović.	Type of instruction (number of hours)	45		45			
Status of the course	obligatory	Percentage of application of e- learning	10					
	COURSE DESC	RIPTION						
Course objectives	 Training students for: application of mathematical concepts and tools from the area of integral calculus, ordinary differential equations, functions of several variables and multiple integrals, to analyze and solve engineering problems. 						al and	
Course enrolment requirements and entry competences required for the course	Good knowledge of High School mathematics and passed State Exam in Mathematics.							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: state definitions and theorems from the enitre course, reproduce proofs of basic theorems, illustrate theorems with examples, identify integrals which are elementary integrable and solve them. solve ordinary differential equations and systems of differential equations. apply differential equations to model population growth, heat conduction, the oscillator and the predator-prey system. identify quadratic surfaces analyze the extrema of real functions of several variables. apply a single and multiple definite integrals to computation of area, curve 							
	Course content			L	or S	<i>,</i>	λΕ	
	1. Indefinite integrals. Definition a	nd basic properties	. Table c	of	iours	hc	ours	
	 basic integrals. Basic techniques Integration of rational functions. 	of integration. Integration of trigo	nometri	с С	3		3 3	
Course content broken down in	 Integration of some irrational fu of functions. Application of integra resistance problem. 	nctions. Integrating Is to free fall with a	a series ir	\$	3		3	
detail by weekly class schedule (syllabus)	4. Definite integrals. Definition and Leibnitz formulae. Techniques of i integrals.	d basic properties. I ntegration. Imprope	Newton- er		3		3	
	5. Application of definite integrals curve, volume and surface area or Numerical integration – trapezoid Richardson extrapolation.	- the length of arc p f the rotating body. rule, Simpson's rule	blanar e,		3		3	
	6. The functions of several variabl properties. Domain of the function Quadratic surfaces.	es. Definition and b . Limits and continu	basic uity.		3		3	

	 Partial derivatives of functions of sever 	. Differe al varial	entiability. oles. Con	Tangei ditional	nt plane extrema	. Extrema a.	3	3
	8. Multiple integrals. integral. Double inte double integral.	Basic c gral in p	oncepts a olar coor	and defi dinates	initions. . Applica	Double ations of	3	3
	9. Triple integral. Tri	ple integ	gral in cyl ables in r	indrical nultiple	and sph	nerical s	3	3
	10. Introduction to D definitions. Example equation, equation o with separable varia	ifferenti s: mode f heat c bles	al Equational Equational Equation (1997) and the second se	ns. Bas Ilation g , Hook	sic conc prowth, le e's law.	epts and ogistic Equations	3	3
	11. Homogeneous d equations. Integratio the first order.	rential tions of	3	3				
	12. Bernoulli differer procedure for solving equations of second	ntial equ g linear order.	ation. Eu differentia	ler meth al equat	nod as n tions. Di	numerical fferential	3	3
	13. Linear differential equations of second order with constant coefficients. Example: electronic circuits - harmonic oscillator. Systems of differential equations. Lotka-Volterra equations for predator-prey system.						3	3
	List of laboratory or design exercises							LE or DE hours
Format of instruction	 ☑ lectures ☑ seminars and workshops ☑ exercises ☑ on line in entirety ☑ partial e-learning ☑ (other) 					nts		
Student responsibilities								
Screening student	Class attendance	3	Researc	h		Practical tra	aining	
proportion of ECTS	Experimental work		Report		Self study			3.6
credits for each activity so that the	Essay		Seminai essay			(Oth	ier)	
ECTS credits is	Tests	0.2	Oral exa	ım		(Oth	ier)	
equal to the ECTS value of the course)	Written exam	0.2	Project			(Oth	ier)	
Grading and evaluating student work in class and at the final exam	During semester two mid-term exams are held. The first exam is scheduled after 7 weeks of lectures, and the second in the week following the lectures. At each mid- term exam students can get 40 points, while the remaining 20 points are attained through assignements during lectures and excercises. The condition for passing the course is minimum 20 points on each mid-term exams and a total of at least 50 points. After semester, two final exams and a correction exam are held. Students which did not pass one mid-term exam, can take only this part of the exam during final exams. Student which did not pass any mid-term exam, take the final exam with comprehensive course content. In that case, maximum numbers of available points is 80. The condition for passing the course is minimum 40 points in the final exam and a total of at least 50 points. The grade is formed after the second final exam according to article 75 of the Statute of FESB: 15% of the best students get the mark excellent (5), next 35% students get the mark very good (4), next 35% students get the mark good (3), and							

	Students who did not pass the course after final exams, and have obtained total of at least 10 points, can attend the correction exam. On the correction exam maximal number of points is 100, and the minimum requirement for a passing grade is 50 points. Mid-term exams, final exams and correction exams are held according to the exam						
Required literature	Title	Number of copies in the library	Availability via other media				
library and via other media)	I. Slapničar, Matematika 2, skripta, FESB, Split		http://www.fesb. unist.hr/mat2				
	Lecture materials on FESB e-learning portal.		https://elearnin g.fesb.unist.hr				
Optional literature (at the time of submission of study programme proposal)	 Petar Javor, Matematička analiza 2, Element, Zagreb, 2000. Luka Krnić i Zvonimir Šikić, Račun diferencijalni i integralni, I. dio, Školska knjiga, Zagreb, 1993. B. P. Demidovič, Zadaci i riješeni primjeri iz više matematike s primjenom na tehničke nauke, Tehnička knjiga, Zagreb, 1995. Dž. Lugić, Matematika II: metodički riješeni zadaci i kratki pregled definicija i teorema, FESB, 1999. 						
Quality assurance methods that ensure the acquisition of exit competences	 homework short tests quizzes mid-term exams final exam student questionnaires 						
Other (as the proposer wishes to add)							

NAME OF THE COURSE	MATHEMATICS 3							
Code	FEMX03	Year of study	2					
Course teacher	Ivan Slapničar, Ph.D., Full Professor, Anita Matković, Ph.D., Associate Professor, Josipa Barić, Ph.D., Assistant Professor	Credits (ECTS)	5	5				
	Ph.D. Nevena Jakovčević Stor,		L	S	AE	LE	DE	
Associate teachers	mr. sc. Ivancica Mirosevic, Irena Bego, Anita Carević, Marija Čatipović, Lea Dujić, Ivana Grgić, Lana Periša, Marina Mandić, Dajana Radišić, Mirjana Strukan, Stjepan Vedran Vukasović, Vanja Županović	Type of instruction (number of hours)	30		30			
Status of the course	obligatory	Percentage of application of e- learning	10					
	COURSE DES	SCRIPTION	<u>,</u>					
Course objectives	Training students for: application of mathematical concepts and tools from the area of Vector analysis, Fourier analysis and Laplace transformation, to analyze and solve engineering and economy problems.							
Course enrolment requirements and entry competences required for the course	Passed courses Mathematics 1 and Mathematics 2.							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: state definitions and theorems from the enitre course, illustrate basic notions and connections between them with examples, apply Hamilton differencial operator on scalar and vector fields, calculate line integrals over scalar and vector fields, calculate surface integrals over scalar and vector fields, represent functions by Fourier series and integral, 							
	Course content				∟ or S hours	hc	AE ours	
	1. Vector analysis. Vector function and continuity. Derivative and in	ons of scalar variable tegral.	e. Limits		2		2	
	Hamilton and Laplace operator.	lient, divergence and	cun.		2		2	
	3. Conservative and solenoidal f	ields. Sidelong deriva	atives.		2		2	
broken down in	 Line integrals. Curve parameter integral of a scalar field. Line integral of a vector field. 				2		2	
class schedule (svllabus)	potential and Green's theorem.	rametrization Tanga	nt nlane		2		2	
	Surface integral of a scalar field.	ametrization. Tange			2		2	
	theorems and their applications.	ions and pariadia and	onsions		2		2	
	8. Fourir analysis. Periodic functions and periodic extensions. Ortogonal trigonometric systems.						2	
	9. Fourier series. Dirichlet's conditions. Convergence of 2						2	

	10. Fourer series for equality.	even a	nd odd fu	10. Fourer series for even and odd functions. Parseval's 2 2							
	11. Fourier integral. transformation theor	Fourier ems an	transforn d their ap	nation, inv plications	verse I s.	ourier	2	2			
	12. Laplace transfor transformation. Inve	mation. rse Lapl	Basic pro	perties of formation	of Lapla n.	ace's	2	2			
	13. Convolution. App	olication	s to diffe	ential equ	uation	s.	2	2			
	List of laboratory or	design e	exercises					LE or DE hours			
Format of instruction	 ☑ lectures ☑ seminars and workshops ☑ mu ☑ exercises ☑ on line in entirety ☑ partial e-learning ☑ field work 			⊠ indepo □ multin □ labora □ work v □	enden nedia atory with m (othe	t assignmer entor r)	nts				
Student responsibilities	Regular attendence	to and a	active par	ticipation	in lec	tures and ex	xcercises.				
Screening student work (name the	Class attendance	2	Researc	h		Practical tra	aining				
proportion of ECTS credits for each	Experimental work		Report			Self study		2.6			
activity so that the total number of	Essay		Seminal essay			(Oth	ner)				
ECTS credits is	Tests	0.2	Oral exa	ım		(Other)					
value of the course)	Written exam	0.2	Project			(Oth	(Other)				
Grading and evaluating student work in class and at the final exam	During semester two weeks of lectures, a term exam students through assignemen course is minimum points. After semester, two Students which did r during final exams. Student which did comprehensive cour is 80. The condition and a total of at lea according to article 7 15% of the best stud next 35% students g next 35% students g the last 15% student Students who did no at least 10 points, ca number of points is points. Mid-term exams, fin- schedule.	o mid-te ind the s can ge its durin 20 poin final exa not pass not pass st 50 p 75 of the lents ge get the n jet the n 100, ar al exam	rm exam second ir second ir d 40 poir g lectures ts on ea ams and ass any ent. In th sing the points. The other statute t the mar nark very nark good et mark s the cours d the cor s and co	s are held the wee ts, while and exce ch mid-te a correction term exa mid-term at case, r course is grade is of FESB: k exceller good (4), I (3), and ufficient (e after fin rection ex nimum re	d. The ek follo the re- ercise erm ex on exa maxim minim s form nt (5), (2). (2). nal exa kam. C equire exams	first exam wing the lead maining 20 s. The cond arm are held in take only f m, take the um number num 40 point ed after the on the corre ment for a p are held ac	is schedu ctures. At points ar dition for p total of a total of a this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this part of this	ed after 7 each mid- e attained assing the t least 50 t the exam xam with ble points nal exam inal exam inal exam inal exam the exam			

	Title	Number of copies in the library	Availability via other media
Required literature	L. Korkut, M. Krnić, M. Pašić, Vektorska analiza, Element, Zagreb, 2014.	5	
library and via other media)	N. Elezović, Fourierov red i integral, Laplaceova transformacija, Element, Zagreb, 2014.	5	
	Ivan Slapničar, Matematika 3, FESB, Split		http://www.fesb. unist.hr/mat3
	Lecture materials on FESB e-learning portal.		https://elearnin g.fesb.unist.hr/
Optional literature (at the time of submission of study programme proposal)	 Luka Krnić i Zvonimir Šikić, Račun diferencijalni i inte Zagreb, 1993. B. P. Demidovič, Zadaci i riješeni primjeri iz v na tehničke nauke, Tehnička knjiga, Zagreb, 1995. Dž. Lugić, Matematika II: metodički riješeni z i teorema, Sveučilište u Splitu, FESB, 1999. 	gralni, I. dio, Š riše matematik adaci i kratki p	školska knjiga, se s primjenom regled definicija
Quality assurance methods that ensure the acquisition of exit competences	 homework short tests quizzes mid-term exams final exam student questionnaires 		
Other (as the proposer wishes to add)			

NAME OF THE COURSE	PHYSICS 2						
Code	FEMA02	Year of study	2				
Course teacher	Ivica Puljak, Ph.D., Full Professor, Nikola Godinović, Ph.D., Associate Professor, Ilja Doršner, Ph.D., Associate Professor, Damir Lelas, Ph.D., Assistant Professor	Credits (ECTS)	7	7			
	Dunja Polić, Ivica Sorić	Type of instruction	L	S	AE	LE	DE
Associate teachers	Toni Šćulac, Darko Zarić, Toni Vrdoljak	(number of hours)	45	0	30	15	0
Status of the course	Obligatory	Percentage of application of e-learning	0				
	COURSE	E DESCRIPTION					
Course objectives Course enrolment requirements and entry competences required for the	Training students for: - uderstanding of basic I - ability to apply laws of None	aws of classical and quan classical and quantum phy	tum ph ysics to	ysics; <u>real-li</u>	fe prob	<u>lems</u>	
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: define fundamental physical variables and equations that are used to describe simple harmonic oscillations, dumped harmonic oscillations and forced harmonic oscillations; name types of mechanical waves and provide associated examples; apply superposition principle to evaluate interference between two or more coherent waves; describe Maxwell's equations; define fundamental quantities and laws that are used in geometric and physical optics; explain quantum nature of light using the example of photoelectric effect; name quantum numbers of atoms; 					vsical	
	Course content			L (hc	or S ours	h	AE ours
	Matter elasticity. Simple ha and physical pendulum. Du oscillations.	rmonic motion. Mathemat imped oscillations. Resona	ical ant		3		2
Course content	Interference of harmonic of nomenclature, simple harm wave equation of transvers mechanical waves.	scillations. Mechanical way nonic wave, wave equation al wave on a wire, energy	ves: n, of		3		2
broken down in detail by weekly class schedule	Wave superposition. Reflect Standing waves. Wave inter and group wave speed. Sp	ction and transmition of wa erference. Wave packets. I herical waves, plane wave	aves. Phase es.		3		2
(Syliadus)	Sound waves. Sound inten effect. Ultrasound.		3		2		
	Gauss' law for electric and Biot-Savart's law. Electrom	magnetic fields, Amper's l agnetic oscillations	aw.		3		2
	Maxwell's equations. Elect	romagnetic waves.			3		2
	Geometrical optics. Laws c Lenses. Magnifying glass. eye.	of geometrical optics. Mirro Microscope. Physics of hu	ors. man		3		2

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Format of instruction seminars and workshops seminars and workshops multimedia laboratory work with mentor grantial e-learning field work Student responsibilities The presence on lectures in the amount of at least 70 % of the times scheduled. Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course) Class attendance 3,0 Research Practical training Written exam 0,2 Oral exam (Other) Individual work 3,6 Grading and evaluating student work in class and at the final exam There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions:	Format of instruction seminars and workshops gexercises on line in entirety partial e-learning field work independent assignments multimedia laboratory work with mentor (other) Student responsibilities The presence on lectures in the amount of at least 70 % of the times scheduled. Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS; Class attendance 3,0 Research Practical training Tests 0,2 Oral exam (Other) Individual work 3,6 Written exam 0,2 Project (Other) The reare two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: - 2 obligatory questions (basic course questions); - 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions: - 2 obligatory questions (basic course questions); - <td< td=""><td></td><td>⊠ lectures</td><td></td><td>010001011</td><td></td><td></td><td></td><td>•</td></td<>		⊠ lectures		010001011				•	
Format of instruction	Format of instruction		□ seminars and workshops							
Grading and evaluating student work in class and at the final exam on line in entirety partial e-learning (other) work with mentor (other) Grading and the final exam class attendance 3,0 Research Practical training Grading and the final exam class attendance 3,0 Research Practical training Grading and the final exam class attendance 3,0 Research Practical training Mitter exam class attendance 3,0 Research Practical training Experimental work Report Individual work 3,6 Experimental work <t< td=""><td>Grading and evaluating student work in class and at the final exams On line in entirety partial e-learning (other) work with mentor (other) Grading and the final exam Grading and the final exams Class attendance attent to proper to big attent to proper to big attent to proper to a single attent to a single attent</td><td>Format of instruction</td><td colspan="4">⊠ <u>exercises</u> ⊠ laboratory</td><td></td><td></td></t<>	Grading and evaluating student work in class and at the final exams On line in entirety partial e-learning (other) work with mentor (other) Grading and the final exam Grading and the final exams Class attendance attent to proper to big attent to proper to big attent to proper to a single attent	Format of instruction	⊠ <u>exercises</u> ⊠ laboratory							
Grading and evaluating student work in class and at the final exam	Grading and event Image: Construction of the time of tim		□ on line in entirety □ work with mentor							
Student responsibilities The presence on lectures in the amount of at least 70 % of the times scheduled. Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course) Class attendance 3,0 Research Practical training Tests 0,2 Seminar essay (Other) Essay 3,6 Written exam 0,2 Oral exam (Other) The reaction of the course Written exam 0,2 Project (Other) There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: - 2 obligatory questions (basic course questions); - 2 obligatory questions and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:	Student responsibilities The presence on lectures in the amount of at least 70 % of the times scheduled. Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course) Class attendance 3,0 Research Practical training Tests 0,2 Oral exam (Other) Written exam 0,2 Project (Other) Written exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: 2 obligatory questions (basic course questions); - 2 obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:		☐ partial e-learning				(other)			
responsibilitiesThe presence of nectures in the amount of a fleast 70 % of the times scheduled.Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)Class attendance3,0ResearchPractical trainingTests0,2Oral exam(Other)Written exam0,2Project(Other)Written exam0,2Project(Other)Written exam0,2Project(Other)There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: 	responsibilitiesThe presence of nectures in the amount of a feast 70 % of the times scheduled.Screening student work (name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)Class attendance3,0ResearchPractical trainingTests0,2Oral exam(Other)Written exam0,2Project(Other)Written exam0,2Project(Other)Written exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions:Grading and evaluating student work in class and at the final exam-2 obligatory questions (basic course questions);2 obligatory question and at least 50% from each of remaining 4 questions.Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:4 obligatory questions (basic course questions);<	Student		turoo in	the eme	unt of o	t looot 70 % of	the times acho	lulad	
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proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)Experimental workReportIndividual work3,6Tests0,2Oral exam(Other)Written exam0,2Project(Other)Written exam0,2Project(Other)There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: - 2 obligatory questions (basic course questions); - 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: - 4 obligatory questions (basic course questions);	proportion of ECTS credits for each activity so that the total number ofExperimental workReportIndividual work3,6EssaySeminar essay(Other)Individual work3,6ECTS credits is equal to the ECTS value of the course)Tests0,2Oral exam(Other)Written exam0,2Project(Other)Individual work3,6Written exam0,2Oral exam(Other)Individual work3,6Grading and evaluating student work in class and at the final examThere are two midterm exams, two final exams and one make-up exam. The first 	work (name the	Class attendance	3,0	Researc	h	Practio	cal training		
activity so that the total number ofEssaySeminar essay(Other)ECTS credits is equal to the ECTS value of the course)Tests0,2Oral exam(Other)Written exam0,2Project(Other)Written exam0,2Project(Other)Written exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions:Grading and evaluating student work in class and at the final exam- 2 obligatory questions (basic course questions); - 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:	activity so that the total number of ECTS credits is equal to the ECTS value of the course) Essay Seminar essay (Other) Written exam 0,2 Oral exam (Other) Written exam 0,2 Project (Other) Written exam 0,2 Project (Other) There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: - 2 obligatory questions (basic course questions); - 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: - 4 obligatory questions (basic course questions);	proportion of ECIS credits for each	Experimental work		Report		Indivic	lual work	3,6	
ECTS credits is equal to the ECTS value of the course) Tests 0,2 Oral exam (Other) Written exam 0,2 Project (Other) There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: - 2 obligatory questions (basic course questions); - 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:	Grading and Tests 0,2 Oral exam (Other) Grading and Written exam 0,2 Project (Other) Grading and evaluating student The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory questions and at least 50% from each of remaining 4 questions. - 4 additional questions that test 165 minutes each and consist out of the following 12 questions: - - 4 obligatory questions (basic course questions); - - 4 obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: - - 4 obligatory questions (basic course questions);	activity so that the	Essay		Seminar essay	•		(Other)		
equal to the ECTS value of the course)Written exam0,2Project(Other)There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions:Grading and evaluating student work in class and at the final exam- 2 obligatory questions (basic course questions);- 4 additional questions that test the theory and problem solving knowledge.The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions.Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions:- 4 obligatory questions (basic course questions):	equal to the ECTS value of the course)Written exam0,2Project(Other)Grading and evaluating student work in class and at the final examThere are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 	ECTS credits is	Tests	0,2	Oral exa	ım		(Other)		
 Grading and evaluating student work in class and at the final exam the final exam There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: 2 obligatory questions (basic course questions); 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: 4 obligatory questions (basic course questions): 	 Grading and evaluating student work in class and at the final exam the final exam Final exam Final exam There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: 2 obligatory questions (basic course questions); 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: 4 obligatory questions (basic course questions): 	equal to the ECTS value of the course)	Written exam	0,2	Project			(Other)		
- 8 additional questions that test the theory and problem solving knowledge.	- 8 additional questions that test the theory and problem solving knowledge.	Grading and evaluating student work in class and at the final exam	 There are two midterm exams, two final exams and one make-up exam. The first midterm exam is after 7 weeks of lectures and the second one is after the next 6 weeks. Each midterm test lasts for 105 minutes and consists of the following 6 questions: 2 obligatory questions (basic course questions); 4 additional questions that test the theory and problem solving knowledge. The requirement for passing grade at the midterm exams is to have at least 90% from each obligatory question and at least 50% from each of remaining 4 questions. Students that do not pass one of the midterm exams can retake it during the final exams. Final exams lasts 165 minutes each and consist out of the following 12 questions: 4 obligatory questions (basic course questions); 8 additional questions that test the theory and problem solving knowledge. 							

	each of obligatory questions and at least 50% from each of remaining 8 questions. Final grade is determined using the relative grading system based on the arithmetic mean of the per cents of each of the additional questions. Obligatory questions do not enter the arithmetic mean. Students that have passed both midterm exams or final exams are grouped in four categories: 15% of the students with the highest arithmetic means are assigned grade A (excellent), 35% of the students with the next best arithmetic means are assigned grade B (very good), 35% of the students with the next to next best arithmetic means are assigned grade C (good), and 15% of the students with the lowest passing arithmetic means are assigned grade D (satisfactory). Students who fail to pass the course through midterms and/or final exams have one make-up exam at the beginning of fall. This exam features the same format as the final exam.							
Poquired literature	Title	Number of copies in the library	Availability via other media					
(available in the	V. Henč-Bartolić, P. Kulišić: Valovi i optika, Školska knjiga Zagreb, 1989.							
media)	V. Henč-Bartolić i suradnici: Riješeni zadaci iz valova i optike, Školska knjiga, Zagreb 1992.							
	J. Vuletin: Zadaci iz Fizike (Titraji i valovi, Toplina, Atomi), FESB, Split, 1996.							
Optional literature (at the time of submission of study programme proposal)	 N. Cindro: Fizika 2, Školska knjiga, Zagreb, 1991; D. Halliday, R. Resnick, J. Walker: Fundamentals of Physics, 7th Edition, John Wiley & Sons, Inc., 2005; E. M. Purcell: Udžbenik fizike Sveučilišta u Berkeleyu, Svezak 2., Elektricitet i magnetizam, Tehnička knjiga, Zagreb, 1988; E. V. Wichmann: Udžbenik fizike Sveučilišta u Berkeleyu, Svezak 4., Kvantna Fizika, Tehnička knjiga, Zagreb, 1988 							
Quality assurance methods that ensure the acquisition of exit competences	 Student evaluation surveys Teacher self-evaluation Institutional and non-institutional evaluations 							
Other (as the proposer wishes to add)								

NAME OF THE COURSE	ECONOMICS AND PRODUCTION ORGANIZATION							
Code	FETA01	Year of st	tudy	2.				
Course teacher	lvica Veža, Ph.D., Full Professor	Credits (E	ECTS)	3				
Associate teachers		Type of ir (number (nstruction of hours)	L 30	S	AE	LE	DE
Status of the course	Obligatory	Percentage application	ge of n of e-learning	0				
	COURSE	DESCRI	PTION					
Course objectives	 Training students for: understanding basic kr organization structures solving problem of prof point (based on supply) 	nowledge of itability (ba and dema	of production org ased on income and)	ganizat and co	ion the ost) and	eory, a d equi	ind nev librium	w
Course enrolment requirements and entry competences required for the course	None	ne						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: define the difference be define the modern theo define outer and inner calculate fixed and vari calculate equilibrium pe 	udents will be able to: define the difference between classic and neoclassic organization theories define the modern theories of organization define outer and inner factors that affect the selection of organization structure calculate fixed and variable costs calculate equilibrium point						sture
Course content broken down in detail by weekly class schedule (syllabus)	Course content Introduction. Organization I Theory of organization (cla Modelling of organization struct Modern trends in organizat Lean Management (VS,5S Toyota Production System Parallel engineering, fracta Networked factory (virtual f reengineering, agile manuf Organization of material fac resources. Organization of control and dynamics. Enterprise, entrepreneursh enterprise, Types of integra Organization of business fu Theory of production and c combination of production f	calculate equilibrium pointSourse contentL or S hoursitroduction. Organization basics.2heory of organization (classic, neoclassic, modern).2lodelling of organization structures.2lodern trends in organization modelling.2ean Management (VS,5S, kaizen)2foyota Production System.2lotworked factory (virtual factory), business process2letworked factory (virtual factors).2Organization of material factors.2Organization of control and management.2Organization of business functions.2Interprise, entrepreneurship, entrepreneur.2Organization of business functions.2Interprise.						AE burs
Format of instruction	 ✓ lectures ✓ seminars and workshops ☐ exercises ☐ independent assignments ☐ multimedia ☐ laboratory ☐ work with mentor ☐ (other) 							

Student responsibilities										
Screening student	Class attendance	1,0	Research		Practical traini	ng				
proportion of ECTS	Experimental work		Report		Individual work	k (Other)	2,0			
credits for each activity so that the total number of	Essay		Seminar essay		(Other)					
ECTS credits is	Tests	0	Oral exam		(Other)					
equal to the ECTS value of the course)	Written exam		Project		(Other)					
Grading and evaluating student work in class and at the final exam	There are two midte lecturing and the set that did not pass th theoretical questions carried out as writte each midterm exam the formula: the activities in perce - M1, M2 – ter Final grade is calcu grade system in ac University of Split. S 15% best ones are g 35% grade good, an after second final ex they can get is suff course. It is a writte minutes.	There are two midterms and final exams. The first midterm exam is after 7 were acturing and the second one is after the next 6 weeks. In the final exams stu- nat did not pass the midterm exams take part. Each midterm test consists neoretical questions and lasts for 45 minutes. The midterm and final exam- arried out as written tests. The requirement for passing grade is 40 % poir ach midterm exam or the final exam. Grade (in percentage) is formed accord ne formula: Grade(%) = 0,5 (M1 + M2) ne activities in percentage: - M1, M2 – test results. Tinal grade is calculated after the second final exam based on the ECTS re- rade system in accordance to Regulations of studies and studying syste Iniversity of Split. Students that passed the exam are divided into the four gr 5% best ones are given grade excellent, next 35% are given grade very good 5% grade good, and last 15% grade sufficient. Students that didn't pass the fter second final exam write correction exam on the autumn and maximum ney can get is sufficient. Correction exam is test of the whole curriculum ourse. It is a written test consisting of 10 theoretical questions and lasts fininutes.								
Required literature		Title)		Number of copies in the library	Availabi other r	lity via nedia			
(available in the library and via other media)	Dulčić, Ž.; Pavić, I.; l menedžment. Fakult brodogradnje – Ekor	Rovan, et elekt nomski i	M.; Veža, I.: Proi rotehnike, strojar akultet, Split, 19	zvodni rstva i 96.	5					
	Sikavica P.; Novak, informator, Zagreb, 2	M.: Pos 2011.	lovna organizacij	a,	5					
Optional literature (at the time of submission of study programme proposal)	- Schroeder, R.G.	: Uprav	ljanje proizvodnjo	om, Mat	e, Zagreb, 200	0				
Quality assurance methods that ensure the acquisition of exit competences	 Assessment of s Annual institution Feedback from s Self-evaluation of Feedback from f courses 	ssessment of students presence on lectures nnual institutional evaluation of students success on exams eedback from students via surveys elf-evaluation of teachers eedback from faculty alumni students of the importance of the curriculum of ourses								
Other (as the proposer wishes to add)										

NAME OF THE COURSE	SYSTEMS THEORY									
Code	FELA09	Year of study	2.							
Course teacher	Vladan Papić, Ph.D., Full Professor	Credits (ECTS)	5							
	Tea Marasović, Ph.D.,		L	S	AE	LE	DE			
Associate teachers	Assistant Professor Ivo Stančić, Ph.D., Assistant Professor	Type of instruction (number of hours)	45	0	0	15	0			
Status of the course	Obligatory	Percentage of application of e-learning	0							
	COURSE	COURSE DESCRIPTION								
Course objectives	Training students for: - Understanding and synthesis of techni - Describing and and - Permanent acquiri technical systems.	 aining students for: Understanding and application of basic principles used in analysis and synthesis of technical systems, Describing and analysing of simple linear dynamical systems, Permanent acquiring and deepening of knowledge in the area of theor technical systems 								
Course enrolment requirements and entry competences required for the course	None									
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: Explain fundamental provide systems, Use standard software Apply methods and tector systems in time and free Mathematically formula Analyze stability and site Interprete system using 	 Students will be able to: Explain fundamental principles of systems theory and basic features of systems, Use standard software packages for analysis of systems, Apply methods and techniques for descripton of behaviour of linear dynamical systems in time and frequency domain, Mathematically formulate simple electrical and mechanical systems, Analyze stability and steady-state errors of linear dynamical systems, 								
					L	ŀ	٩E			
					nours	hc	ours			
	Introduction to systems				3					
	Linear, nonlinear, variable examples	and non-variable systems	,		2					
	Transfer function				3					
	Laplace transform, exampl	es			4					
	Block diagrams and signal-	-flow graphs.			3					
	First order systems. Examp	oles.			2					
	Second order systems. Exa	amples.			5					
Course content	Syste description in freque	ncy domain.			3					
broken down in	Nyquist and Bode dijagram	is. Examples.			4					
detail by weekly	Graphoanalytical criterium	of stability.			3					
(syllabus)	Analitical criterium of stabil	ity.			2					
(-)	Steady-state errors.				2	_				
	Description of system with state variables. 3									
	List of laboratory exercises LE hours									
	ntroduction to MATLAB, Laplace transform in solving differential									
	Transfer functions and time	response.					2			
	Modelling and system simulation with Simulink 2									
	Time response of first and second order systems. 2									
	Frequency analysis: polar a	nd Nyquist plots.					2			
	⊢requency analysis: Bode p	DIOTS					2			
	wodelling with state variabl	es.					2			

Format of instruction	 ☑ lectures □ seminars and workshops □ exercises □ on line in entirety □ partial e-learning □ field work □ independent a ☑ multimedia ☑ multimedia ☑ multimedia ☑ work with mer □ (other) 					t assignments entor er)		
Student responsibilities	The presence on lect Performed all require	0 % of the time	es schedu	led.				
Screening student	Class attendance	Class attendance 1,5 Research P						
proportion of ECTS	Experimental work	Individual work	K	2,2				
credits for each activity so that the	Essay		Seminal essay			Laboratory exe	ercises	0,5
ECTS credits is	Tests	0,2	Oral exa	ım		Preparation fo laboratory exe	r rcises	0,5
value of the course)	Written exam	0,1	Project			(Other)		
Grading and evaluating student work in class and at the final exam	There are two midte lecturing and the sec are answering parts exams are carried of The requirement for exam and positive a percentage), each m max. 20% out of tota Final grade is former Percentage Grade 50% to 61% sufficien 62% to 74% good (3 75% to 87% very go 88% to 100% excella	rms and cond on they did ut as wr passing ssessm idterm o al possik d in the nt (2)) od (4) ent (5)	I final exa e is after I not pass itten tests grade is ent of lab exam cor ble points following	ims. The the nex in the s and it 50% po oratory otributes (40%+4 way:	e first m t 6 weel midterm lasts for pints on exercise with ma 40%+20	idterm exam is ks. In the final e max. 75 minut each midterm es. In final grac ax. 40%, lab. e %).	after 7 w exams stu n and fina res. exam or f ling (in xercises v	eeks of idents I inal with
		Title)			Number of copies in the library	Availabi other r	lity via nedia
Required literature (available in the	Papić, V. Teorija skripta.	sustav	a, preda	vanja.	Interna		e-lear port	ning tal
library and via other media)	Zanchi, V. : Autom 2003./2004.	atika, 3	rd editio	n, FESI	B, Split,	5		
	Zanchi, V., Cecić M. analizi regulacijskih	, Šupuk sustava	T. : MAT , FESB, \$	LAB po Split, 20	drška u 06.	5		
(at the time of submission of study programme proposal)	Hohn Van de Veg Gugić, P.: Teorija	Hohn Van de Vegte: Feedback Control System, Prentice Hall Inc., 1986. Gugić, P.: Teorija automatskog reguliranja I, FESB-Split, 1981.						
Quality assurance methods that ensure the acquisition of exit competences	 Evaluation of res Feedback from s Self-evaluation of Institutional and 	Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers					comes	
Other (as the proposer wishes to add)					-			

NAME OF THE COURSE	ELECTROTECHNICAL M	ATERIALS AND TECHNO	DLOGY	(
Code	FELA02	Year of study	2.							
Course teacher	Maja Stella, Ph.D., Assistant Professor	Credits (ECTS)	4							
Associate teachers	Prof. dr. sc. Dinko Begušić, Ph.D., Full Professor Josip Lörincz, Ph.D., Assistant Professor	Type of instruction (number of hours)	AE 0	LE 15	DE 0					
Status of the course	Obligatory									
	COURSE	E DESCRIPTION								
Course objectives	Training students for: - understanding structure, p technologies in electrical - knowledge and applicatio magnetic materials in elec - basic knowledge in micro - permanent adoption and in electrical engineering	raining students for: understanding structure, properties, and application of basic materials and technologies in electrical engineering knowledge and application of conductive, semiconductive, insulating and magnetic materials in electrical engineering, basic knowledge in microelectronic and optical technologies permanent adoption and deepening of the knowledge of materials and technolog								
Course enrolment requirements and entry competences required for the course	None	n electrical engineering.								
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 define and apply basic kn electrical engineering evaluate and apply basic evaluate and apply a con- materials in electrical eng evaluate and apply the fu permanently adopt and electrical engineering. 	 define and apply basic knowledge of basic materials and technologies in electrical engineering evaluate and apply basic materials and technologies evaluate and apply a conductive, semiconductive, insulating and magnetic materials in electrical engineering evaluate and apply the fundamental microelectronic and optical technologies permanently adopt and deepen the knowledge of materials and technology in 								
	Course content			L	or S	<i> </i>	٩Ε			
	Introduction. Structure and	properties of materials. Pr	opertie	es l	<u>nours</u> 2	hc	-			
	Materials for conductors: c	opper and its allovs and al	uminur	n	2		-			
	High melting point conduct tantalum and niobium. Mat silver, iron and platinum.	ors: tungsten, molybdenur erials for specific purposes	n, s: gold,		2		-			
	Materials for resistors, ther conductors through the gla	mocouple, thermocouple, ss and contacts	fused,		2		-			
Course content broken down in detail by weekly	Superconductivity and superconductor materials. (for obtaining a single crysta	erconducting materials. Cleaning semiconductors. al	Method	ds	2		-			
class schedule	Magnetic materials in gene alloys: iron-calcium and iro	eral. Soft magnetic materia n-nickel.	ls (iron	,	2		-			
(Synabus)	The soft magnetic material ferromagnetic powder and materials (carbon steels, al magnetic materials and ma	ne soft magnetic materials for the HF technique (a rromagnetic powder and ferrite core). Hard magnetic aterials (carbon steels, alloy dispersion, ductile hard 2 - agnetic materials and materials based on metal oxides).								
	Insulating materials in gene commonly used insulation mica, ceramics.	nsulating materials in general. Features overview the most commonly used insulation materials: air, insulating liquids, 2 - nica, ceramics.								
	Glass, varnishes, putty inst materials, caoutchouc and (thermoplastic and thermos	ulation, laminates and fibro rubber, synthetic resin setting). Printed circuit.	bus		2		-			

	Soldering process. N development. The di technology: general.	licroele vision o	ctronics: f integrat	Introduo ed circu	ction an iits. Plai	d historical nar	2		-		
	Procedures of plana passivation Si surface Metallization	ocedures of planar technology: epitaxy, oxidation or issivation Si surface, diffusion and ion implantation. etallization.									
	Thin layer technolog components (resisto film technology: in ge (resistors, capacitors proparation of applic	in layer technology: generally, preparation of thin film mponents (resistors, capacitors, conductive paths). Thick in technology: in general, production of thick components sistors, capacitors, conductive paths). Methods for expandion of application specific integrated circuits (ASIC)									
	Fiber optic transmiss light propagation thre type, the protection of and manufacture of	er optic transmission systems: historical development, the t propagation through the light conductor, the optical fiber e, the protection of the optical fiber, types of optical fiber d manufacture of the fiber optical cable									
	List of laboratory or o	design e	exercises					LE (or DE		
	Specific electric resis	tance m	neasurem	ient					2		
	Resistance measure	ment of	color-coo	led resi	stors				2		
	Thermistors								2		
	Measuring the tempe	erature v	vith thern	nocoupl	е				2		
	Testing quality of tran	nsforme	r plates a	nd mea	sureme	ent losses in	the iron		2		
	Rated power dissipat		5151015						2		
	□ seminars and wor	kshops		□ inde	penden	t assignme	nts				
Format of instruction	□ exercises	-		⊔ mun ⊠ labo							
	□ on line in entirety				with m	entor					
	☐ partial e-learning				(othe	er)					
Student											
responsibilities											
Screening student work <i>(name the</i>	Class attendance	1,0	Researc	h	-	Practical tra	raining		aining		-
proportion of ECTS credits for each	Experimental work	-	Report		-	Individual v	al work		2,2		
activity so that the total number of	Essay	-	Seminal essay	•	-	Laboratory	exercises	5	0,5		
ECTS credits is	Tests	0,2	Oral exa	ım	-						
equal to the ECTS value of the course)	Written exam	0,1	Project		-	(Oth	ier)				
Grading and evaluating student work in class and at the final exam	There are two midted lecturing and the seconsists of 5 theoret final exams students and final exams are is the positive assess points on each mid assessment grade (if the activities in percen- LV – laborat M1, M2 – teach The final grade is b grade and the oral p without the need for oral part of the example There are two terms	rms and cond on ical que s that di carried sment of dterm e n perce ory asse ory asse st result pased of art of the the oral n. for the f	I final exa e is after stions. The out as w of laborat exam or ntage) is de(%) = 0 essment, s. n the gra e final exam	inde of t am. The ritten te ory exe the fin formed 0,2 LV +	e first m t 6 wee tion of e midterm sts. The rcises, al exar accord - 0,4 (M he conf e studer exam n he additi	hidterm exar eks. Each m each test is 2 exams tak e requireme the seminar n. The cor ing to the fo 1 + M2) tinuous kno nts whose g nay not be con onal term fo	m is after idterm an 2 school h e part. Th nt for pas r exercise ntinuous rmula: wledge as rade may obliged to r the make	7 wed d fina our. e mi sing and know ssess be fo atter e up o	eks of al test In the dterm grade 50 % rledge sment ormed nd the exam.		

	The requirement for attendance of the final exam or the grade for all laboratory exercises. At the final exam to the area of the midterm exam(s) which has/have before. At the make up exam the student writes the to	The requirement for attendance of the final exam or the make up exam is the passing grade for all laboratory exercises. At the final exam the student writes the test from the area of the midterm exam(s) which has/have not been successfully passed before. At the make up exam the student writes the test from the complete course.							
Required literature (available in the	Title	Number of copies in the library	Availability via other media						
library and via other media)	M. Kapov: Elektrotehnički materijali i tehnologije, skripta, FESB Split, 2005.		e-learning portal						
Optional literature (at the time of submission of study programme proposal)	M. Vrdoljak, M. Kapov: Elektrotehnički materijali- lab. 2001 V. Bek: Tehnologija elektromaterijala, ETF Zagreb, 1 P. Biljanović: Mikroelektronika, ETF Zagreb, 1983.	vježbe, skript 989.	a, FESB Split,						
Quality assurance methods that ensure the acquisition of exit competences	 Evaluation of results in accordance with the above Feedback from students via surveys Self-evaluation of teachers Institutional and non-institutional evaluations 	learning outco	omes						
Other (as the proposer wishes to add)									

NAME OF THE COURSE	ELECTRONIC CIRCUITS								
Code	FELA10	Year of study	3.						
Course teacher	Ivan Marinović, Ph.D., Full Professor	Credits (ECTS)	5	5					
Associate teachers	Duie Čoko, Ph D	Type of instruction	S	AE	LE	DE			
		(number of hours)	30		15	15			
Status of the course	Obligatory	Percentage of application of e-learning							
	COURSE	COURSE DESCRIPTION							
Course objectives	Training students for: - DC and AC analysis of - doing measurements a	raining students for: DC and AC analysis of basic electronic circuits doing measurements applying oscilloscope							
Course enrolment requirements and entry competences required for the course	Finished course Electronic	components and circuits							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: - understand principles of - do DC analysis of elec - do AC analysis of elec - do analysis in frequence - make measurements of	Students will be able to: understand principles of basic analogue electronic circuits do DC analysis of electronic circuits do AC analysis of electronic circuits do analysis in frequency domain make measurements of basic circuit parameters applying oscilloscope							
Course content	Course content				or S	h	AE ours		
detail by weekly	Cascade amplifier				1	().5		
detail by weekly	Amplifier frequency charac	teristic and Bode diagram			1	().5		

class schedule (svllabus)	Low-frequency and I amplifiers	nigh-frea	quency a	nalysis (of BT ar	nd JFET	4	2		
(cynabad)	Impulse response of	lifiers4ulse response of linear amplifier10								
	Nose in BT. JFET ar	in BT, JFET and MOSFET amplifiers								
	Feedback amplifiers						6	3		
	Power amplifiers, A-	class ar	nplifier w	th trans	former,	AB-class	8	4		
	Differential amplifier						2	1		
		r					6	3		
							0		F	
	List of laboratory or o	design e	exercises					hours	-	
	Frequency character	istic of E	BT amplif	er				2		
	Frequency character	istic of J	FEI amp	blifier				2		
	Frequency character	ISTIC OF T	wo-stage	amplifie	er			2		
	Feedback amplifier	lass amplifier								
	AB-class ampliner	rential amplifier								
	Differential amplifier	rential amplifier								
								3		
		kehone		□ inde	penden	t assignmer	nts			
		kshops		🗆 mult	imedia					
Format of instruction				⊠ labo	ratory					
				□ work	with m	entor				
	□ partial e-learning				(othe	r)				
-	☐ field work				(01.10	- /				
Student	The presence on lec	tures ar	nd exercis	ses in th	ie amou	int of at leas	st 70% of	the times	;	
responsibilities	scheduled. Performe	ed all red	quired lat	oratory	exercis	es.				
Screening student work (name the	Class attendance	2	Researc	h		Practical tra				
proportion of ECTS credits for each	Experimental work		Report			Exercises	1			
activity so that the	Essay		Seminal essay			Individual w	2			
ECTS credits is	Tests		Oral exa	ım		(Oth				
value of the course)	Written exam		Project			(Oth	er)			
Grading and evaluating student work in class and at the final exam	There are two midte lecturing and the se theoretical questions exams students that carried out as written grading is applied.	rms and cond or s and nu t did not n tests v	final exa ne is afte umerical pass the while the	ms. The r next 6 problem e midter final exa	e first m weeks ns as w rm exar ams are	idterm exar . Each midt ell as the fi ns take par e written and	n is after erm test nal test. t. The m d oral. Ti	7 weeks of consists of In the fination of the	of of al re te	
						Number	of Ava	lability vi	ia	
Required literature		Title	•			copies in the librar	n oth	er media		
(available in the library and via other	P. Biljanović: Elektro	onički sk	lopovi, Šl	kolska k	njiga,	5	-			
media)	I. Zulim, P. Biljanovid	ć: Elektr	onički sk	opovi -	zbirka	5				
	zadataka, Školska k	njiga, Za	agreb			5				
Optional literature										
(at the time of	-									
submission of study										
programme										
Quality assurance	Evidence of stur	tonte att	ondanco							
methods that ensure	- Annual analysis	of grade	enuance es achiev	ed						
the acquisition of	- Teachers self-ev	/aluation	טיייטט גע ווטע	54						
exit competences	- Students feedba	ick via d	uestionn	aires an	d surve	VS				
Other (as the						,-				
proposer wishes to										
add)										

NAME OF THE COURSE	OBJECT ORIENTED PRO	OGRAMMING							
Code	FELA13	Year of study	2						
Course teacher	Ivo Mateljan, Ph.D., Professor Marjan Sikora, Ph.D., Assistant Professor	Credits (ECTS)	5						
Associate teachers		Type of instruction (number of hours)	LE 30	DE					
Status of the course	Obligatory	Percentage of application of e-learning	30		1				
	COURSE	COURSE DESCRIPTION							
Course objectives	Training students for: - programming with - understanding the	 aining students for: programming with C++ language, understanding the principles of object oriented programming 							
Course enrolment requirements and entry competences required for the course	Competences from the firs	empetences from the first year of study.							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	On completion of the cours - explain the concept of - explain difference betw - explain the polymorphi - use fundamental STL of - use the facilities in the - use the exception hance - use Microsoft Visual St	completion of the course, students should, regarding C++ language, be able to: explain the concept of namespace, scope and lifetime explain difference between object based and object oriented programming explain the polymorphism use fundamental STL classes: string, vector, list use the facilities in the "iostream" to provide user and file i/o in programs use the exception handling mechanism use Microsoft Visual Studio, to make programs with GUI, with MFC classes							
	Course content			l	_ or S nours	/ hc	∖E ours		
	Introduction to class. Object	ct based and object oriente	ed		2				
	Structural programming, fu Pointers and references.	nctions and primitive data	types.		2				
	Operators, type conversion	n, variable scope and lifetir	ne.		2				
	Classes and objects.				2	_			
	Class abstraction, interface	and implementation.			2				
	Recapitulation and prepara	ation for mid-term.			2				
	Operator overloading.				2				
	Generic programming and	s. templates Strings			2				
Course content	Inheritance and STL library	/			2				
broken down in	Polymorphism.				2				
detail by weekly	Exception handling. Multith	reading.			2				
class schedule	Recapitulation and prepara	ation for exam			2				
(Syliadus)	List of laboratory or design	exercises				LE o	or DE ours		
	Compilation, debugging, fu	nctions					2		
	Overloaded functions, pointers and references. 2								
	Operators, type conversion, scope and lifetime of memory objects. 2								
	Classes an objects I						2		
	Classes an objects II						2		
	Dynamic memory allocation	i, operator overloading					∠ 2		
	Streams and the operations						∠ 2		
	Templates						∠ 2		
	Inheritance						2		
	Polymorphism					1	2		

Format of instruction	 ☑ lectures ☑ seminars and workshops ☑ exercises □ on line in entirety ☑ partial e-learning ☐ field work 			□ inde □ mult ⊠ labo ⊠ worł □	ependen timedia pratory k with m (othe	endent assignments media atory with mentor (other)			
Student responsibilities									
Screening student work (name the	Class attendance	2	Researc	h	1	Practical training	ng		
proportion of ECTS	Experimental work		Report			Team work			
activity so that the	Essay		Seminai essay			(Other)			
ECTS credits is	Tests	1	Oral exa	ım		(Other)			
equal to the ECIS value of the course)	Written exam	exam Project 1				(Other)			
Grading and evaluating student work in class and at	Grade (%) = 0,15L +	Grade (%) = 0,15L + 0,15P + 0,35(M1 + M2)							
Required literature		Title	Number of copies in	Availabi	lity via nedia				
(the library	•						
(available in the library and via other	Ivo Mateljan: OOP, I	ecture r	otes, FE	SB, 200)1.	the library			
(available in the library and via other media)	Ivo Mateljan: OOP, I Stroustrup, B., The C Adison Wesley, 198	ecture r C++ prog 6.	otes, FE	SB, 200 g Langu)1. Jage,				
(available in the library and via other media) Optional literature (at the time of submission of study programme proposal)	Ivo Mateljan: OOP, I Stroustrup, B., The (Adison Wesley, 1980 Owen L. Astrachan,	ecture r C++ prog 6. Comput	notes, FE gramming ter Sciend	SB, 200 g Langu ce Tape	01. lage, estry, Mo	GrawHill 2000			
(available in the library and via other media) Optional literature (at the time of submission of study programme proposal) Quality assurance methods that ensure the acquisition of exit competences	Ivo Mateljan: OOP, I Stroustrup, B., The (Adison Wesley, 1980 Owen L. Astrachan, - Evaluation c - Feedback fr - Self-evaluat - Institutional	ecture r C++ pro- 6. Comput of results om stud ion of te and nor	ter Scient s in accor ents via s achers i-institutio	SB, 200 g Langu ce Tape dance v surveys onal eva	01. lage, estry, Mo with the aluations	cGrawHill 2000	outcome	S	

NAME OF THE COURSE	COMPUTER AND DATA SECURITY								
Code	FELA40	Year of s	tudy	3.					
Course teacher	Mario Čagalj, Ph.D., Full Professor	Credits (E	ECTS)	5					
Associate teachers		Type of ir (number	nstruction of hours)	L 30	S 0	AE 0	LE 30	DE	
Status of the course	Elective	Percenta	ge of on of e-learning	0	_	_			
	COURSE	E DESCRI	PTION	l					
Course objectives	Introduce students to: - fundamentals of compo- - critical thinking on secu	uter and da urity issues	ata security, s in computer sy	stems.					
Course enrolment requirements and entry competences required for the course	None								
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: define the basic concernor, data confidenti analyse vulnerabilities suggest basic protection 	udents will be able to: define the basic concepts of computer security such as authentication, access control, data confidentiality, system and data integrity analyse vulnerabilities of password-based authentication systems, suggest basic protection measures.							
	Course content					L hours	/ hc	∖E ours	
	Introduction to computer se	ecurity.				2			
	Basic cryptographic primitives (encryption and authentication)								
	User authentication (passwords, security tokens, biometry, attacks)								
	User authentication on Wir systems	ndows and	Unix-like operat	ting		2			
	Attacks on passwords (bru	te-force, d	ictionary, rainbo	w table	s)	2			
	Access control (Windows,	Unix-like C	DS)			4			
Course content	First midterm exam								
broken down in dotail by wookly	Malware (viruses, compute	er worms, b	ootnets)			2			
class schedule	Protection against malware	e (AV softw	vare)			2			
(syllabus)	Denial-of-Service (DoS) an	d Distribut	ted DoS (DDoS)	attacks	S	2			
	Software security (buffer ov	verflow atta	acks)			2			
	Risk assessment and man	agement				2			
	Second midterm exam								
	List of laboratory exercises						LEI	hours	
	Intro to computer security u	sing Crypt	ool					4	
	User authentication and acc	cess contro	ol					6	
	Malicious software (keylogo	jers) the brows	or ottocke)					6	
	DoS attacks	-me-brows	er allacks)					4 1	
	Software security (buffer ov	erflow atta	ncks)					2	
	⊠ lectures							_	
	□ seminars and workshops	S	□ independent	assign	ments	6			
	□ exercises		multimedia						
Format of instruction	nat of instruction on line in entirety								
	□ partial e-learning	□ work with mentor							
	□ field work		凶 (other)					
Student	The presence on lectures i	n the amo	unt of at least 70) % of t	he tin	nes sch	nedule	d.	
responsibilities	Performed all required labo	oratory exe	ercises.						

Screening student	Class attendance	0,7	Research		Practical traini	ng		
proportion of ECTS	Experimental work		Report		Individual work	(2	
credits for each activity so that the total number of	Essay		Seminar essay		Laboratory exe	ercises	2	
ECTS credits is	Tests	0,2	Oral exam					
equal to the ECTS value of the course)	Written exam	0,1	Project		(Other)			
Grading and evaluating student work in class and at the final exam	There are two midted lecturing and the sec submit a written rep graded. The final grade is for Grade where: • P – is a grade • LV – a grade • M1, M2 – tes NOTE: If a student fa set to 0 in the above	 here are two midterms and final exams. The first midterm exam is after 7 weeks of cturing and the second one is after the next 6 weeks. Students are also required to ubmit a written report on their work on laboratory assignments; these are also raded. he final grade is formed as follows: Grade = Round[0,05 P + 0,15 LV + 0,35 M1 + 0,45 M2] here: P - is a grade based on attendance at lectures, LV - a grade earned during laboratory exercises, M1, M2 - test results. OTE: If a student fails a given task (P, LV, M1, M2), the corresponding grade is et to 0 in the above formula.						
Required literature (available in the		Number of copies in the library	Availabi other r	lity via nedia				
media)	Lecture notes and p		e-lear	ning tal				
Optional literature (at the time of submission of study programme proposal)	 Stallings W., Borwn L.: Computer Security, Principles and Practice, Pearson Prentice Hall, 2008. Gollmann D.: Computer Security, 2nd Edition, Wiley, 2005. Pfleeger C. P., Pfleeger S. L. : Security in Computing, 4th Edition, Prentice Hall, 2006. 							
Quality assurance methods that ensure the acquisition of exit competences Other (as the proposer wishes to	 Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers Institutional and non-institutional evaluations 							

NAME OF THE COURSE	DIGITAL INSTRUMENTA	TION 1								
Code	FELA20	Year of study	3							
Course teacher	Ivan Marasović, Ph.D., Assistant Professor	Credits (ECTS)	5							
Associate teachers		Type of instruction	L	S	AE	LE	DE			
Associate teachers		(number of hours)	30		0	15				
Status of the course	Obligatory	Percentage of application of e-learning								
	COURSE	DESCRIPTION								
Course objectives	 Training students for: Understanding the main microcontrollers in inst Signal acquiring and control representation. Development of digital microcontroller. 	 Understanding the main properties of digital instrumentation chain using microcontrollers in instrumentation. Signal acquiring and conditioning, analog to digital conversion, data representation. Development of digital instrumentation chain based on the AVR ATMEL series microcontrollers. 								
Course enrolment requirements and entry competences required for the course	None.	lone.								
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: State the basic principles of microcontrollers. Choose the basic peripheral components necessary for microcontrollers based system. Programing microcontrollers in assembler and C. Acquisition, conditioning and processing physical signals by using microcontrollers. Send processed data to computer using serial communication (RS232) and representation on the alphanumerical 16x2 display. 									
	Course content	1	,			Lh	ours			
	Introduction. Digital instrum	nentation chain based on t	he				2			
	Microcontroller and microprocessors. Microprocessors architecture. Program counter, instructions and operation code, pipeline and status									
	ATmega16 microcontroller architecture (internal modules, IO ports, timer/counter, USART, ADC). Registers and memory organization and addressing.									
	System clock and clock op System control and reset	tions. Power management	and sl	leep m	odes.		2			
Course content broken down in	General purpose input-out and input register. Alternation modes of operation. Timer	out pins, data direction reg e port functions. Timer/cou /counter interrupt vectors.	ister, d inter m	lata reg odules	gister s and		2			
class schedule (syllabus)	Universal Synchronous and Transmitter (USART) for se description. Baud rate setti	d Asynchronous serial Rec erial communication. USAI ng.	ceiver a RT regi	and ister			2			
	Memory programing, memory signature and calibration by	ory and data memory lock yes. Parallel, serial and JT	bits. F AG pro	use bit ogrami	s, ng.		2			
	Microcontroller peripheral of circuits.	components, supply, reset	and cl	ock so	urce		2			
	Digital instrumentation cha	in. Acquiring, conditioning	and sig	gnal			2			
	Analog circuits in instrumer analog-digital converters.	ntation chain, amplifiers, fil	ters, b	ridges	and		2			
	Data representation, LED, and graphic display. Develo	seven segment display, Lo	CD alp symbo	hanum ols.	erical		2			
	Connecting display to micro	ocontroller, initialization an	id com	munica	ation.					

	Standard communic (RS232) SPL TWI/I	ation int	erfaces ii	n digital	instrum IrDA	entation, USA	RT	2	
	ARM microcontroller	s and p	rocessor	s. Archit	ecture a	and mode of		2	
	List of laboratory or o	design e	exercises				LE	E hours	
	Introduction to Atme	el studio	and ST	K500. l/	/O pins	configuration,	LED	3	
	Program, data and E	EPROM	I memory	, using.				3	
	Timer/counter appli	cation.	Interrup	ts gen	erated	by timer/cou	unter.	3	
	Executing program - Using serial standar	monitor d RS23	ing modu 2, conne	le (wato	hdog til hicrocor	mer). htroller to comp	puter.	0	
	Analog comparator n	nalog comparator module application.							
	Using alphanumeric Connecting display a	Ising alphanumerical 16x2 display and LM35 temperature sensor.							
	thermometer develop	oment.					- g		
	⊠ lectures	lectures							
	☐ seminars and workshops				imedia	g			
Format of instruction	\Box exercises			⊠ labo	ratory				
	□ partial e-learning			□ work	with m	entor			
	□ field work				(othe	er)			
Student responsibilities	Students should attend at least 70% of the lectures. Students must complete all aboratory exercises.								
Screening student	Class attendance	2	Researc	h		Practical training			
proportion of ECTS	Experimental work		Report			Individual work	<	1.25	
credits for each activity so that the	Essay		Seminai essay			Laboratory exe	ercises	1	
ECTS credits is	Tests	0.15	Oral exa	Dral exam		Preparation for laboratory exe	r rcises	0.5	
value of the course)	Written exam	0.1	Project			(Other)			
Grading and evaluating student work in class and at the final exam	There are two midter after 7 weeks of cla midterm exam is w problems. Each mid should score at leas the laboratory exerci The final grade (in pri- where: • M1, M2 – gr • L – grade fro Students not passing theoretical/numerica final exam, students of the laboratory exer- where: • T – grade fro • L – grade fro	 There are two midterm exams and a final exam. The first midterm exam is scheduled after 7 weeks of classes and the second one after the following 6 weeks. Each midterm exam is written and consists of 10 theoretical/numerical/programming problems. Each midterm exam lasts 90 minutes. To pass an exam, the student should score at least 50% in the midterms and also have a positive assessment of the laboratory exercises. The final grade (in percentage) is determined according to the formula: Grade(%) = 0,25(M1+M2)+0,5L, where: M1, M2 – grade from questions in midterms given in percentage, L – grade from laboratory exercises given in percentage, Students not passing the midterm exams take part in the final exam. It consists of 10 theoretical/numerical/programing problems and lasts 160 minutes. For passing the final exam, students must score at least 50%, as well as have a positive assessment of the laboratory exercise. The grade on final exams is determined by the formula: Grade(%) = 0.5(T)+0.5L, where: T – grade from theoretical questions given in percentage, 							
Required literature (available in the		Title	•			Number of copies in the library	Availab other	ility via media	
library and via other media)	I. Marasović – autori	zirana p	oredavanj	a (Powe	erPoint)		e-lea poi	rning rtal	

	M. Ali Mazidi, Sa. Naimi, Se. Naimi, The AVR						
	microcontrollers and embedded systems, Using						
	assembly and C, Prentice Hall, 2011.						
	Ivo Mateljan: Virtualna instrumentacija – skripta,						
	FESB, 2008.						
	A. Šantić: Elektronička instrumentacija, 3. izdanje,						
	Školska knjiga, Zagreb, 1993.						
	Marasović, I: Digitalna instrumentacija I - Upute za		e-learning				
	laboratorijske vježbe, Skripta za internu upotrebu,		portal				
Optional literature (at the time of submission of study programme proposal)	P. Horowitz, W. Hill: The Art of Electronics, Cambridg M. Balch: Complete digital design: A comprenhensive and computer system architecture, McGRAW-HILL, 2 Timothy S. Margush: SOME ASSEMBLY REQUIRED the AVR Microcontroller, CRC Press, 2012. Günther Gridling, Bettina Weiss: Introduction to Micro & 182.074, Vienna University of Technology Institute Embedded Computing Systems Group, 2007	 P. Horowitz, W. Hill: The Art of Electronics, Cambridge University Press, 2015. M. Balch: Complete digital design: A comprenhensive guide to digital electronics and computer system architecture, McGRAW-HILL, 2003. Fimothy S. Margush: SOME ASSEMBLY REQUIRED Language Programming with he AVR Microcontroller, CRC Press, 2012. Günther Gridling, Bettina Weiss: Introduction to Microcontrollers, Courses 182.064 A 182.074, Vienna University of Technology Institute of Computer Engineering 					
Quality assurance methods that ensure the acquisition of exit competences	 Record of number of students attending the classes Evaluation of results in accordance with expected learning outcomes Feedback from students via student surveys Teachers self-evaluation Institutional and non-institutional evaluations 						
Other (as the proposer wishes to add)							

NAME OF THE COURSE	DATABASES								
Code	FELB08	Year of study	2.						
Course teacher	Vladan Papić, Ph.D., Full Professor	Credits (ECTS)	6						
Associate teachers	Tea Marasović, Ph.D.,	Type of instruction	L	S	AE	LE	DE		
	Assistant Professor	(number of nours)	30	0	30				
Status of the course	Obligatory	Percentage of application of e-learning							
COURSE DESCRIPTION									
Course objectives	 Training students for: Understanding how typical database work, Modelling, normalization and design of simple databases, Retreaval, input, deleting and updating of data using simple and complex SQL queries. 								
Course enrolment requirements and entry competences required for the course	None								
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: Explain basic terms us life cycle, Use standard DBMS, Come up with queries 	ed in databases, types and for creation and retreaval o	d struct	tures, r a from t	metho tables	dology	and		

	 Translate given E-R diagram into Analyze relations in a database a Model simple databases accordir Explain basic problems of database 	 Translate given E-R diagram into relational form, Analyze relations in a database and conclude about level of normalization, Model simple databases according to given specification, Explain basic problems of databases working in multi user environment 						
	Course content	<u> </u>	L	AE				
	Basic terms. File model. Database ar system. Physical and logical indepen	nd database managament dence of data. Database	hours 2	hours				
	Database models. Database types ar life cycle.	nd structures. Database	2					
	Data modelling. Steps in designing d attributes. Relationship and relationsl relationship. Entity membership in rel	atabase. Entities and nip set. Functionality of ationships.	2					
	Representation of ER-model with dia diagrams. Conceptual database desi to make data model in easiest way?	2						
	Relational database model. Structure Transfeer of ER model into relational relational model with network and hie	2						
	Normalization and normal forms. Firs Functional dependencies – basic def Second normal form (2NF). Third nor	2						
	Boyce-Codd normal form (BCNF). Me and forth normal form (4NF). Joining normal form (5NF). Normal form of ke Reasons for aborting with normalizat	2						
	Relational model operations. Relation calculus.	nal algebra. Relational	2					
broken down in detail by weekly class schedule	SQL (Structured Query Language). F instruction. Database definition using of existing table. Deleting table. Index tables.	2						
(syllabus)	Database queries. Simple queries on condition. Reports.	1						
	Queries on more than one relation. C Queries for insert, modification and d	uery for table creation. eleting of dana. Aliases.	1					
	Aggregate functions. Group queries. subqueries Union. SQL queries opti	Nested queries – mization.	1					
	Multiuser environment problems. Vie	WS.	1					
	Protection from unautorizhed use. Ac and cascade. Revoking priviledges. U integrity and security. Time stamps.	ling privileges – single Jser groups. Data	2					
	Database storing and recovery. Data Transaction log. Criteriums for DBMS	base replication. S evaluation.	2					
	List of laboratory exercises			LE hours				
	Introduction to DBMS.			2				
	ER-diagrams			2				
	I ranstering ER-diagrams into relation	al model		2				
	Data modelling: etitles and relationshi	ps.		2				
	Filtering sorting and searching for da	ta		2				
	Simple queries	ld.		2				
	Complex queries.			2				
	Input forms.			2				
	Views and reports.			6				
	Macro commands.			2				
Format of instruction	⊠ lectures	⊠ independent assignmer	nts					

	seminars and workshops Image: Constraint of the seminars and workshops exercises Image: Constraint of the seminars and workshops on line in entirety Image: Constraint of the seminars and workshops partial e-learning Image: Constraint of the seminars and workshops field work Image: Constraint of the seminars and workshops			⊠ multir ⊠ labora □ work □	nultimedia aboratory work with mentor (other)				
Student responsibilities	The presence on lect Performed all require	The presence on lectures in the amount of at least 70 % of the times scheduled. Performed all required laboratory exercises.							
Screening student	Class attendance	1,5	Researc	h		Practical training			
proportion of ECTS	Experimental work		Report			Individual work	<	2,2	
credits for each activity so that the	Essay		Semina essay	•		Laboratory exe	ercises	0,5	
ECTS credits is	Tests	0,2	Oral exa	ım		Preparation fo laboratory exe	r rcises	0,5	
value of the course)	Written exam	0,1	Project			(Other)			
Grading and evaluating student work in class and at the final exam	There are two midte lecturing and the sec are answering parts exams are carried of The requirement for exam and positive a percentage), each m max. 20% out of tota Final grade is former Percentage Grade 50% to 61% sufficien 62% to 74% good (3 75% to 87% very go 88% to 100% excelled	There are two midterms and final exams. The first midterm exam is after 7 weeks of ecturing and the second one is after the next 6 weeks. In the final exams students are answering parts they did not pass in the midterms. The midterm and final exams are carried out as written tests and it lasts for max. 90 minutes. The requirement for passing grade is 40% points on each midterm exam or final exam and positive assessment of laboratory exercises. In final grading (in percentage), each midterm exam contributes with max. 40%, lab. exercises with max. 20% out of total possible points (40%+40%+20%). Final grade is formed in the following way: Percentage Grade 50% to 61% sufficient (2) 62% to 74% good (3) 75% to 87% very good (4)							
Required literature (available in the		Title	•			Number of copies in the library	Availabi other r	ility via nedia	
media)	Papić, V. Databases Croatian)	s, lectur	es. Text	book, FE	SB (in		e-lear por	ning tal	
Optional literature (at the time of submission of study programme proposal)	An Introduction to Da 2003. Hector Garcia-Molin The Complete Book Clare Churcher, Beg 2007.	atabase a, Jeffre , Prentic jinning [Systems by D. Ullm ce-Hall 20 Database	s, Eighth nan, Jenr 002. Design	Edition hifer D. From N	by C.J. Date, Widom: Datab lovice to Profe	Addison V base Syste ssional, A	Vesley ems: press,	
Quality assurance methods that ensure the acquisition of exit competences	 Evaluation of res Feedback from s Self-evaluation of Institutional and 	 Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers 							
Other (as the proposer wishes to add)		-							

NAME OF THE COURSE	COMPUTER ARCHITECTURES								
Code	FELA17	Year of study	3						
Course teacher	Sven Gotovac, Ph.D. Full Professor	Credits (ECTS)	5						
Associate teachers	Dunja Gotovac, Assistant	Type of instruction (number of hours)	L 30	S	AE	LE 30	DE		
Status of the course	Obligatory	Percentage of application of e-learning	0						
	COURSE	E DESCRIPTION							
Course objectives	 Training students for: Understand digital com Define difference betw Understand computer a Understand and apply application problem. 	nputer architecture. een different computer arc architecture on the digital different computer archite	chitectu circuits cture a	re on a level. ccordii	assem ng to t	bler le he	vel.		
Course enrolment requirements and entry competences required for the course	C programming language Digital electronics and circu	programming language igital electronics and circuits							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: Understand difference between computer architecture from the Instruction Set Point of view (ISA) Identify the properties and performance of different architectures at the level of logic circuits Select and apply the appropriate computer architecture according to the problem being solved. Evaluate the impact of architecture on a software solution (advantages and disadvantages). 								
	Course content					hc	λE ours		
	Introduction. Different view		2		/010				
	Data and instructions. Clas Instructions, Instruction set Modes. CISC. RISC.	r	2						
	Instruction level processor Architecture)		2						
	Arithmetical and Logical ins Transfer.	structions, Instruction for E	Data		2				
Course content	Flow control instructions, T then to binary code.	ranslation from C to asser	nbler a	nd	2				
broken down in detail by weekly	Processor design on digita microarchitecture.	Logic Docign for the 1 Bu			2				
class schedule (syllabus)	Microarchitecture.		15		2				
	Control Unit design, 2-Bus	and 3-Bus Microarchitectu	ure		2				
	Pipeline architecture.				2				
	Instruction-Level Parallelis		2						
	Memory System Design, N Level Memory Hierarchy.	lemory System Componer	nts, Two	D-	2				
	Cache, Associative cache, Cache.	Direct Mapped Cache, 2-	way		2				
	U/I system design.				2				

	List of laboratory or	design e	exercises				L	E or DE . hours
	ARM Architecture - Ir	ntroduct	ion.					2
	ARM Instruction Set	Archited	ture, Reg	gisters, N	lemory/	, Stack.		2
	Atmel Studio IDE. Pr	ogram S	Structure					2
	Instruction Set, Arithr Instructions, Branch	netical a Control	and Logic Instructio	al Instru ns	ctions,	Dana Transfer		8
	Procedures							2
	Program Examples	a and T	oot					10
			esi					4
	Seminars and workshops							
		🗵 multir	media					
Format of instruction	\Box on line in entirety			⊠ labor	atory			
				\Box work	with m	entor		
					(othe	r)		
Student		tures in	the amo	unt of at	loost 7	0 % of the time	s schod	ulad
responsibilities	Performed all require	ed labor	atory exe	rcises	least /		s scheu	uleu.
Screening student		0		h		Due etie el treie ini		
work (name the	Class attendance	2	Researc	n		Practical trainii	ng	
proportion of ECTS credits for each	Experimental work		Report			Laboratory exe	ercises	2
activity so that the	Essay	Essay Seminar F essay I		Preparation for laboratory exe	r rcises			
ECTS credits is	Tests	0,4	Oral exa	Oral exam		Self-study		0,5
value of the course)	Written exam	0,1	Project					
Grading and evaluating student work in class and at the final exam	lecturing and the seminutes and consists tests consist of 6 the students that did not are carried out as we assessment of labor final exam. Grade (in the activities in perce • LV – laborat • M1, M2 – te The final grade will b ECTS grading syste system of the Univer divided into four grou following B (very goo E). A group of stude is required), or F (sig Rulebook for Exam, the completion of cla According to Article participate in all form and laboratory exe	cond on s of 5 to eoretica pass the vritten te atory ex- n percer Grade entage: ory asse st result be detern m in acc rsity of 5 od), the nts who gnificant only two asses. e 65 of es of teac rcises	e is after 7 theoret 1 question e midterm ests. The kercises a ntage) is f e(%) = 0, essment, s. mined aft cordance Split. The % of the b next 35% did not p additiona o exam p the Stat ching and 100% of	the next cal ques is and n n exams to requirent and 50 % ormed a 33 LV + er the first with the group of best gets to rating C ass the e al work is eriods ar ute of th l attend: teaching	t 6 wee tions an umeric take pa nent fo 6 points ccordin 0,33 (M st test t Regula s tuder the gra C (good exam g s requir re organ ne Fac lectures g hour	eks. Each midte nd numerical pr al problems. In rt. The midterm r passing grad s on each midt ing to the formul (1 + M2) term by applyin ations on the st nts who passed ade A (excellen), and the last ains FX score ed). In accorda nized in the exa ulty, the stude s at least 70% o s. If you do	erm test roblems in the fina- in and fina- le is the erm exa- la: ag a rela- udy and the exa- udy and the exa- th, 35% 15% rati (addition ance with am perio- ent is of of teachi not me	lasts 60 and final Il exams al exams positive m or the study am is of the ng D, hal work n the bd after bliged to ng hours et these
Required literature (available in the		Title			ะรร เกย	Number of copies in the library	Availat other	oility via media
library and via other media)	Heuring, V.P., Jored Design and Architec AddisonWesley, 200	an, H.F. ture, 2rc)3	.: Compu d edition,	ter Syste	ems	2	Electro On e-l	nic copy earning

	S.Gotovac Authorized lectures from the Digital Computer Architecture		On e-learning				
Optional literature (at the time of submission of study programme proposal)	Hennesy & Patterson, "Computer Architecture: A Qua edition, Morgan Kaufmann, 2011	antitative Appro	oach", 5rd				
Quality assurance methods that ensure the acquisition of exit competences	 Class attendance records. Evaluation of results in accordance with the abov Feedback from students via surveys Self-evaluation of teachers Feedback from students who have already gradu Institutional and non-institutional evaluations 	Class attendance records. Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers Feedback from students who have already graduated.					
Other (as the proposer wishes to add)							

COURSE	INTERNET PROGRAMMI	ING								
Code	FELA14	Year of study	3							
Course teacher	Darko Stipaničev, Ph.D., Full Professor Ljiljana Šerić, Ph.D., Assistant Professor	Credits (ECTS)	5							
	Marin Bugarić, Ph.D.,	Type of instruction	L	S	AE	LE	DE			
Associate teachers	Assistant Andrija Sommer, mag.ing	(number of hours)	30	0	0	30	0			
Status of the course	Obligatory Percentage of application of e-learning 30									
	COURSE DESCRIPTION									
Course objectives	 Training students for: Understanding the operating principles of the Internet Preparation and processing of data and information for publication on the Web Designing, editing and maintenance of the content published on the web 									
Course enrolment requirements and entry competences required for the course	Completed courses: Programming 1 Programming 2									
Learning outcomes expected at the level of the course (4 to	 Students will be able to: Appoint communic Describe the steps Identify elements of 	ation protocols used on th of the TCP / IP protocol f HTML code	e Interr	net						

10 learning outcomes)	 Design and write HTML code of Web sites consisting of several web pages Write an external CSS document with instructions for the design of the sites Write simple JavaScript code that dynamically modifies website Explain the difference between client and server scripting technology 							
	Course content						L or S	AE
	Introduction. History	of the Ir	nternet. li	nternet	Commu	nication	6	nours
	protocols HTML language for	web pac	ie develo	pment.	HTML5		4	
	CSS style language.	CSS3	,				4	
	XML, XHTML						2	
	JavaScript, DOM						4	
	Ajax						2	
	jQuerry						2	
Course content	PHP						2	
detail by weekly	Overview of other tehnologijes for web page programming					nming	2	
(syllabus)	List of laboratory or	design e	exercises					LE or DE hours
	ntroduction. History of the Internet. Internet Communication						tocols	2
	HTML language for web page development. HTML5							4
	CSS style language.	CSS3						4
	XML, XHTML							2
				2				
	Ajax iQuarru							2
								2
	oc for wol		program	mina		2		
	⊠ lectures	mologije) page	program	ming		2
Format of instruction	t of instruction				 Independent assignments multimedia laboratory work with mentor (other) 			
Student responsibilities	The presence on lec Performed all require	tures in ed labor	the amo atory exe	unt of a rcises.	t least 7	0 % of the t	imes sche	eduled.
Screening student	Class attendance	2	Researc	h		Practical tra	aining	
work (name the proportion of ECTS	Experimental work		Report			Individual v (Other)	vork	2
credits for each activity so that the	Essay		Seminai essay	•		Laboratory (Other)	exercises	0,5
total number of ECTS credits is equal to the ECTS	Tests		Oral exa	ım		Preparatior laboratory ((Other)	n for exercises	0,5
value of the course)	Written exam		Project			(Oth	ier)	
Grading and evaluating student work in class and at the final exam	During the semester there will be two mid-term exams (tests). The first mid-exam be held after 7 weeks of classes, the second after the next 6 weeks. Mid-term exa are written on a computer and consists of 20 random questions to be answered. At the final exam students can take only parts of material that they did not pass the mid-term exams At the final exam ar autmn students take the whole subject matter of the course. The requirement for passing grade is positively evaluated seminar paper and at le 60% of points achieved on the mid-term / final exam. The number of points is calculated as the arithmetic average of the two mid-ter exams, or the number of points the entire final exam. The final grade is determined as follows:						I-exam will erm exams wered. not pass in course. nd at least o mid-term	
	Percentage Rating							

	60% to 69% is sufficient (2) 70% to 79% good (3) 80% to 89% very good (4) 90% 100% Excellent (5)						
Required literature	Title	Number of copies in the library	Availability via other media				
(available in the library and via other media)	Lj.Šerić, Programiranje za Internet, predavanj, FESB		e-learning portal				
	M.Bugarić, upute za laboratorijske vježbe, FESB		e-learning portal				
	http://www.w3schools.com		web				
Optional literature (at the time of submission of study programme proposal)	D. Sušanj, D. Petric: "Velika knjiga o Worl Wide Web L. Abrus ,"Irada weba, abeceda za Webmastere",BU Comer, D.E.: The Internet Book, Prentice Hall, 2000. Zeid, I.: Mastering the Internet & HTML, Prentice Hal Deitel, Deitel & Neto, Internet & WWW – How to Prog	 D. Sušanj, D. Petric: "Velika knjiga o Worl Wide Webu", Znak, Zagreb 1996. g. Abrus, "Irada weba, abeceda za Webmastere", BUG&SysPrint, Zagreb, 2003 Comer, D.E.: The Internet Book, Prentice Hall, 2000. Zeid, I.: Mastering the Internet & HTML, Prentice Hall, 2000. 					
Quality assurance methods that ensure the acquisition of exit competences	 Keeping records of the class attendance Annual review of the performance of exam Student survey in order to evaluate teachers Self-evaluation of teachers Feedback from students who have already graduated from about the relevance of the course content 						
Other (as the proposer wishes to add)							

NAME OF THE COURSE	OPERATING SYSTEMS						
Code	FELA27	Year of study	3				
Course teacher	Sven Gotovac, Ph.D., Full Professor	Credits (ECTS)	5				
Associate teachers	Petra Lončar, Assistant	Type of instruction	L	S	AE	LE	DE
	r ella Londal, Assistant	(number of hours)	45			15	
Status of the course	Obligatory	Percentage of application of e-learning	0				
	COURSE	DESCRIPTION	=				
Course objectives	 Training students for: Understand the archite system. Understand the method Apply and use the funct Estimate which solution 	 Training students for: Understand the architecture, complexity and functionality of the operating system. Understand the methodology of implementing operating system functionalities. Apply and use the functionality of the operating systems in their solutions. 					
Course enrolment requirements and entry competences required for the course	Computer Architecture Data Structures Algorithms						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: Understand and explai Distinguish the functior Understand and explai Evaluate the performant Choose appropriate so Use appropriate solution 	n the operating system are nality of the operating syste n how individual functional nce of individual solutions lutions for a particular app ons in their own applicatior	chitectu em lities ar licatior	ure and re solv	d funct	ionalit	y.

	Course content						L or S hours	AE hours
	Introduction to the co considered, Operatir	ourse, B ng syste	brief desc m tasks.	ription c	of topics	to be	3	
	Process Manageme	nt, Proc	ess Defir	ition, P	rocess	Descriptor	3	
	Implementation of P	rocess I	Manager	nent Sys	stems, F	Process	3	
	Cooperating Processes, Process Synchronization. Producer-						3	
	Test&Set Instruction	, Mutex	, Semaph	ores. P	roduce	ſ -	3	
	Deadlock Problem.	Possible	Solution	s.	.		3	
	Memory manageme	nt syste	m – Intro	duction	to topic		3	
	Logical vs. Physical Creation.	Address	s Space.	Logical	Addres	s Space	3	
	Paging						3	
Course content	Virtual Memory.						3	
detail by weekly	I/O Subsystem Arch	itecture					3	
class schedule	Interrupt Driven I/O.	DMA.					3	
(syllabus)	File Subsystem.	<u>, </u>					3	
	Real Time Operation	ı. 1 Syster	ns				3	
	List of laboratory or	design a	vorcisos				0	LE or DE
			576101363					hours
								2
	Linux OS Processes	rk Com	mand					2
	Linux processes - co	mmunic	ation with	ninelir	nes			2
	Windows OS Multitas	skina			100			2
	Write multi-tasking p	rograms	for the V	Vindows	s platfor	m		2
	Write multi-threading programs for the Windows platform						2	
	Time control of thread execution within the process							2
	Thread Sync Synchro	onizatio	n (Intro, E	event)				2
	Synchronization of th	read ex	ecution (mutex,	semaph	nores)		2
	Java multithreading							2
	Windows interproces	s comm	unication)				2
	US on a virtual mach ⊠lectures	line						2
	□ seminars and wor	kshops		⊠ inde	penden	it assignmei	nts	
	□ exercises			⊠ muli	limedia			
Format of Instruction	□ <i>on line</i> in entirety				oratory			
	□ partial e-learning				k with m	ientor		
	☐ field work				(othe	er)		
Student	The presence on lec	tures in	the amo	unt of a	t least 7	'0 % of the t	imes sche	eduled.
responsibilities	Performed all require	ed labor	atory exe	rcises.				
Screening student work (name the	Class attendance	2	Researc	:h		Practical tra	aining	
proportion of ECTS	Experimental work		Report			Laboratory	exercises	s 2
activity so that the	Essay		Seminai essay	•		Preparation laboratory	n for exercises	
ECTS credits is	Tests	0,4	Oral exa	ım		Self-study		0,5
value of the course)	Written exam	0,1	Project			(Oth	ner)	
Grading and evaluating student work in class and at the final exam	There are two midte lecturing and the se minutes and consists tests consist of 6 the	rms and cond on s of 5 to eoretica	l final exa le is after 7 theoret I question	ims. Th the ne ical que ns and	e first m xt 6 we stions a numeric	nidterm exar eks. Each n nd numerica al problems	m is after nidterm te al problem s. In the fi	7 weeks of est lasts 60 ns and final nal exams

	 are carried out as written tests. The requirement for passing grade is the positive assessment of laboratory exercises and 50 % points on each midterm exam or the "inal exam. Grade (in percentage) is formed according to the formula: Grade(%) = 0,33 LV + 0,33 (M1 + M2) the activities in percentage: LV – laboratory assessment, M1, M2 – test results. The final grade will be determined after the first test term by applying a relative ECTS grading system in accordance with the Regulations on the study and study system of the University of Split. The group of students who passed the exam is divided into four groups: 15% of the best gets the grade A (excellent), 35% of the following B (very good), the next 35% rating C (good), and the last 15% rating D, E). A group of students who did not pass the exam gains FX score (additional work is required), or F (significant additional work is required). In accordance with the Rulebook for Exam, only two exam periods are organized in the exam period after the completion of classes. According to Article 65 of the Statute of the Faculty, the student is obliged to participate in all forms of teaching and attend: lectures at least 70% of teaching hours and laboratory exercises 100% of teaching hours. If you do not meet these conditions, the student will not be able to access the exam 					
Required literature	Title	Number of copies in the library	Availability via other media			
Required literature (available in the library and via other media)	Title Tanenbaum, A.S.: Woodhull, A.S.: Operating Systems: Design and Implementation, (3rd Edition) Prentice Hall, 2006.	Number of copies in the library 2	Availability via other media Electronic copy on e-learning			
Required literature (available in the library and via other media)	Title Tanenbaum, A.S.: Woodhull, A.S.: Operating Systems: Design and Implementation, (3rd Edition) Prentice Hall, 2006. S.Gotovac Autorizirana predavanja iz Operacijskih sustava	Number of copies in the library 2	Availability via other media Electronic copy on e-learning e-learning			
Required literature (available in the library and via other media) Optional literature (at the time of submission of study programme proposal)	Title Tanenbaum, A.S.: Woodhull, A.S.: Operating Systems: Design and Implementation, (3rd Edition) Prentice Hall, 2006. S.Gotovac Autorizirana predavanja iz Operacijskih sustava Stalings, W.: Internals and Design Principles (7th Edition)	Number of copies in the library 2 tion), 2011.	Availability via other media Electronic copy on e-learning e-learning			
Required literature (available in the library and via other media) Optional literature (at the time of submission of study programme proposal) Quality assurance methods that ensure the acquisition of exit competences	Title Tanenbaum, A.S.: Woodhull, A.S.: Operating Systems: Design and Implementation, (3rd Edition) Prentice Hall, 2006. S.Gotovac Autorizirana predavanja iz Operacijskih sustava Stalings, W.: Internals and Design Principles (7th Edi 1. Class attendance records. 2. Evaluation of results in accordance with the abov 3. Feedback from students via surveys 4. Self-evaluation of teachers 5. Feedback from students who have already gradu 6. Institutional and non-institutional evaluations	Number of copies in the library 2 tion), 2011.	Availability via other media Electronic copy on e-learning e-learning			

NAME OF THE COURSE	DIAGNOSTIC METHODS FOR VEHICLES							
Code	FENA25	Year of study	3					
Course teacher	Assoc. Prof. Tonko Garma	Credits (ECTS)	5					
Associate teachers	Miljenko Baković, M.Sc.		L	S	AE	LE	DE	

		Type of instruction (number of hours)	30			30	
Status of the course	Elective	Percentage of application of e-learning	0				
	COURSE	DESCRIPTION					
Course objectives	 understanding of the concepts related to communication protocols and diagnostic methods used within modern vehicles Understanding the tools and instrumentation needed to measure and interpret signals on the vehicle communication bus Understanding of operation and application in instrumentation and diagnostics of modern embedded systems used in vehicles independent analysis of communication between vehicle microcomputers and external computer, signal processing independent communication between the on-board microcomputer and the service computer 						
Course enrolment requirements and entry competences required for the course	Course Electrical Measure	ments or related course su	iccessf	ully pa	ssed		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After successfully completing the course, students will be able to: 1. know the theoretical basics of the processed communication protocols used in nodern vehicles (CAN, LIN, FlexRay, OBD, UDS, XCP) 2. know the basic tools for testing communication within the vehicle 3. independently measure and analyze the communication signals used within the vehicle 4. develop simple communication between the computer and the microcomputer used in the vehicle using the "real-time" operating system						
	Course content			L	or S	/ hc	∖E ours
	Basic knowledge of device vehicles	communication within mo	odern		2		
	Basic insights into the testi modern vehicles	ng of communication with	nin		2		
	Overview and getting acqu	ainted with CAN bus oper	ation		4		
	Detailed elaboration of CA	N protocol			2		
Course content	Detailed elaboration of CA	N FD protocol			2		
broken down in	Review of the LIN protocol				2		
detail by weekly	Review of the FlexRay prot	cocol			2		
class schedule	The basics of measuring pa	arameters in a vehicle			2		
(Syllabus)	Measurement of non-elect	trical parameters within th	ne vehi	cle	2		
	Measurement of electrical	parameters within the ve	hicle		2		
	Basic insights into diagnost	tic protocols used within t	he car		2		
	Implementation of the OB	D diagnostic protocol			2		
	Implementation of the UD	S diagnostic protocol			2		
	Basic knowledge of calibra	tion protocols used withir	the ca	ır	2		
	Implementation of XCP cal	ibration protocol			2		
List of laboratory or design exercises							

Required literature (available in the		Title	9			Number of copies in the library	Availab other	ility via media
Grading and evaluating student work in class and at the final exam	Attendance at lectu Written, submitted a	res of a nd succ	at least 7 essfully c	70%. La lefende	aborator d semin	y exercises at ar paper.	tendance	100%.
value of the course)	Written exam		Project			(Other)		
total number of ECTS credits is	Tests		Oral exa	m		Preparation for laboratory exe	r rcises	0,5
credits for each activity so that the	Essay		Seminai essay	•	1,5	Laboratory exe	ercises	1,5
work (name the proportion of ECTS	Experimental work		Report			Impended rese	earch	0,5
responsibilities Screening student	Class attendance	1,0	Researc	:h		Practical training	ng	
Student					,	,		
Format of instruction	 seminars and wor exercises on line in entirety partial e-learning field work 	rkshops	i	\square mul	Itimedia Dratory k with m (othe	nentor er)		
	⊠ lectures						2	
	Measurement of vehicle emissions						2	
	driver while driving (so-called "G-force")							2
	Measuring process quantities in vehicles: measuring forces affecting the						g the	2
	Measuring process q	uantitie	es in vehic	cles: me	easuring	noise and vibr	ation	2
Measurement of process quantities in vehicles: pressure measurem					nent	2		
	Measurement of non-electrical quantities in vehicles: measurement of illumination. Contact and contactless temperature measurement						t of	2
	wheel speed and effect on the ABS system							Ζ
	Measurement of non-electrical quantities in vehicles: measurement of						t of	0
	Measurement of elected	leasurement of electrical quantities in vehicles: battery test, capacity						2
	waveforms by an osc	cilloscop	e De	I VEIIICI	es. mea:	Surement of		2
	resistance, inductand	ce and c	apacity	wohiel	<u></u>	suramont of		2
	Measurement of ele	ctrical q	uantities	in vehi	cles: me	asurement of		0
	Measurement of ele	ctric qua	antities ir	n vehicl	es: mea	surement of DO	Cand	2
	measurement of DC	neasurement of DC and AC voltages						2
	Measurement of electron	Aeasurement of electrical guantities in vehicles: contact and contactless						
	Measurement of electron	Measurement of electrical quantities in vehicles: contact and contactless neasurement of DC and AC current						2
	microcomputers via	CAN bu	s	lication	Setwee			2
	computers via CAN b Software implement	ous ation of	commur	nication	hetwee	on computers a	nd	-
	Implementation of tl	he comr	nunicatio	on betw	veen mic	crocomputers a	nd	2

library and via other	Milianka Dakavić, "Kanavnikasijaki protokali i							
indrary and via other	IVIIIJENKO BAKOVIC, "KOMUNIKACIJSKI PROTOKOII U		e-iearning,					
meula)	vozilima", Rimac Automobili, Split, 2019. (ppt		Internet					
	prezentacija)							
	Christoph Marscholik, "Road Vehicles – Diagnostic		e-learning,					
	Communication", Paperback – Prosinac, 2010.	mmunication", Paperback – Prosinac, 2010.						
	https://www.amazon.com/Road-Vehicles-	s://www.amazon.com/Road-Vehicles-						
	Communication-Christoph-							
	Marscholik/dp/8131807347	arscholik/dp/8131807347						
	Tonko Garma, Upute za laboratorijske vježbe iz	e-learning,						
	kolegija Dijagnostika motornih vozila, autorizirane		Internet					
	upute, FESB, 2020							
Optional literature	• Unruh, J.; Mathony, H. J.; Kaiser, K.H: Error Det	tection, Analys	is of Automotive					
(at the time of	Communication Protocols. SAE International Cor	ngress 1990.						
submission of study	 Christmann, E.: Data Communication in the Auto 	omobile – Part	t 1: Architecture,					
programme	Tasks, and Advantages of Serial Bus Systems							
proposal)								
	- Keeping records of student attendance.	6	C					
Quality assurance	- Annual analysis of course statistics in terms of	of midterm and	i finais exams.					
the equipition of	- Feedback from students via surveys.							
avit competences	- Teacher Sell-evaluation. Eachack from graduated students (or senior	r students) on	course content					
exit competences	relevance.	students) on t	course content					
Other (as the	/							
proposer wishes to								
add)								

NAME OF THE COURSE	ELEMENTS OF ELECTRICAL POWER SWITCHGEARS						
Code	FENA08	Year of study	3.				
Course teacher	Tonći Modrić, Ph.D., Assistant Professor	Credits (ECTS)	6				
Associate teachers		Type of instruction	L	S	AE	LE	DE
Associate teachers		(number of hours)	45	0	0	15	0
Status of the course	Obligatory	Percentage of application of e-learning	0				
COURSE DESCRIPTION							
Course objectives	 Training students for: understanding the bas power switchgears, understanding the con- dimensioning and sele elements, determination of equiva system, calculation of basic fau 	ic theoretical and practical cept of different electrical p ction of basic high voltage alent circuits and impedan It currents in power syster	knowle bower s electric ces of c n.	edge ir switcho cal pov elemei	n the e gear ty ver sv nts in	electric /pes, vitchge power	al ear
Course enrolment requirements and entry competences required for the course	None						

	Students will be able to:				
	 specify the role of electrical power 	er switchgears in power system			
	- enumerate different electrical power	ver switchgear types			
	- define the currents relevant for di	mensioning the electrical nower swit	chaear		
Learning outcomes		mensioning the electrical power swit	engear		
expected at the level	specify the basic high voltage elements in the electrical power switch				
of the course (4 to	describe the basic faults in the electrical power switchgear				
10 learning	calculate the basic fault currente				
	- calculate the basic fault currents,				
outcomes)	system	its and voltages during basic faults in	i powei		
	system,	aanta in the algotrical newer switcher	oor		
	- Select the basic high voltage elen	nents in the electrical power switchig	ear, rol point		
	arounding	erent methods of power system neut	rai point		
	grounding.				
	Course content		hours		
	Role and functions of electrical power	r switchgears in power system	nours		
	Different electrical power switchgear	types Basic high voltage elements			
	and subsystems of electrical power's	witchgears (classification and	2		
	araphical symbols)	witchgears (classification and			
	Stresses of electrical power switcher	ar elements caused by electrical			
	current Basic faults Calculation of sy	mmetrical and unsymmetrical fault			
	currents using the method of symmet	rical components. Numerical	5		
	examples	incal components. Numerical			
	Influence of transformation to the uns	symmetrical currents distribution			
	Calculation of unsymmetrically loaded	d power transformer currents			
	Application of arrows that represent of	surrents in the case of basic	5		
	unsymmetrically loaded power transf	ormers Numerical examples			
	Equivalent short-circuit impedances of	of nower system elements			
	Numerical examples	power system ciements.	6		
	Analysis of typical short-circuit curren	t-time diagram			
	Short-circuit current components.				
Course content	Definitions and calculations of currents relevant for dimensioning of				
broken down in	electrical power switchgear elements (peak, thermal and breaking short-				
detail by weekly	circuit current).	(1-1-)			
class schedule	Voltage stresses of high voltage elect	trical power switchgear elements.			
(syllabus)	Standard nominal and highest voltage	es used in power system.			
	Overvoltages. Standard withstand vo	Itages and testing procedures.	4		
	Insulation coordination. Grounding of	power system neutral point.			
	Numerical examples.				
	Basic high voltage electrical power sv	witchgear elements.	7		
	Power transformer on load operation	(parallel operation, harmonics,	2		
	unsymmetrical loads). Examples.		2		
	Selection example of typical high volt	age elements in the electrical	2		
	power switchgear.		2		
	Typical system concepts and circuit c	configurations.	1		
	Basic elements of secondary systems	s in the electrical power	1		
	switchgear.		1		
	List of laboratory exercises		LE hours		
	Unsymmetrical load of two-winding po	ower transformers.	3		
	Unsymmetrical load of three-winding	power transformers.	3		
	Measurement of power transformer in	npedances.	3		
	Current transformer.		3		
	Calculation of fault currents and voltage	ges on a computer.	3		
	⊠ lectures	🛛 independent assignments			
	\square seminars and workshops				
Farmat (1) of the	⊠ exercises				
Format of instruction	□ on line in entirety				
	partial e-learning				
	☐ field work	└┘ (other)			

Student responsibilities	The presence on lectures in the amount of at least 70% of the times scheduled. Performed all required laboratory exercises and submitted all written reports with measurement and calculation results.						
Screening student	Class attendance	1,7	Research		Practical traini	ng	
work (name the proportion of ECTS	Experimental work		Report		Individual work	(3,0
credits for each activity so that the	Essay		Seminar essav		Laboratory exe	ercises	0,6
total number of ECTS credits is	Tests	0,2	Oral exam		Preparation fo laboratory exe	r rcises	0,4
value of the course)	Written exam	0,1	Project		(Other)		
Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks ecturing and the second one is after the next 6 weeks. Each midterm test consiss of 3 theoretical questions and 1 numerical problem. Each final test consists of heoretical questions and 2 numerical problems. In the final exams students that d not pass the midterm exams take part. The midterm and final exams are carried o as written tests. The requirement for passing grade is the positive assessment aboratory exercises with submitted all written reports and 50 % points on eac midterm exam or the final exam. Grade (in percentage) is formed according to the formula: Grade (%) = 0,05 NP + 0,05 LV + 0,45 (M1 + M2) the activities in percentage: NP – attendance at lectures, LV – laboratory assessment, M1, M2 – midterm test results. The final grade is determined as follows: 50 - 61 % sufficient (2) 62 - 74 % good (3) 75 - 87 % very good (4) 88 - 100 % excellent (5)						eeks of consists sts of 6 that did ried out ment of m each g to the
Desivined literature		Title)		Number of copies in the library	Availabi other r	lity via nedia
(available in the	T. Modrić: Autorizirana predavanja, FESB				e-lear por	ning tal	
media)	T. Modrić: Autorizira	ne audi	torne vježbe, FE	SB		e-lear por	ning tal
	I. Medić, E. Sutlović: za laboratorijske vje:	Električ žbe, Re	ćna postrojenja, u dak, Split, 2014.	upute		webknjiz	zara.hr
Optional literature (at the time of submission of study programme proposal) Quality assurance methods that ensure the acquisition of exit competences Other (as the	 H. Požar: Visokonaponska rasklopna postrojenja, Tehnička knjiga, Zagreb, 1990. K. Meštrović: Sklopni aparati srednjeg i visokog napona, Graphis, Zagreb, 2007. R. Milošević: Vakuumski električni sklopni aparati, Graphis, Zagreb, 2011. A. Dolenc: Transformatori, Sveučilište u Zagrebu, 1968. Evaluation of student presence on lectures Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers Institutional and non-institutional evaluations 					agreb, agreb, 2011.	
proposer wishes to	-						

NAME OF THE COURSE	POWER ELECTRONICS							
Code	FENA09	Year of study	3					
Course teacher	Dinko Vukadinović, Ph.D., Full Professor	Credits (ECTS)	6					
Associate teachers	Mateo Bašić, Ph.D. Assistant Professor Ivan Grgić, Assistant	Type of instruction (number of hours)	L 30	S 0	AE 0	LE 30	DE 0	
Status of the course	Obligatory	Percentage of application of e-learning	0					
	COURS	E DESCRIPTION						
Course objectives	Training students for: - understanding of basic pr - understanding of power c - analysis of rectifiers, inve	inciples of power electronic onverters operating princip rters and non-isolated DC-I	cs devi les DC cor	ces sv nvertei	vitching rs	,		
Course enrolment requirements and entry competences required for the course	Theory of Systems and Ma	thematics 3						
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1) define ways of power ele 2) explain the natural comm 3) analyze the operation of 4) make the simulation mod converter 5) make the simulation mod 6) make the simulation mod 7) calculate the power factor converter 8) specify ways of power ele	tudents will be able to:) define ways of power electronics devices switching) explain the natural commutation in phase-controlled rectifiers) analyze the operation of rectifiers, inverters and non-isolated DC-DC converters) make the simulation model of the natural commutation in the phase-controlled onverter) make the simulation model of the phase-controlled three-phase converter) make the simulation model of the buck non-isolated DC-DC converter) make the simulation model of the buck non-isolated DC-DC converter) calculate the power factor of the load connected to the electric grid via the power onverter						
	Course content				L hours	h	AE ours	
	Introduction and basic princ	ciples of power electronics	device	s	4			
	Ways of power electronics commutation	devices turning-off and nat	ural		2			
	Diode rectifiers				2			
	Thyristor-based converters				2			
	Power flow in electric grids and effects of current distor	with power electronics con rtion	verters	6	2			
Course content	AC converters				2			
broken down in	Inverters				4			
detail by weekly	Non-isolated DC-DC conve	erters			4			
class schedule	Direct AC-AC converters				2			
(syllabus)	electronics devices protecti	tronics devices and power			2			
	List of laboratory exercises						LE ours	
	Resistor and inductor with a	power electronics device ((simula	tion)			3	
	Natural commutation (simul	ation))		L .		3	
	Single-phase full-controlled (simulation)	bridge converter for the DC	moto ت	r supp	ыу		6	
	Three-phase full-controlled bridge converter (simulation and experiments)						6	
	Single-phase AC voltage co	nuoller (experiment)					0	

	Buck non-isolated DC	-DC co	nverter (simulation a	and ex	(periments)		6
	x lectures			x indepen	dent a	ssignments	·	
	□ seminars and worl	ksnops		M multime	dia	0		
Format of instruction				x laborato	ry			
				🗆 work wi	th mei	ntor		
	□ partial e-learning			□ (other)				
						<u> </u>		
student responsibilities	Performed all require	d labora	the amo atory exe	unt of at lea ercises.	ast 70	% of the time	es schedule	ed.
Screening student work (name the	Class attendance	1	Resear	ch		Practical tra	ining	
proportion of ECTS credits for each	Experimental work		Report			Individual w	ork	3
activity so that the total number of	Essay		Semina	r essay		Laboratory e	exercises	1
ECTS credits is	Midterm exams	0.3	Oral exam Auditory exercises				0.5	
value of the course)	Written exam	0.2	Project			(Other)		
Grading and evaluating student work in class and at the final exam	and the second after either theoretical or course which they did The requirement for (L) and the midterma more. The sum is cal Grade (%) = $0.25L +$ where the number of The students that do consists of 4 problem at least 50% points a the midterm exams a course. Subsequently Grade (%) = $0.25L +$ where I is the numbe The final grade for th 50% to 61% - Suffici 62% to 74% - Good 75% to 87% - Very g 88% 100% - Exceller	13 weel numeric d not pa passing s' grade culated 0.375(N points a o not pa ns. The achieved are pres y, the gr 0.75(I) r of poir e cours ent (2) (3) good (4) nt (5)	ks of lect cal. In the ss in the grade is es (M1 a as M1 + M2) achieved ss the m requiren d. In the ented wi rade is d ts achie e is dete	in each mi diderm ex that the s nd M2), ex in each mi didterm exa nent for a p final exam, th 4 problem etermined as f	dterm ms ta cositive the si ms follo inal w ollows	the laborator ed as a perce exam has to ke the final w e evaluation of tudents that of m the correspond ws:	be at least be at least written exar of the final did not pass ponding pa	s' grade 50% or 50%. m which exam is s one of irt of the %).
Required literature (available in the		Title	1			Number of copies in the library	Availabi other n	lity via nedia
library and via other media)	D. Vukadinović, Lj. K energetske elektronil	ulišić: P (e za šk	redavan	ja iz)13/14	1		e-learning	g portal
Optional literature	D. W. Hart: Power El	ectronic	s, wcgr	aw-⊓III, 201	١.		e-iearnin	y portai
(at the time of submission of study programme proposal)	N. Mohan, T. N. Und Applications, and De	eland, T sign, 3n	. N. Rob	bins, Powe n, John Wile	r Elec ey & S	tronics: Conv ons, 2003.	verters,	
	- Keeping records	of stude	ent atten	dance				
Quality assurance	- Annual analysis	of the pe	erforman	ce at midte	rm ex	ams and final	l exams	
the acquisition of	- Feedback from s	tudents	via surv	eys				
exit competences	- Self-evaluation o	f teache	ers					
	- Feedback from g	raduate	d studer	nts				
Other (as the proposer wishes to add)								

NAME OF THE COURSE	CONTROL ENGINEERIN	G					
Code	FENA10	Year of study	3				
Course teacher	Dinko Vukadinović, Ph.D., Full Professor	Credits (ECTS)	5				
Associate teachers	Mateo Bašić, Ph.D. Assistant Professor Ivan Groić, Assistant	Type of instruction (number of hours)	L 45	S 0	AE 0	LE 15	DE 0
Status of the course	Obligatory	Percentage of application of e-learning	0			1	
	COURS	E DESCRIPTION	-				
Course objectives	Training students for: - understanding of basic pr - stability analysis of contro - determination of performa	inciples of continuous and of systems ance indices of control sys	digital tems	contro	I syste	ms,	
requirements and entry competences required for the course	Theory of Systems and Ma	thematics 3					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able to: 1) classify control systems 2) design the analogue Pl of 3) carry out the system sta 4) apply absolute value opt parameters 5) determine performance controlled variable 6) calculate the transfer fur	upon different criterions controller bility of continuous and dig imum and symmetrical op indices of control systems nction of multi-loop system	gital con timum upon t	ntrol sy to dete he resj	vstems ermine ponse o	contoll of a	er's

	Course content						L hours	AE hours
	Basic concepts and t	erminol	ogy				2	
	System analysis in th	e time o	domain				1	
	Frequency character	istics of	systems	;			1	
	Frequency character	istics of	operatio	nal amplifie	ers		1	
	Frequency domain a	nalysis:	Nyquist	and Bode r	nethoo	ds	2	
	Multi-loop automatic	control	systems	Masson's	rule		2	
	DC machine as an ol	oject of	control				2	
	Stability of automatic	control	systems	;			1	
	Stability criterions by	Hurwitz	<u>z, Nyquis</u>	t, Bode and	d Khar	itonov	2	
	Performance indices	of auto	matic co	ntrol systen	ns		2	
	State-variable feedba	ack syst	ems				2	
	PID controller and er	igineerii	ng tuning	methods			2	
Course content	Root locus technique	•					2	
broken down in detail by weekly	Control system optim	isation	- absolut	e value opt	timum		2	
class schedule	Control system optim	isation	- symme	trical optim	um		2	
(syllabus)	Synthesis of linear sy	/stems of	of autom	atic control			3	
	Fundamentals of digi	tal cont	rol syste	ms			1	
	Z-transform, samplin	g proce	ss and d	igital contro	ol syste	ems	2	
	Digital PID controller						1	
	Sensitivity of control	systems	6				2	
	Experimental synthes	sis of a	cascade	speed-con	trol sy	stem of	2	
	Nonlinear automatic	control	systems	and metho	ds of		-	
	linearization						2	
	List of laboratory exe	rcises						LE hours
	Time response and B	ode ma	gnitude a	and phase	plots o	f PI cont	roller	4
	PI controller tuning ba	ased on	Ziegier-i	NICHOIS ME	thod			3
	Speed control system	of a se	narately	excited DC	: moto	r		4
	x lectures	0. 4 00	paratory		/ 111010			
	□ seminars and worl	kshops		x indepen	dent a	ssignme	nts	
	⊠ exercises			⊠ multime	edia			
Format of instruction	□ on line in entirety				ry the mean			
	□ partial e-learning				in mer	lior		
	□ field work							
Student responsibilities	The presence on lect Performed all require	tures in d labora	the amo atory exe	unt of at lea ercises.	ast 70	% of the	times schedul	ed.
Screening student	Class attendance	1.5	Resear	ch		Practica	al training	
proportion of ECTS	Experimental work		Report			Individu	al work	2
activity so that the	Essay		Semina	r essay		Laborat	ory exercises	0.5
total number of ECTS credits is	Midterm exams	0.3	Oral exa	am		Auditory	y exercises	0.5
equal to the ECTS value of the course)	Written exam	0.2	Project			(Other)		
Grading and evaluating student work in class and at the final exam	During the semester, and the second after either theoretical or course which they did The requirement for	, two mi 13 weel numeric d not pa passing	dterm ex <s lect<br="" of="">cal. In th ss in the grade is</s>	ams are he ures. Each e final exa midterm e s that the s	eld - th midter ms, st xams. um of	ne first af m exam oudents t the labo	iter 7 weeks o consists of 4 p ake those par ratory exercise	f lectures problems, rts of the es' grade
	(L) and the midterm more. The sum is cal	s' grade	es (M1 a as	nd M2), ex	press	ed as a	percentage, is	s 50% or

	Grade (%) = 0.25L + 0.375(M1 + M2)		
	where the number of points achieved in each midtern	n exam has to	be at least 50%.
	The students that do not pass the midterm exams to consists of 4 problems. The requirement for a positive at least 50% points achieved. In the final exam, the se the midterm exams are presented with 4 problems for course. Subsequently, the grade is determined as fol	ake the final v ve evaluation o students that o om the corres lows:	written exam which of the final exam is lid not pass one of ponding part of the
	Grade (%) = 0.25L + 0.75(I)		
	where I is the number of points achieved in the final w	written exam (a	at least 50%).
	The final grade for the course is determined as follow	/S:	
	50% to 61% - Sufficient (2) 62% to 74% - Good (3) 75% to 87% - Very good (4) 88% 100% - Excellent (5)		
Required literature (available in the	Title	Number of copies in the library	Availability via other media
media)	Vukadinović, D., "Predavanja iz Regulacijske tehnike za šk. god. 2013/14", FESB, Split, 2014.		e-learning portal
Optional literature (at the time of submission of study programme proposal)	Dorf, R.C.; Bishop, R.H.: Modern Control Systems, 12	2 th edition, Pre	entice Hall, 2011.
Quality assurance methods that ensure the acquisition of exit competences	 Keeping records of student attendance Annual analysis of the performance at midterm e. Feedback from students via surveys Self-evaluation of teachers Feedback from graduated students 	xams and fina	l exams
Other (as the proposer wishes to add)			

NAME OF THE COURSE	ELECTRICAL DISTRIBUT	TION NETWORKS					
Code	FENA15	Year of study	3				
Course teacher	Damir Jakus, Ph.D. Assistant Professor	Credits (ECTS)	4				
Associate teachers	losin Vasili, Ph D	Type of instruction	L	S	AE	LE	DE
Associate teachers	JUSIP VASIIJ, FTI.D.	(number of hours)	30			15	
Status of the course	Elective	Percentage of application of e-learning	30				
	COURS	E DESCRIPTION					
Course objectives	Training students for:						

	 Understanding the specifics related to the network struct and operation as well as network element construction Development of models for the distribution network analy stationary conditions Understanding the specifics related to the distribution network earthing Calculation of short circuit currents in distribution network Selection of network elements while respecting the techr and ability to propose measures for the network operatio Understanding the effects of distribution generation con conditions Deepening the basic knowledge in the field of electricity distribution 	ture, grid p ysis under twork neu ks nical requi on improve nection or transmiss	tral rements ments network
Course enrolment requirements and entry competences required for the course	None		
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: Identify the typical structures of the distribution networks and the with all their specifics Define the classic single line diagram and disposition of distribution Determine the equivalent circuits of distribution network element of calculations Perform the distribution network power flow and voltage conditions specialized software packages Simulate the impact of distributed generation connection on disconditions Parametrize the distribution network elements to ensure normation and system To carry out a techno-economic analysis of the excessive construction of the distribution network and to calculate 	neir compo ution subs nts for diff ions analy stribution r al network ed TS 10 sumption c ate energy	onents tations erent type sis using network operation 0.4 kV of reactive y losses
	Course content	L or S	AE
	 DISTIRIBUTION NETWORK POSITION AND ROLE IN ELECTRIC POWER SYSTEMS: production, transmission and distribution of electrical energy basic characteristics and differences of transmission and distribution networks 	2	nours
	 DISTIRBUTION NETWORK TOPOLOGY AND STRUCTURE: Middle voltage network structure Low voltage network structure 	2	
Course content broken down in	 DISTIRBUTION NETWORK SUBSTATIONS: Distribution substations Examples of real distribution substations 110/35 V, 35/10 kV and 10/0.4 kV 	2	
detail by weekly class schedule (syllabus)	 BASIC ELECTRIC PARAMETERS AND EQUVIVALNET SCHEMES FOR NETWORK ELEMENTS Symmetrical components system Physical interpretation of direct, inverse and zero system Calculation of element impedances Equivalent schemes 	2	
	 5. DISTRIBUTION NETWORK FAULT ANALYSIS (PART 1) Three phase fault Two phase fault Single phase faults Single phase faults in low voltage grid 	3	
	 6. DISTRIBUTION NETWORK FAULT ANALYSIS (PART 2) Transformer earthling options in middle voltage distribution networks Single phase faults 	2	

			1
- S	ingle phase faults in networks earthed using low-ohm		
res	sistors		
- gi	round faults in unearthed networks		
- E	xamples of fault analysis calculations		
- A	pproximate load flow calculations in radial distribution		
net	works		
- A	pproximate voltage drop calculations	2	
- R	ating power lines and transformers based on load flow and		
vol	tage drop calculations		
	xamples of load flow and voltage profile calculations		
8. LO	AD FLOW CALCULATION USING BACKWARD-		
	KWARD METHOD		
- F1	officiality activitients in radial distribution networks	3	
	and flow calculations in radial distribution networks		
- Lo	works		
9, 10	W VOLTAGE DISTRIBUTION NETWORKS (PART 1)		
- S	pecificities of low voltage distribution networks		
- Lo	ow voltage distribution network types based on earthing	2	
typ	e	2	
- Lo	oad modeling and load flow calculations		
- Lo	Dad TIOW / VOItage conditions calculations		
10. LO	w voltage DISTRIBUTION NETWORKS (PART 2)		
- P	anning and design of low voltage networks	2	
- N	etwork protection and fuse selection criteria	2	
- G	works		
11. AC	TIVE POWER/ENERGY LOSS CALCULATION		
- P	ower/energy loss classification		
- P	ower losses in transformers and power lines	2	
- E	nergy loss calculations using approximate approach and		
usi	ng load duration curve		
12. RE	ACTIVE POWER COMPENSATION		
- In	idividual/group/central/mixed compensation	2	
- P	ositive effects of reactive power compensation	_	
	imensioning of capacitors banks		
13. IM	PAUL OF DISTRIBUTED GENERATION CONNECTION		
- In - In	npact on network losses	2	
- In	npact on network protection	2	
- H	igher harmonics, voltage/current asymmetry, flickers		
14. DIS	STIRBUTION NETWORK OPERATION AND CONTROL		
- S	upervision, control, SCADA	2	
- N	etwork reliability and energy not served	2	
- M	ITU system		
List of lab	poratory or design exercises		LE or DE
			hours
1. Pi	reparing for the lab. Exercises and demonstration of sol	tware	2
to	ols used in exercises		_
2. Lo	bad flow / voltage conditions/ power losses analysis and		3
	ompensation of reactive power in the distribution networ	KS	
3.	ne preparatory exercise for the load flow calculations in	IOW-	3
VC	Dirage distribution networks		
4. Lo	ow-voltage distribution network project: load modeling /	ioad flow	
/\	voltage calculations, selection and rating of lines and		2
tra	ansionners, short circuit analysis, selection and compile		2
te	sung of ruses, ground resistance calculation and design	i oi poie	
	Numeu Substation 10/0.4 KV earthing (Part 1)	load flow	
5. L(voltage calculations: selection and rating of lines and	ioau now	
/\	ansformers, short circuit analysis, selection and complic	ance	2
to	esting of fuses, around resistance calculation and design		4
le	sumplies ruses, ground resistance calculation and design interference (Part 2) (10.01 ± 10.01)		
	1000000000000000000000000000000000000		

	 Analysis of d networks 	istribute	ed genera	ition coi	nnectior	on the distribution	3
Format of instruction	 ☑ lectures □ seminars and wor □ exercises □ on line in entirety □ partial e-learning □ field work 	kshops		⊠ inde ⊠ mult ⊠ labo □ wort	ependen timedia oratory k with m (othe	t assignments entor er)	
Student responsibilities	 The presence or Completed all re Completed and 	n lecture quired l graded s	es in the a aboratory seminar	amount / exerci work as	of at lea ses. signmei	ast 70 % of the times sc nt.	heduled.
Screening student	Class attendance	1	Researc	h		Practical training	
proportion of ECTS	Experimental work		Report			(Other)	1
activity so that the	Essay		Semina essay	r	0.5	(Other)	0.5
ECTS credits is	Tests	0.5	Oral exa	am		(Other)	
equal to the ECTS value of the course)	Written exam	0.5	Project			(Other)	
Grading and evaluating student work in class and at the final exam	During the semeste midterm exam will be the last week of sum given their seminar a exams and by comp and July, students c exams. Also, if the si then he is not oblige class subject is divide exams. Students who have subject by taking the The last chance to p the second part of th exam students have previous results in n positive mark is that positive mark is that positive mark from s The requirement for each part of the cour entire course subject evaluated seminar a of all activities accor Grade (%) = 0,3xG1 Grade (%) = 0,6xG wherein: • G1, G2 – points obtained • S – point given for • P – presence at leac The final grade is de Grade (%)	r there e in the mer ser assignm leting th an pass tudent p ed to re- ded into failed to e disciplin ass the ne autur to re-tal mid-term t the stu eminar a positive rse subject on dis ssignment ding to t +0,3xC +0,3xS tained for d during seminar ctures termine (%)	will be the eighth we mester. A ents. Stu- heir seming asses on take that o two par pass the nary exar subject is no exam ke whole n and fin ident has assignme e mark is ect during sciplinary ent. The f the formu- G2 + 0.3x + 0.1xP or each s g disciplir r assignme d as follo	wo midi eek of s a part dent ca part ca part (s) e part of ts acco e class m which s throug period. e class m which s throug period. at lease ent. s that th g midter y and c inal sco inal sco	term ex ummer t of labo n pass t gnment which t of class i the exa rding to after two n is orga h comm During overing ns. In a st 50% s me stude m and f ommiss ore (in per xP ciplinary	ams covering lectures. semester, and the seco pratory exercises studer he class by passing two s. In the two final exam hey didn't pass through materials through first fin m in the second final ex- o separation defined for o final exams can try to nized in first part of autu- ission exam which will b the disciplinary and con both subject parts regar utumn term the require success on the exam a ant has at least 50% poin ion exam), as well as ercentage) is formed on and commission exam ng midterms and(or) fin ssion exam	The first nd one in hts will be o midterm s in June o midterm hal exam, xam. The midterm pass the umn term. be held in mmission rding their ement for is well as bints from hts for the positively the basis) hal exams
	62 % do 74 75 % do 87 88 % do 10	4 % 7 % 00 %	gc ve ex	od(3) ery good cellent((4) 5)		

	Exam terms: The first and second final exam: June / July The disciplinary and commission exam: Augu Under the Article 65 of the Faculty Statute, the studer forms of teaching and attend: lectures at least 70% o exercises 100% of scheduled time. If you do not meet will not be able to take the examination.	st / September nt is required to f scheduled tim these requirem	o participate in all le and laboratory ents, the student
Required literature	Title	Number of copies in the library	Availability via other media
(available in the library and via other	Goić R., Jakus D., Penović I.: Distribucija električne energije – interna skripta, FESB, 2014,		e-learning
media)	Goić, R. – Upute za energetske proračune u niskonaponskoj distributivnoj mreži (2009), Split, FESB		e-learning
Optional literature (at the time of submission of study programme proposal)	 E. Lakaervi, E.J. Holmes: Electricity Distribution Peregrinus Lt, 1989. Abdelhay A. Sallam, Om P. Malik:Electric Distribution Press, 2011. Dale R. Patrick, Stephen W. Fardo: Electrical Distribution Press, 2009. E. Lakaervi, E.J. Holmes: Electricity Distribution N Peregrinus Lt, 1989. William H. Kersting: Distribution System Modeling 2002. Programski paket PowerCAD, upute za rad (2009), S 	Network Desig ution Systems, tribution Syster Network Desigr g and Analysis, 9), Split, FRAC	n, Peter Wiley-IEEE ms, The n, Peter CRC Press, TAL d.o.o. d.o.o.
Quality assurance methods that ensure the acquisition of exit competences	 Keeping records of student class attendance Annual review of the exam success Feedback from students via surveys Self-evaluation of teachers Feedback on the subject relevance from the form graduated 	er students wh	o have already
Other (as the proposer wishes to add)			

NAME OF THE COURSE	MARINE ELECTRICAL E	NGINEERING					
Code	FENA20	Year of study	3.				
Course teacher	Slavko Vujević, Ph.D., Full Professor	Credits (ECTS)	4				
Associate teachers		Type of instruction	L	s	AE	LE	DE
Associate teachers		(number of hours)	30	0	0	15	0
Status of the course	Elective	Percentage of application of e-learning			0		
	COURSE	DESCRIPTION					
Course objectives	Training students for under - marine electrical device - marine electrical equip	standing and application of es and systems, ment,	of spec	ialized	knowl	edge	of:

	- marine electrical	installa	tions.					
Course enrolment requirements and entry competences required for the course	None							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	Students will be able - describe the bas - describe the bas distribution, - describe the bas - describe high vo - define safety rule - compare the fea - use the normativ - apply the require national maritime	e to: ic princi ic princi ltage po es for w tures of re docur ements of admin	iples of s iples of s ower syst orking wi marine p ments in of classifi istrations	hip's ele hip's ele em on s th elect oower sy the fielo cation s	ectric po ectric po ships, rical equ ystems I of mari	ower generation, ower transmission and ower consumption, uipment on ships, and terrestrial power ine electrical enginee s and the requirement	d syste ring, ts of	ems,
	Course content						Lh	ours
	Specific features of t power generation.	he ship'	s electric	power	system	. Marine electric		2
	Marine electric propu	ulsion.	<u> </u>					4
	Marine electric powe	r transn	nission a	nd distri	ibution.			6
	Marine electric powe	on consu	mption.					4 2
	Ship's high voltage e	electric p	ower sys	stem.				4
Course content broken down in detail by weekly	The dangers of elect working with electric ships.	ricity. P al equip	rotection ment. Sa	and sat fety and	fety mea d securi	asures when ty measures on		2
class schedule (syllabus)	Standardization of m Requirements of clas maritime administrat	arine el ssificatio ions.	ectrical e on societi	ngineer es and	ring thro requirer	ough IEC and ISO. ments of national		2
	Two midterm exams							
	List of laboratory exe	ercises	ation				LE	nours
	Marine electric powe	lsion	alion					<u>১</u> ৭
	Marine electric powe	r transn	nission a	nd distr	ibution			3
	Marine electric powe	r consu	mption					3
	Safety and security r	neasure	es on ship	os				3
Format of instruction	 lectures seminars and wor exercises on line in entirety partial e-learning field work 	kshops		□ inde ⊠ mult ⊠ labo □ worl	ependen timedia pratory k with m (othe	t assignments entor er)		
Student	Attendance on lectur	es in th	e amoun	t of at le	east 70 9	% of the times sched	uled.	
responsibilities	Performed all require	ed labor	atory exe	ercises.				
work (name the	Class attendance	1.5	Researc	h		Practical training		17
credits for each	Essay		Seminal			Laboratory exercises	S	0.4
total number of ECTS credits is	Tests	0.2	essay Oral exa	am		Preparation for		0.1
equal to the ECTS value of the course)	Written exam	0.1	Project			(Other)		
Grading and evaluating student work in class and at the final exam	There are two midten entire exam. In the two pass in the prelimina two course parts, that	rm exan wo final iry exan at cours	ns. After exams st ns. If in th e part the	two mid tudents he first f e studer	term ex take co inal exa nt does r	ams, student can pas urse parts that they c m student passes on not have to take in the	ss the lid no e of t e sec	e ot he cond

	 final exam. The requirement for a positive evaluation student has completed at least 50 % points from that (in percentage) can be calculated using the formula: Grade (%) = 0.1*LV + 0.45*(G1 + G2) where activities in percentage are: LV - laboratory as the first course part, G2 - points from the second cou Students who did not pass the entire exam after two fexam in the additional exams. In the two additional ex course. The requirement for a positive assessment of the student has completed at least 50 % points from from grade (in percentage) can be calculated using the for Grade (%) = 0.1*LV + 0.9*G where activities in percentage are: LV - laboratory as entire course. The final grade can be calculated as follows: 50 % to 61 % - pass (2) 62 % to 74 % - good (3) 75 % to 87 % - very good (4) 88 % to 100 % - excellent (5) Each of the midterm exams consists of ten theoretica and two additional exams consist of twenty theoretica 	of the course course part. T sessment, G1 rse part. final exams ca xams students f the additiona the entire cour mula: sessment, G -	part is that the The final grade - points from an pass the take the entire I exams is that rse. The final points from the wo final exams
Required literature	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	Title Vujević, S., "Predavanja iz predmeta Brodska elektrotehnika (113)", Sveučilište u Splitu, FESB, Split, 2014. (lecture notes – electronic version)	Number of copies in the library	Availability via other media e-learning portal
Required literature (available in the library and via other media)	TitleVujević, S., "Predavanja iz predmeta Brodska elektrotehnika (113)", Sveučilište u Splitu, FESB, Split, 2014. (lecture notes – electronic version)Milković, M., "Brodski električni strojevi i uređaji", Sveučilište u Dubrovniku, Dubrovnik, 2005.	Number of copies in the library	Availability via other media e-learning portal
Required literature (available in the library and via other media) Optional literature (at the time of submission of study programme proposal)	Title Vujević, S., "Predavanja iz predmeta Brodska elektrotehnika (113)", Sveučilište u Splitu, FESB, Split, 2014. (lecture notes – electronic version) Milković, M., "Brodski električni strojevi i uređaji", Sveučilište u Dubrovniku, Dubrovnik, 2005. • Hall, D.T., "Practical Marine Electrical Knowledge Witherby & Co Ltd, 1999. • McGeorge, H.D., "Marine Electrical Engineering a Edition", Butterworth-Heinemann, 1993. • Skalicki, B. i Grilec, J., "Brodski električni uređaji" Zagreb, 2000.	Number of copies in the library 5 e - Second Rev and Practice - ', Sveučilište u	Availability via other media e-learning portal vised Edition", Second zagrebu, FSB,
Required literature (available in the library and via other media) Optional literature (at the time of submission of study programme proposal) Quality assurance methods that ensure the acquisition of exit competences	TitleVujević, S., "Predavanja iz predmeta Brodska elektrotehnika (113)", Sveučilište u Splitu, FESB, Split, 2014. (lecture notes – electronic version)Milković, M., "Brodski električni strojevi i uređaji", Sveučilište u Dubrovniku, Dubrovnik, 2005.• Hall, D.T., "Practical Marine Electrical Knowledge Witherby & Co Ltd, 1999.• McGeorge, H.D., "Marine Electrical Engineering a Edition", Butterworth-Heinemann, 1993.• Skalicki, B. i Grilec, J., "Brodski električni uređaji" Zagreb, 2000.• Evaluation of results in accordance with the abov • Feedback from students via surveys • Self-evaluation of teachers • Institutional and non-institutional evaluations	Number of copies in the library 5 e - Second Ret and Practice - ', Sveučilište u re learning out	Availability via other media e-learning portal vised Edition", Second zagrebu, FSB, comes

NAME OF THE COURSE	ELECTROMAGNETIC FIELDS								
Code	ELA32 Year of study 3								
Course teacher	Dragan Poljak, Ph.D., Full Professor	II Credits (ECTS) 5							
Associate teachers	Anna Šužniara	Type of instruction		S	AE	LE	DE		
Associate teachers	Anna Sushjala	(number of hours)	30	0	15	15			

Status of the course	Obligatory	Percentage of application of e-learning	0						
COURSE DESCRIPTION									
Course objectives	 Training students for: Understanding and apply fundamental principles and laws of electromagnetism, Formulating and solve simple problems in static, quasistatic and dynamic fields, Permanent adopting and fostering the knowledge in electromagnetics, Applying anaytic and numerical methods to solve engineering problems involving elektromagnetic waves and elektromagnetic radiation 								
Course enrolment requirements and entry competences required for the course	Mathematics 2 and and 2	Mathematics 2 and 3, Physics 2, Fundamental of Electrical Engineering 1 and 2							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Define fundamental notions, quantities, and laws of electromagnetic fields, Apply fundamental laws of electromagnetic theory for calculation of basic quantities of electromagnetic fields Apply methods an dtechniques suitable for handling problems in propagation electromagnetic waves and radiation of electrically short antennas, Mathematically formulate simple cases of plane wav epropagation and radiation from electrically small antennas, Analyze simple transmission lines, grounding electrodes, antennas Calculate parametars of simple transmission lines, grounding electrodes, antennas Develop simple codes and use commercial software packages for propagation and radiation problems 								
	Course content			L or S hours 2	AE hours 1				
	Electrical properties of materials, isotropy, linearity,				1				
	Maxwell's equations in differential form. Maxwell's equations in integral form.				1				
	Maxwell's equations for special cases. Media classification and application of approximations depending on frequency range				1				
	Continuity conditions.			2	1				
	Poynting vector. Poynting theorem. Complex Poynting vector for time-harmonic fields.				1				
Course content	Electromagnetic potential solutions for potentials.	s. Wave equations an	d paticar	2	1				
detail by weekly	Electrostatic fields. Gree Poisson equation. The field	n theorems. General so l of a point charge.	olution of	2	1				
(syllabus)	Magnetostatic field. Stationary and quasistationary currents. Magnetic scalar and vector potentials. Biot-Savart law. Self inductance and mutual inductance.				1				
	Solution methods of electromagnetic phenomena. Analytical methods.				1				
	Image theory method. Typical examples. Separation of variables. Typical examples.				1				
	Numerical methods: Finite Difference Method. Method of Moments. Finite Element Method. Typical examples.				1				
	Plane wave. Plane wave propagation in lossless media and lossy media. Electromagnetic radiation. Hertz dipole.2				1				
	List of laboratory or design exercises				LE or DE hours				
	ield and potential inside a capacitor. (plate, cylindrical and spherical 3 apacitor)								

Spatial charge distribution – Poisson equation. 2							2	
	Field an dpotential of a point charge.						2	
	Magnetic field of infinite conductor and infinite cable.						2	
	Propagation of EM wave in a dielectric medium.						2	
	Radiation of electromagnetic field of a short dipole						2	
							-	
Format of instruction	 □ seminars and workshops □ independent assignments □ multimedia □ aboratory □ partial e-learning □ field work □ field work □ independent assignments □ multimedia □ work with mentor □ (other) 							
Student responsibilities								
Screening student work (name the	Class attendance	2	Researc	h		Practical trainin	ng	
proportion of ECTS credits for each	Experimental work		Report			(Other)		2,2
activity so that the	Essay		Seminar			(Other)		0,2
ECTS credits is	Tests	0,2	Oral exa	ım		(Other)		0,2
value of the course)	Written exam	0,2	Project			(Other)		
Grading and evaluating student work in class and at the final exam	lecturing and the second one is after the next 6 weeks. Each midterm test (120 mi in duration) consists of 3 questions (each containing theoretical part and sho numerical problem) and 2 longer numerical problems. The requirement for passin grade is the positive assessment of laboratory exercises and 50 % points on eac midterm. Grade (in percentage) is formed according to the formula: Grade(%) = 0,5 (M1 + M2) where M1 and M2 are the midterm test results, and is determined through following percentage score: Percentage score: From 50% to 62% sufficient (2) From 63% to 75% good (3) From 76% to 88% very good (4) From 89% to 100% excellent (5) Students who do not pass midterm exams are obliged to pass final test (150 min i) min in s (each	
	problems. The requirement for passing grade is 50 % points. Final grade is form according to the described procedure. The midterm and final exams are carried as written tests.						formed ried out	
Required literature		Title	9			copies in the library	other n	nedia
library and via other media)	D.Poljak, Teorija primjenama u inženj	elektr erstvu,	o <i>magnets</i> Šk. knjiga	s <i>kih p</i> Zagret	olja s o, 2014.			
	D.Poljak i dr., <i>Model</i> <i>računala</i> , Kigen Zag	<i>iranje ži</i> reb 200	ičanih ant 9.	ena prii	mjenom			
Optional literature (at the time of submission of study	 D. Poljak, Advanced Modeling in Computational Electromagnetic compatibility, Wiley Interscience, New York 2007. Z. Haznadar, Ž. Štih: Elektromagnetizam, Školska knjiga, Zagreb 1997. 							

programme proposal)	 S. Ratnajeevan, H. Hoole, P. Ratnamahilan, P. Hoole: A Modern Short Course in Engineering Electromagnetics, Oxford University Press, 1996. S.M.Wentworth: Fundamentals of Electromagnetics with Engineering Applications, Wiley, 2005
Quality assurance methods that ensure the acquisition of exit competences	 Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers Institutional and non-institutional evaluations
Other (as the proposer wishes to add)	

NAME OF THE COURSE	DIGITAL SIGNAL PROCESSING							
Code	FELA29	Year of study	3.					
Course teacher	Dinko Begušić, Ph.D., Full Professor	Credits (ECTS)	5					
Associate teachers	Maja Stella, Ph.D., Assistant Professor	Type of instruction (number of hours)	L 30	S 0	AE 15	LE 15	DE 0	
Status of the course	Obligatory:114 (Elective: 111, 112, 120)	Percentage of application of e-learning						
	COURSE	DESCRIPTION						
Course objectives	 I raining students for: - understanding and application of basic concepts and methods of digital signal processing, - application of methods for analysis and synthesis of discrete time signals and systems, - application and design of digital filters, - permanent adoption and deepening of the knowledge in the area of digital signal processing. 						al d gnal	
Course enrolment requirements and entry competences required for the course	None							
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	 Students will be able to: define the basic concepts and methods for analysis of discrete time signals and systems, apply the the methods for frequency analysis of signals and systems defined in the discrete time domain, apply the linear integral transforms for discrete time signals and systems analysis and synthesis, apply and design digital FIR and IIR filters, understanding of the basic methods of adaptive signal processing. 							

	- peroform analysis a software environme	and syn ent (MA	thesis of TLAB).	disrete	signals	and system	is by using	g standard
	Course content						L or S	AE
	The basic concents of discrete time signals and systems						nours	nours 1
	I ne basic concepts of discrete time signals and systems.							1
	Analysis of linear time invariant systems.						2	1
	Application of the z-transform in the analysisi of discrete time							1
	Frequency analysis of discrete time signals and systems							1
	Discrete Fourier transform (DET)						2	1
	Fast Fourier transfor	m (FFT).				2	1
Course content	Implementation and	applica	tion of dis	crete ti	me svst	ems.	2	1
broken down in	Analysis and synthe	sis of di	screte tin	ne svste	ems.		2	1
detail by weekly	Digital filter structure	es.		ie eyete			2	1
class schedule	Design of FIR filters						2	1
(syllabus)	Design of IIR filters						2	1
	Adaptive signal proc	essina	methods	and and	lication	9	2	1
	Adaptive signal proc	cooling	nethous		Jication	5.		I E or DE
	List of laboratory or	design e	exercises					hours
	Generation and pres	entation	of discre	te time	domain	signal.		2
	Linear time invariant	system	s in discre	ete time	domair	۱.		2
	Analysis of inear time	e invaria	int syster	ns using	g z-trans	sform.		2
	Application of DFT in	linear f	iltering.			<u>arlan aava </u>		2
	Linear filtering of long signal sequences using the overlap-save n						netnoa.	2
	Design of IIR filters							2
	⊠ lectures							_
	□ seminars and workshops							
	⊠ exercises							
Format of instruction	\square on line in entirety							
	□ partial e-learning							
	□ field work							
Student								
responsibilities								
Screening student	Class attendance	1,5	Researc	:h	-	Practical tra	aining	-
proportion of ECTS	Experimental work	-	Report		-	Individual v	vork	2,2
activity so that the	Essay	-	Seminal essay		-	Laboratory exercises		0,5
ECTS credits is	Tests	0,2	Oral exa	ım	-	Preparation for laboratory exercises		0,5
value of the course)	Written exam	0,1	Project		-	(Oth	ner)	
Grading and evaluating student work in class and at the final exam	There are two midterms and final exams. The first midterm exam is after 7 weeks of lecturing and the second one is after the next 6 weeks. Each midterm and final test consists of 10 theoretical questions and numerical problems. The duration of each test is 2 school hour. In the final exams students that did not pass the midterm exam take part. The midterm and final exams are carried out as written tests. The requirement for passing grade is the positive assessment of laboratory exercises, the seminar exercise and 50 % points on each midterm exam or the final exam. The continuous knowledge assessment grade (in percentage) is formed according to the formula: Grade(%) = 0,05 NP + 0,15 LV + 0,4 (M1 + M2) the activities in percentage:					7 weeks of d final test on of each erm exams tests. The ercises, the exam. The ding to the		
	• NP - attendance at lectures,							

	 LV – laboratory assessment, M1, M2 – test results. The final grade is based on the grade of the continuous knowledge assessment grade and the oral part of the final exam. The students whose grade may be formed without the need for the oral part of the final exam may not be obliged to attend the oral part of the final exam and one additional term for the make up exam. There are two terms for the final exam and one additional term for the make up exam. The requirement for attendance of the final exam or the make up exam is the passing grade for all laboratory excercises and submitted seminar excercis work. At the final exam the student writes the test from the area of the miterm exam(s) which has/have not been succesfully passed before. At the make up exam the student writes the test						
Required literature (available in the	Title	Number of copies in the library	Availability via other media				
library and via other media)	D.Begušić: Digital signal processing, handouts, FESB, 2016.		e-learning portal				
Optional literature (at the time of submission of study programme proposal)	 I I I Martin Vetterli, Jelena Kovačević, Goyal Vivek K: Foundations of Signal Processing, Cambridge University Press, 2014 Proakis, J.G., Manolakis, D.G.: Digital Signal Processing: Principles, Algorithms, and Applications, Prentice Hall, 1996 Havkin, S.: Adaptive Filter Theory, Prentice Hall, 1996 						
Quality assurance methods that ensure the acquisition of exit competences	 Evaluation of results in accordance with the above learning outcomes Feedback from students via surveys Self-evaluation of teachers Institutional and non-institutional evaluations 						
Other (as the proposer wishes to add)							