



COURSE SYLLABUS

General information

Course title:	English Language I (1/2), English language I (2/2)
ISVU course code:	170165 (SZ108) / 170167(SZ208)
Course instructor:	Mirjana Cibulka, mag.educ.philol.angl. et ital, lecturer
Course assistant:	/
Study programme and specialization in which the course is taught:	Safety and Protection at Work
ECTS credits:	3
Semester of the course execution:	I, II
Exam prerequisites:	/
Course objectives:	Development of productive and receptive language skills (listening, speaking, reading and writing) and expansion of language and grammatical structures (vocabulary, communication samples, phonological and orthographic characteristics) as well as development of general vocabulary and phraseology related to Safety and Protection; learning competencies necessary for life-long learning, that is, learning to communicate in the conditions of increased international mobility and unstable labour market, motivating independent learning and raising awareness of intercultural aspects

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	15	attendance 80 %
Exercises (auditory, linguistics):	15	
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	30	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Expose oral/presentations	Continuous revision (blitztests, term papers)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10	During the academic year
Outcome 2	Form a simple text on the subject-matter	10	10	20	10	



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	related to the profession and/or personal interest on the basis of given information					
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest	10	10	20	10	
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10	
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	10	10	20	10	
Total % grade points		50 %	50 %	100 %	50 %	
Share in ECTS		1.5	1.5	3		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10
Outcome 2	Form a simple text on the subject-matter related to the profession and/or personal interest on the basis of given information	10	10	20	10
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest		20	20	10
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	20		20	10
Total % of grade points		50 %	50 %	100 %	50 %
Share in ECTS		1,5	1,5	3	



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Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Safety	1, 3	Safety – introduction, course presentation, definitions of safety, measures and risks	2
2.	Safety at Work	1, 3	Safety at Work – reading and translating, analysis of unfamiliar words, Word Families	2, 5
3.	Machine Safety	1, 4	Machine Safety – asking questions, answering questions, reading and analysis, synonyms and antonyms	2,3,5
4.	Noise Protection - Tenses I	1, 4	Noise Protection – translation, highlighting language structures in professional texts, forming dialogues, tense revision	2, 3, 5
5.	Vibration	1, 2	Vibration – vocabulary, reading new words and expressions, explaining their meaning	3, 4
6.	Heating	1, 3	Heating – reading and translating, possessives'	4, 5
7.	Heating II, Noun plural	1, 4	Heating II - Outdoor and Indoor Heating, noun plural	2, 3, 5
8.	Lighting	1, 3	Lighting – reading and translating, types of lighting systems, discussion on the importance of good lighting	2, 5
9.	Ventilation	1, 2	Ventilation – vocabulary, explaining words and expressions	3
10.	Electricity Safety, Tenses II	1, 4	Electricity Safety – reading and translating, introducing a dialogue on protection against electric shock, tense revision	2, 3, 5
11.	Explosions I	1, 3	Explosions – reading and translating, vocabulary	4, 5
12.	Explosions II	1	Explosions II – questions and answers in oral and written form	2
13.	Safety in Transportation I, Tenses III	1	Safety in Transportation – discussion on safety in transportation, types of car accidents, tense revision	2, 3, 4
14.	Safety in Transportation	1, 3	Safety in Transportation II – analysing traffic signs, developing a dialogue on pedestrian and cyclists safety in traffic	2
15.	1st term paper		2nd term paper	

References (compulsory / additional)

Compulsory: Horvatić, Miroslav, English for Safety Engineers, Karlovac University of Applied Sciences, 2008
Suggested: Eastwood, Oxford Guide to English Grammar, 1994.;
<https://www.perfect-english-grammar.com/grammar-exercises.html>
Safety and Health Magazine (online)
<https://www.safetyandhealthmagazine.com/>



COURSE SYLLABUS

General information

Course title:	English Language I (1/2), English language I (2/2)
ISVU course code:	170225 (ISZ105) / 170226 (ISZ207)
Course instructor:	Mirjana Cibulka, mag.educ.philol.angl. et ital, lecturer
Course assistant:	/
Study programme and specialization in which the course is taught:	Safety and Protection at Work
ECTS credits:	3
Semester of the course execution:	I, II
Exam prerequisites:	/
Course objectives:	Development of productive and receptive language skills (listening, speaking, reading and writing) and expansion of language and grammatical structures (vocabulary, communication samples, phonological and orthographic characteristics) as well as development of general vocabulary and phraseology related to Safety and Protection; learning competencies necessary for life-long learning, that is, learning to communicate in the conditions of increased international mobility and unstable labour market, motivating independent learning and raising awareness of intercultural aspects

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	15	attendance 60 %
Exercises (auditory, linguistics):	15	
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	30	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Expose oral/presentations	Continuous revision (blitztests, term papers)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10	During the academic year
Outcome 2	Form a simple text	10	10	20	10	



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	on the subject-matter related to the profession and/or personal interest on the basis of given information					
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest	10	10	20	10	
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10	
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	10	10	20	10	
Total % grade points		50 %	50 %	100 %	50 %	
Share in ECTS		1.5	1.5	3		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10
Outcome 2	Form a simple text on the subject-matter related to the	10	10	20	10



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	profession and/or personal interest on the basis of given information				
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest		20	20	10
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	20		20	10
Total % of grade points		50 %	50 %	100 %	50 %
Share in ECTS		1,5	1,5	3	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Safety	1, 3	Safety – introduction, course presentation, definitions of safety, measures and risks	2
2.	Safety at Work	1, 3	Safety at Work – reading and translating, analysis of unfamiliar words, Word Families	2, 5
3.	Machine Safety	1, 4	Machine Safety – asking questions, answering questions, reading and analysis, synonyms and antonyms	2,3,5
4.	Noise Protection - Tenses I	1, 4	Noise Protection – translation, highlighting language structures in professional texts, forming dialogues, tense revision	2, 3, 5
5.	Vibration	1, 2	Vibration – vocabulary, reading new words and expressions, explaining their meaning	3, 4
6.	Heating	1, 3	Heating – reading and translating, possessives'	4, 5
7.	Heating II, Noun plural	1, 4	Heating II - Outdoor and Indoor Heating, noun plural	2, 3, 5
8.	Lighting	1, 3	Lighting – reading and translating, types of lighting systems, discussion on the importance of good lighting	2, 5
9.	Ventilation	1, 2	Ventilation – vocabulary, explaining words and expressions	3
10.	Electricity Safety, Tenses II	1, 4	Electricity Safety – reading and translating, introducing a dialogue on protection against electric shock, tense revision	2, 3, 5
11.	Explosions I	1, 3	Explosions – reading and translating, vocabulary	4, 5
12.	Explosions II	1	Explosions II – questions and answers in oral and written form	2
13.	Safety in Transportation I, Tenses III	1	Safety in Transportation – discussion on safety in transportation, types of car accidents, tense revision	2, 3, 4



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14.	Safety in Transportation	1, 3	Safety in Transportation II – analysing traffic signs, developing a dialogue on pedestrian and cyclists safety in traffic	2
15.	1st term paper		2nd term paper	

References (compulsory / additional)

Compulsory: Horvatić, Miroslav, English for Safety Engineers, Karlovac University of Applied Sciences, 2008
Suggested: Eastwood, Oxford Guide to English Grammar, 1994.;
<https://www.perfect-english-grammar.com/grammar-exercises.html>
Safety and Health Magazine (online)
<https://www.safetyandhealthmagazine.com/>



COURSE SYLLABUS

General information

Course title:	English Language II (1/2), English language II (2/2)
ISVU course code:	170168 (SZ308) / 170170 (SZ408)
Course instructor:	Mirjana Cibulka, mag.educ.philol.angl. et ital, lecturer
Course assistant:	/
Study programme and specialization in which the course is taught:	Safety and Protection at Work
ECTS credits:	3
Semester of the course execution:	III, IV
Exam prerequisites:	English language I
Course objectives:	Development of productive and receptive language skills (listening, speaking, reading and writing) and expansion of language and grammatical structures (vocabulary, communication samples, phonological and orthographic characteristics) as well as development of general vocabulary and phraseology related to Safety and Protection; learning competencies necessary for life-long learning, that is, learning to communicate in the conditions of increased international mobility and unstable labour market, motivating independent learning and raising awareness of intercultural aspects

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	15	attendance 80 %
Exercises (auditory, linguistics):	15	
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	30	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Expose oral/presentations	Continuous revision (blitztests, term papers)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10	During the academic year
Outcome 2	Form a simple text on the subject-matter	10	10	20	10	



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	related to the profession and/or personal interest on the basis of given information					
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest	10	10	20	10	
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10	
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	10	10	20	10	
Total % grade points		50 %	50 %	100 %	50 %	
Share in ECTS		1.5	1.5	3		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10
Outcome 2	Form a simple text on the subject-matter related to the profession and/or personal interest on the basis of given information	10	10	20	10
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest		20	20	10
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	20		20	10
Total % of grade points		50 %	50 %	100 %	50 %
Share in ECTS		1.5	1.5	3	



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Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Personal Protective Equipment	1	reading and translating, vocabulary analysis	4, 5
2.	General Hand Protection	1	reading and translating, collocations	4, 5
3.	Ecology	1, 5	text analysis, discussion on environmental protection	2, 3
4.	Environmental Pollution	1, 5	Environmental Pollution – Conditional exercises	4, 5
5.	Air Pollution	1, 2	text analysis, discussion on air pollution, conditional exercises	3, 4, 5
6.	Water Pollution	1, 3	reading and translating, vocabulary	4, 5
7.	Writing an abstract	1, 2	How to write an abstract, bad/good examples, rules, writing	1, 2
8.	Pollution Control	1, 3	reading and translating, discussion	3, 5
9.	Soil Pollution, Introducing reported speech	1, 2	vocabulary, explaining words and expressions, reported speech exercises	3
10.	Waste Disposal	1, 4	reading and translating, introducing a dialogue on waste disposal	3, 5
11.	Fire, Fire Properties	1, 3	reading and translating, vocabulary	4, 5
12.	Fire Prevention, Fire Extinguisher	1	questions and answers in oral and written form	2
13.	First Aid	1	discussion, text analysis, vocabulary	3, 5
14.	Flood	1, 3	Discussion on floods, experience in Croatia and the world	2, 3
15.	1st term paper (January)		2nd term paper (June)	

References (compulsory / additional)

Compulsory: Horvatić, Miroslav, English for Safety Engineers, Karlovac University of Applied Sciences, 2008
Suggested: Eastwood, Oxford Guide to English Grammar, 1994.;
<https://www.perfect-english-grammar.com/grammar-exercises.html>
Safety and Health Magazine (online)
<https://www.safetyandhealthmagazine.com/>



COURSE SYLLABUS

General information

Course title:	English Language II (1/2), English language II (2/2)
ISVU course code:	170227 (ISZ307) / 170228 (ISZ407)
Course instructor:	Mirjana Cibulka, mag.educ.philol.angl. et ital, lecturer
Course assistant:	/
Study programme and specialization in which the course is taught:	Safety and Protection at Work
ECTS credits:	3
Semester of the course execution:	III, IV
Exam prerequisites:	English language I
Course objectives:	Development of productive and receptive language skills (listening, speaking, reading and writing) and expansion of language and grammatical structures (vocabulary, communication samples, phonological and orthographic characteristics) as well as development of general vocabulary and phraseology related to Safety and Protection; learning competencies necessary for life-long learning, that is, learning to communicate in the conditions of increased international mobility and unstable labour market, motivating independent learning and raising awareness of intercultural aspects

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	15	attendance 60 %
Exercises (auditory, linguistics):	15	
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	30	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Expose oral/presentations	Continuous revision (blitztests, term papers)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10	During the academic year
Outcome 2	Form a simple text on the subject-matter	10	10	20	10	



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	related to the profession and/or personal interest on the basis of given information					
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest	10	10	20	10	
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10	
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	10	10	20	10	
Total % grade points		50 %	50 %	100 %	50 %	
Share in ECTS		1.5	1.5	3		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Extract required information from written and/or listened speech of the related profession	10	10	20	10
Outcome 2	Form a simple text on the subject-matter related to the profession and/or personal interest on the basis of given information	10	10	20	10
Outcome 3	Discuss on subject-matter related to the profession as well as personal interest		20	20	10
Outcome 4	Distinguish word types and grammatical structures in English	10	10	20	10
Outcome 5	Connect appropriate language and grammatical structures in mother tongue and in English	20		20	10
Total % of grade points		50 %	50 %	100 %	50 %
Share in ECTS		1.5	1.5	3	



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Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Personal Protective Equipment, General Hand protection	1	reading and translating, vocabulary analysis, collocations	2, 4, 5
2.	Ecology	1, 4	text analysis, discussion on environmental protection	2, 3
3.	Environmental Pollution	1, 4	text analysis, discussion, voc. translation	2, 3, 5
4.	Air Pollution	1, 2	reading and translating, conditionals	3, 4, 5
5.	Water Pollution	1, 3	text analysis, discussion, conditional exercises	4, 5
6.	Writing a motivation letter	2	Writing a motivational letter	2
7.	Pollution Control	1, 3	reading and translating, vocabulary analysis,	3, 5
8.	Reported Speech	4, 5	Grammar exercises	4, 5
9.	Soil Pollution	1, 2	vocabulary, explaining words and expressions, reported speech exercises	3
10.	Waste Disposal	1, 4	reading and translating, introducing a dialogue on waste disposal	3, 5
11.	Fire, Fire Properties	1, 3	reading and translating, vocabulary	3, 4
12.	Fire Prevention, Fire Extinguisher	1	questions and answers in oral and written form	2
13.	First Aid	1	discussion, text analysis, vocabulary	3,5
14.	Flood	1, 3	Discussion on floods, experience in Croatia and the world	2,3
15.	1st term paper (January)		2nd term paper (June)	

References (compulsory / additional)

Compulsory: Horvatić, Miroslav, English for Safety Engineers, Karlovac University of Applied Sciences, 2008
Suggested: Eastwood, Oxford Guide to English Grammar, 1994.;
<https://www.perfect-english-grammar.com/grammar-exercises.html>
Safety and Health Magazine (online)
<https://www.safetyandhealthmagazine.com/>



COURSE SYLLABUS

General information

Course title:	Computer Practise
ISVU course code:	38438
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (full-time study)
ECTS credits:	5
Semester of the course execution:	II
Exam prerequisites:	-
Course objectives:	The aim of the course is to train students to understand and understand the importance of using computers as a necessary and unavoidable tool for work both in general in various areas of human activity, as well as for their own business and personal needs, and to be trained for more advanced independent use and the further progress of digital transformation.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 80%
Exercises (auditory, linguistics):	45	presence of min. 80%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	75	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium 1	Colloquium 2	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Explain the historical and technological development of computers, and its impact on modern computer systems				8%	8%	4%	Until the end of ac. year
Outcome 2	Describe the functional structure of personal computers of this type and the purpose of external				8%	8%	4%	Until the end of ac. year



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	connection units							
Outcome 3	Recognize and describe the classification and organization of modern computer networks				8%	8%	4%	Until the end of ac. year
Outcome 4	Distinguish types of program support and their areas of application.				8%	8%	4%	Until the end of ac. year
Outcome 5	Differentiate between types of harmful influences and ways of their prevention				8%	8%	4%	Until the end of ac. year
Outcome 6	Independently apply acquired knowledge in independent use of office and graphic software support and databases	20%	20%			40%	20%	Until the end of ac. year
Outcome 7	Independently analyze and present the development and application of computer, software and network solutions			20%		20%	10%	Until the end of ac. year
Total % grade points		20	20	20	40	100	50	
Share in ECTS		1	1	1	2	5		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Explain the historical and technological development of computers, and its impact on modern computer systems	4%	4%	8%	4%
Outcome 2	Describe the functional structure of personal computers of this type and	4%	4%	8%	4%



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	the purpose of external connection units				
Outcome 3	Recognize and describe the classification and organization of modern computer networks	4%	4%	8%	4%
Outcome 4	Distinguish types of program support and their areas of application.	4%	4%	8%	4%
Outcome 5	Differentiate between types of harmful influences and ways of their prevention	4%	4%	8%	4%
Outcome 6	Independently apply acquired knowledge in independent use of office and graphic software support and databases	40%		40%	20%
Outcome 7	Independently analyze and present the development and application of computer, software and network solutions	13%	7%	20%	10%
Total % of grade points		73%	27%	100%	50%
Share in ECTS		3.65	1.35	5	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Introduction to the course, definitions of basic terms	I1	Familiarization with the equipment in the IT cabinet and the rules of conduct during exercises, analysis of the content of the exercises, basics of using the available computer and software support	I1, I2
2.	Technological development of computers: calculating machines, beginnings of computers, computer systems	I1	Microsoft Word: presentation of the working environment, page formatting, text formatting	I6
3.	Characteristics of modern computer systems: properties of the 5th generation of computers	I2	Microsoft Word: insertion and formatting of tables, images, symbols and formulas	I6
4.	Stages of development of computer systems in the territory of the Republic of Croatia	I1	Microsoft Word: advanced text formatting, group letters, print formatting	I6
5.	Classification of modern computers: according to the type of processor, according to the purpose of use	I2	Microsoft Excel: presentation of the working environment, series of constants, formatting of tables	I6
6.	Structure of a personal computer and types of external connection units	I2	Microsoft Excel: addressing cells, inserting and moving, formulas and functions	I6
7.	Basics of computer networks and open computer systems	I3	Microsoft Excel: conditional cell formatting, chart types and formatting, printouts; Repeating the first set of exercises	I6
8.	Program support: types, division, rights and terms of use, education, certification	I4	Microsoft PowerPoint: introduction, slide masters, formatting and animations	I6



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9.	Operating Systems: Command line based OS, Graphical User Interface OS	14	Colloquium from exercises 1	
10.	Integrated office packages: types, contents and possibilities	14	Microsoft Access: presentation of the working environment, organization and overview of development tools, creation of database tables, keys and links	16
11.	Computer graphics: software support for design and engineering graphics	14	Microsoft Access: referential integrity, data import from Excel and text files, query formatting, relations, reports, printouts	16
12.	Data compression on digital media: types and formats of records	14	Microsoft Visio: presentation of the work environment, introduction to templates, design of the work area (pages), organization diagrams	16
13.	Internet services, use of e-mail, data exchange via computer networks	14	Microsoft Visio: mechanical sketches, construction and architectural sketches, electrical and electronic schematics, prints	16
14.	Protection of computer data from losses and harmful external influences	15	Repeating the second set of exercises	16
15.	Ergonomic considerations and possibilities for improving human-computer communication	11	Colloquium from exercises 2	

References (compulsory / additional)

Compulsory:

1. Kralj, D., Primjena računala, Veleučilište u Karlovcu, Karlovac, 2018.
2. Roller, D., Informatički priručnik, Informator, Zagreb, 1996.
3. Smiljanić, G., Osnove digitalnih računala, Šolska knjiga, Zagreb, 1990.
4. ITdesk.Info, Microsoft Office 2010, ODRAZI, Zagreb, 2011.
5. ITdesk.Info, Računalna sigurnost, CARNET, Zagreb, 2011

Additional:

1. Grbavac, V., Informatika, kompjuteri i primjena, HDZP, Zagreb, 1995.
2. Ribarić, S., Arhitektura računala pete generacije, Tehnička knjiga, Zagreb, 1986.



COURSE SYLLABUS

General information

Course title:	Computer Practise
ISVU course code:	115147
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (part-time study)
ECTS credits:	5
Semester of the course execution:	II
Exam prerequisites:	-
Course objectives:	The aim of the course is to train students to understand and understand the importance of using computers as a necessary and unavoidable tool for work both in general in various areas of human activity, as well as for their own business and personal needs, and to be trained for more advanced independent use and the further progress of digital transformation.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 60%
Exercises (auditory, linguistics):	45	presence of min. 60%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	75	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Explain the historical and technological development of computers, and its impact on modern computer systems			8%	8%	4%	Until the end of ac. year
Outcome 2	Describe the functional structure of personal computers of this type and the purpose of external			8%	8%	4%	Until the end of ac. year



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	connection units						
Outcome 3	Recognize and describe the classification and organization of modern computer networks			8%	8%	4%	Until the end of ac. year
Outcome 4	Distinguish types of program support and their areas of application.			8%	8%	4%	Until the end of ac. year
Outcome 5	Differentiate between types of harmful influences and ways of their prevention			8%	8%	4%	Until the end of ac. year
Outcome 6	Independently apply acquired knowledge in independent use of office and graphic software support and databases	30%			30%	15%	Until the end of ac. year
Outcome 7	Independently analyze and present the development and application of computer, software and network solutions		30%		30%	15%	Until the end of ac. year
Total % grade points		30	30	40	100	50	
Share in ECTS		1.5	1.5	2	5		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Explain the historical and technological development of computers, and its impact on modern computer systems	4%	4%	8%	4%
Outcome 2	Describe the functional structure of personal computers of this type and	4%	4%	8%	4%



COURSE SYLLABUS

	the purpose of external connection units				
Outcome 3	Recognize and describe the classification and organization of modern computer networks	4%	4%	8%	4%
Outcome 4	Distinguish types of program support and their areas of application.	4%	4%	8%	4%
Outcome 5	Differentiate between types of harmful influences and ways of their prevention	4%	4%	8%	4%
Outcome 6	Independently apply acquired knowledge in independent use of office and graphic software support and databases	30%		30%	15%
Outcome 7	Independently analyze and present the development and application of computer, software and network solutions	20%	10%	30%	15%
Total % of grade points		70%	30%	100%	50%
Share in ECTS		3.5	1.5	5	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Introduction to the course, definitions of basic terms	I1	Familiarization with the equipment in the IT cabinet and the rules of conduct during exercises, analysis of the content of the exercises, basics of using the available computer and software support	I1, I2
2.	Technological development of computers: calculating machines, beginnings of computers, computer systems	I1	Microsoft Word: presentation of the working environment, page formatting, text formatting	I6
3.	Characteristics of modern computer systems: properties of the 5th generation of computers	I2	Microsoft Word: insertion and formatting of tables, images, symbols and formulas	I6
4.	Stages of development of computer systems in the territory of the Republic of Croatia	I1	Microsoft Word: advanced text formatting, group letters, print formatting	I6
5.	Classification of modern computers: according to the type of processor, according to the purpose of use	I2	Microsoft Excel: presentation of the working environment, series of constants, formatting of tables	I6
6.	Structure of a personal computer and types of external connection units	I2	Microsoft Excel: addressing cells, inserting and moving, formulas and functions	I6
7.	Basics of computer networks and open computer systems	I3	Microsoft Excel: conditional cell formatting, chart types and formatting, printouts; Repeating the first set of exercises	I6
8.	Program support: types, division, rights and terms of use, education, certification	I4	Microsoft PowerPoint: introduction, slide masters, formatting and animations	I6



COURSE SYLLABUS

9.	Operating Systems: Command line based OS, Graphical User Interface OS	14	Colloquium from exercises 1	
10.	Integrated office packages: types, contents and possibilities	14	Microsoft Access: presentation of the working environment, organization and overview of development tools, creation of database tables, keys and links	16
11.	Computer graphics: software support for design and engineering graphics	14	Microsoft Access: referential integrity, data import from Excel and text files, query formatting, relations, reports, printouts	16
12.	Data compression on digital media: types and formats of records	14	Microsoft Visio: presentation of the work environment, introduction to templates, design of the work area (pages), organization diagrams	16
13.	Internet services, use of e-mail, data exchange via computer networks	14	Microsoft Visio: mechanical sketches, construction and architectural sketches, electrical and electronic schematics, prints	16
14.	Protection of computer data from losses and harmful external influences	15	Repeating the second set of exercises	16
15.	Ergonomic considerations and possibilities for improving human-computer communication	11	Colloquium from exercises 2	

References (compulsory / additional)

Compulsory:

6. Kralj, D., Primjena računala, Veleučilište u Karlovcu, Karlovac, 2018.
7. Roller, D., Informatički priručnik, Informator, Zagreb, 1996.
8. Smiljanić, G., Osnove digitalnih računala, Šolska knjiga, Zagreb, 1990.
9. ITdesk.Info, Microsoft Office 2010, ODRAZI, Zagreb, 2011.
10. ITdesk.Info, Računalna sigurnost, CARNET, Zagreb, 2011

Additional:

3. Grbavac, V., Informatika, kompjuteri i primjena, HDZP, Zagreb, 1995.
4. Ribarić, S., Arhitektura računala pete generacije, Tehnička knjiga, Zagreb, 1986.



COURSE SYLLABUS

General information

Course title:	Safety in Using Electric Energy
ISVU course code:	38459
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (full-time study)
ECTS credits:	4
Semester of the course execution:	V
Exam prerequisites:	Electrical engineering
Course objectives:	Acquaint students with the properties and specifics of electricity and electrical systems, electrical installations and plants, regulations in the application of electrical energy, procedures for performing work on EE plants, protection against electric shock and providing first aid to victims of electrical energy.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 80%
Exercises (auditory, linguistics):	30	presence of min. 80%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium 1	Colloquium 2	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Learn and be able to describe the basic terms in electrical engineering and magnetism, as well as the basic structure and application of modern electrical systems	19%			(19%)	19%	9,5%	Until the end of ac. year
Outcome 2	Learn and be able to describe the effects of electricity on the human	19%			(19%)	19%	9,5%	Until the end of ac. year



COURSE SYLLABUS

	body, the application of basic procedures for providing first aid after an electric shock, and the application of basic protective equipment.							
Outcome 3	Learn and adopt the basics of safety and health regulations when working with electricity (types of protection, installations, devices, plants)		19%		(19%)	19%	9,5%	Until the end of ac. year
Outcome 4	Learn and adopt the basics of regulations on safety and health when working with electricity (rules of conduct and execution of works; documentation; maintenance of installations, plants and devices)		19%		(19%)	19%	9,5%	Until the end of ac. year
Outcome 5	Independently analyze and describe modern direct current and alternating single-phase and three-phase electrical systems and regulations in the domain of safety during construction and use			24%		24%	12%	Until the end of ac. year
Total % grade points		38	38	24	(76)	100	50	
Share in ECTS		1.52	1.52	0.96	(3.04)	4		



COURSE SYLLABUS

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Learn and be able to describe the basic terms in electrical engineering and magnetism, as well as the basic structure and application of modern electrical systems	9,5%	9,5%	19%	9,5%
Outcome 2	Learn and be able to describe the effects of electricity on the human body, the application of basic procedures for providing first aid after an electric shock, and the application of basic protective equipment.	9,5%	9,5%	19%	9,5%
Outcome 3	Learn and adopt the basics of safety and health regulations when working with electricity (types of protection, installations, devices, plants)	9,5%	9,5%	19%	9,5%
Outcome 4	Learn and adopt the basics of regulations on safety and health when working with electricity (rules of conduct and execution of works; documentation; maintenance of installations, plants and devices)	9,5%	9,5%	19%	9,5%
Outcome 5	Independently analyze and describe modern direct current and alternating single-phase and three-phase electrical systems and regulations in the domain of safety during construction and use	14%	10%	24%	12%
Total % of grade points		52%	48%	100%	50%
Share in ECTS		2.08	1.92	4	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Basics of electrical engineering - structure of atoms, electrostatics, direct current	I1	Auditory exercises	I1, I2
2.	Basics of electrical engineering - electromagnetism, alternating currents	I1	Auditory exercises	I1, I2
3.	Basics of electrical engineering - three-phase system	I1	Auditory exercises	I1, I2
4.	The influence of electric current on the human body. Freeing the victim from the electrical circuit and first aid	I2	Auditory exercises	I1, I2
5.	Protective means, their use and properties	I2	Auditory exercises	I1, I2
6.	Safety measures when making electrical installations in buildings	I2, I3	Presentations of seminar papers	I5



COURSE SYLLABUS

7.	Norms for construction and works on EE systems with nominal voltages of 1 - 400 kV	I3	Presentations of seminar papers	I5
8.	Classification of electrical devices with regard to protection against electric shock	I3	Colloquium 1	I1, I2
9.	Lightning rods and surge protection.	I3	Presentations of seminar papers	I5
10.	Grounding devices. Protection against static electricity	I3, I4	Presentations of seminar papers	I5
11.	High voltage power plants.	I4	Presentations of seminar papers	I5
12.	Safety measures when working on electric power systems	I4	Presentations of seminar papers	I5
13.	Documents for work at power plants.	I4	Presentations of seminar papers	I5
14.	Methods and application of safety rules when performing live work.	I4	Presentations of seminar papers	I5
15.	Electrical devices and installations in areas threatened by explosive atmospheres	I4	Colloquium 2	I3, I4

References (compulsory / additional)

Compulsory:

11. Kralj, Damir (2023.), SUPEE - prezentacije s predavanja.
12. Mileusnić, Egon (1999.) Mjere sigurnosti i zaštite na radu kod primjene električne energije, ZIRS, Zagreb
13. Ožanić, Boris (2016.), Sigurnost u primjeni el. energije - skripta, Veleučilište u Karlovcu

Additional:

1. Bego, Vojislav (2003.), Mjerenja u elektrotehnici - 9. izdanje, Graphis, Zagreb
2. HEP (2001.), Bilten 94: Pravila i mjere sigurnosti na radu, HEP - INTERNO
3. ETD (1994), Zbirka propisa iz elektrotehničke struke, EDZ
4. Kacian, Nenad (1988.), Osnove zaštite na radu, IPROZ, Zagreb



COURSE SYLLABUS

General information

Course title:	Safety in Using Electric Energy
ISVU course code:	115226
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (part-time study)
ECTS credits:	4
Semester of the course execution:	V
Exam prerequisites:	Electrical engineering
Course objectives:	Acquaint students with the properties and specifics of electricity and electrical systems, electrical installations and plants, regulations in the application of electrical energy, procedures for performing work on EE plants, protection against electric shock and providing first aid to victims of electrical energy.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 60%
Exercises (auditory, linguistics):	30	presence of min. 60%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium 1	Colloquium 2	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Learn and be able to describe the basic terms in electrical engineering and magnetism, as well as the basic structure and application of modern electrical systems	19%			(19%)	19%	9,5%	Until the end of ac. year
Outcome 2	Learn and be able to describe the effects of electricity on the human	19%			(19%)	19%	9,5%	Until the end of ac. year



COURSE SYLLABUS

	body, the application of basic procedures for providing first aid after an electric shock, and the application of basic protective equipment.							
Outcome 3	Learn and adopt the basics of safety and health regulations when working with electricity (types of protection, installations, devices, plants)		19%		(19%)	19%	9,5%	Until the end of ac. year
Outcome 4	Learn and adopt the basics of regulations on safety and health when working with electricity (rules of conduct and execution of works; documentation; maintenance of installations, plants and devices)		19%		(19%)	19%	9,5%	Until the end of ac. year
Outcome 5	Independently analyze and describe modern direct current and alternating single-phase and three-phase electrical systems and regulations in the domain of safety during construction and use			24%		24%	12%	Until the end of ac. year
Total % grade points		38	38	24	(76)	100	50	
Share in ECTS		1.52	1.52	0.96	(3.04)	4		



COURSE SYLLABUS

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Learn and be able to describe the basic terms in electrical engineering and magnetism, as well as the basic structure and application of modern electrical systems	9,5%	9,5%	19%	9,5%
Outcome 2	Learn and be able to describe the effects of electricity on the human body, the application of basic procedures for providing first aid after an electric shock, and the application of basic protective equipment.	9,5%	9,5%	19%	9,5%
Outcome 3	Learn and adopt the basics of safety and health regulations when working with electricity (types of protection, installations, devices, plants)	9,5%	9,5%	19%	9,5%
Outcome 4	Learn and adopt the basics of regulations on safety and health when working with electricity (rules of conduct and execution of works; documentation; maintenance of installations, plants and devices)	9,5%	9,5%	19%	9,5%
Outcome 5	Independently analyze and describe modern direct current and alternating single-phase and three-phase electrical systems and regulations in the domain of safety during construction and use	14%	10%	24%	12%
Total % of grade points		52%	48%	100%	50%
Share in ECTS		2.08	1.92	4	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Basics of electrical engineering - structure of atoms, electrostatics, direct current	I1	Auditory exercises	I1, I2
2.	Basics of electrical engineering - electromagnetism, alternating currents	I1	Auditory exercises	I1, I2
3.	Basics of electrical engineering - three-phase system	I1	Auditory exercises	I1, I2
4.	The influence of electric current on the human body. Freeing the victim from the electrical circuit and first aid	I2	Auditory exercises	I1, I2
5.	Protective means, their use and properties	I2	Auditory exercises	I1, I2
6.	Safety measures when making electrical installations in buildings	I2, I3	Presentations of seminar papers	I5



COURSE SYLLABUS

7.	Norms for construction and works on EE systems with nominal voltages of 1 - 400 kV	I3	Presentations of seminar papers	I5
8.	Classification of electrical devices with regard to protection against electric shock	I3	Colloquium 1	I1, I2
9.	Lightning rods and surge protection.	I3	Presentations of seminar papers	I5
10.	Grounding devices. Protection against static electricity	I3, I4	Presentations of seminar papers	I5
11.	High voltage power plants.	I4	Presentations of seminar papers	I5
12.	Safety measures when working on electric power systems	I4	Presentations of seminar papers	I5
13.	Documents for work at power plants.	I4	Presentations of seminar papers	I5
14.	Methods and application of safety rules when performing live work.	I4	Presentations of seminar papers	I5
15.	Electrical devices and installations in areas threatened by explosive atmospheres	I4	Colloquium 2	I3, I4

References (compulsory / additional)

Compulsory:

14. Kralj, Damir (2023.), SUPEE - prezentacije s predavanja.
15. Mileusnić, Egon (1999.) Mjere sigurnosti i zaštite na radu kod primjene električne energije, ZIRS, Zagreb
16. Ožanić, Boris (2016.), Sigurnost u primjeni el. energije - skripta, Veleučilište u Karlovcu

Additional:

5. Bego, Vojislav (2003.), Mjerenja u elektrotehnici - 9. izdanje, Graphis, Zagreb
6. HEP (2001.), Bilten 94: Pravila i mjere sigurnosti na radu, HEP - INTERNO
7. ETD (1994), Zbirka propisa iz elektrotehničke struke, EDZ
8. Kacian, Nenad (1988.), Osnove zaštite na radu, IPROZ, Zagreb



COURSE SYLLABUS

General information

Course title:	Computational Ergonomics
ISVU course code:	238475
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (full-time study)
ECTS credits:	5
Semester of the course execution:	V
Exam prerequisites:	-
Course objectives:	Familiarize students with computer ergonomics, computer peripherals and software support. Updating knowledge on the existing basics of ergonomics in the context of workplaces at the computer, both in everyday and in specific areas of computer application. Analysis of human-machine interaction, especially human-computer interaction. Analysis of users' abilities, limitations and health risks. Historical and technological development of computer user interfaces. Definition and understanding of the concept of universal design in everyday life and its application for the development of a digital inclusive society. Definition and analysis of the accessibility of software solutions for web and mobile platforms. Definition and specific examples of support technologies and analysis of the possibilities of new technologies (augmented and virtual reality, holographic technologies, haptic interfaces, BCI) as support technologies. Introduction to the concept of assisted communication for people with complex communication needs and examples of program solutions for its implementation. Presentation of multidisciplinary research in this area.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 80%
Exercises (auditory, linguistics):	30	presence of min. 80%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium 1	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Recognize the importance of norms and regulations in			8%	8%	4%	Until the end of ac. year



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	the field of ergonomics						
Outcome 2	Analyze possible health risks in the workplace with computers, as well as protection options and methods of prevention			8%	8%	4%	Until the end of ac. year
Outcome 3	Explain the basic principles of human-computer communication and the usability of elements of computer systems, as well as the reasons for the application and design of advanced user interfaces.			8%	8%	4%	Until the end of ac. year
Outcome 4	Independently evaluate usability and design ergonomically acceptable screen forms	30%			30%	15%	Until the end of ac. year
Outcome 5	Recognize the needs of users with disabilities and recognize adequate support technology for interaction with the computer			8%	8%	4%	Until the end of ac. year
Outcome 6	Independently analyze the properties and advantages of modern intelligent interfaces and elements of universal design.		30%		30%	15%	Until the end of ac. year



COURSE SYLLABUS

Outcome 7	Recognize the importance and need for universal design and diversity of ICT system users in order to achieve inclusiveness.			8%	8%	4%	Until the end of ac. year
Total % grade points		30	30	40	100	50	
Share in ECTS		1.5	1.5	2	5		

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Recognize the importance of norms and regulations in the field of ergonomics	4%	4%	8%	4%
Outcome 2	Analyze possible health risks in the workplace with computers, as well as protection options and methods of prevention	4%	4%	8%	4%
Outcome 3	Explain the basic principles of human-computer communication and the usability of elements of computer systems, as well as the reasons for the application and design of advanced user interfaces.	4%	4%	8%	4%
Outcome 4	Independently evaluate usability and design ergonomically acceptable screen forms	30%		30%	15%
Outcome 5	Recognize the needs of users with disabilities and recognize adequate support technology for interaction with the computer	4%	4%	8%	4%
Outcome 6	Independently analyze the properties and advantages of modern intelligent interfaces and elements of universal design.	20%	10%	30%	15%
Outcome 7	Recognize the importance and need for universal design and diversity of ICT system users in order to achieve inclusiveness.	4%	4%	8%	4%
Total % of grade points		70%	30%	100%	50%
Share in ECTS		3.5	1.5	5	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Introduction to the field of ergonomics. Definition, types and fields of application of ergonomics.	I1	Introduction to the subject area and organization of exercises. Description of topics for workshops.	I1, I2



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2.	A traditional and modern approach to computer workplace ergonomics.	I1, I2	Workplace at the computer. Possibilities of improvement. Aids. Methods of preserving health.	I2, I3, I4
3.	Man-machine system. Ergonomics of computer equipment.	I2, I3	Processing examples in the command line application. Interactive and default single-task (batch) mode of operation. Real-time processing. Examples of improving working shells.	I2, I4
4.	Health risks in the workplace with computer equipment and how to prevent them	I2, I3	Processing of examples in the application of graphic and visual user interfaces. Direct manipulation.	I2, I4
5.	Human-computer interaction. User capabilities and limitations.	I3	Practical examples of improving human-computer communication by adjusting visual and sound parameters of program interfaces. Elements of contextual help.	I3, I4
6.	Usability: definitions and standardization (ISO / NIST), measurement methods	I1, I2	Examples of methods of evaluating and measuring the usability of software support.	I3, I4
7.	Human senses and practical application of the principles of the psychological approach in the design of user interfaces.	I3, I4	Creating an example of an ergonomically acceptable program support interface (MS Access) and evaluating the results.	I4
8.	Development and application of user interfaces. Command line (CLI). Interactive systems.	I3, I4	Workshop: Mobile and classic computer graphic interfaces. Advantages and disadvantages of natural user interfaces. Acceptability and accessibility of websites.	I4, I7
9.	Graphical and visual user interfaces (GUI, VUI) and direct manipulation (DM)	I3, I4	Workshop: Advanced User Interfaces. Application of haptic interfaces and holograms. Virtual and augmented reality. Brain-computer interface.	I3, I4,
10.	Haptic and natural user interfaces (HUI, NUI), brain-computer interface (BCI)	I2, I3, I4	Workshop: Intelligent user interfaces. Application of digital assistants (agents). Machine learning and artificial intelligence	I3, I4,
11.	Fundamentals of Intelligent User Interfaces (IUI) and Artificial Intelligence (AI) Applications	I2, I3, I4	Workshop: Assistive technologies to help deaf and hard of hearing people work.	I5, I6
12.	Application of holographic elements in the context of virtual and augmented reality (VR, AR)	I2, I3, I4	Workshop: Assistive technologies to help blind and visually impaired people in life and work.	I5, I6
13.	Assistive technologies and assisted communication based on modern technological solutions.	I5, I6	Workshop: Assistive technologies to help children and adults with dyslexia in life and work.	I5, I6
14.	Digital accessibility and inclusion of society. User demographics in the context of digital technologies. Universal design.	I6, I7	Workshop: Methods of improving digital accessibility and inclusiveness of society. Contemporary factors of acceleration of digital transformation.	I7
15.	Preliminary examination		Colloquium	

References (compulsory / additional)

Compulsory:



COURSE SYLLABUS

17. Kralj, Damir (2021.), Računalna ergonomija - prezentacije s predavanja.
18. Shneiderman, Ben; Plaisant, Catherine; Cohen, Maxine; Jacobs, Steven (2009.), Designing the User Interface: Strategies for Effective Human-Computer Interaction, Addison-Wesley.
19. Kirin, Snježana (2019), Uvod u ergonomiju, Veleučilište u Karlovcu.

Additional:

5. Kralj, Damir (2018), Primjena računala, Veleučilište u Karlovcu.
6. Nielsen, Jakob (1993), Usability Engineering, Morgan Kaufman.
7. ICT-AAC (2014.), Katalog znanja o potpomognutoj komunikaciji, Sveučilište u Zagrebu, Fakultet elektrotehnike i računarstva.



COURSE SYLLABUS

General information

Course title:	Computational Ergonomics
ISVU course code:	238476
Course instructor:	Damir Kralj, PhD, college professor
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional Study Programme of Safety and Protection Engineering (part-time study)
ECTS credits:	5
Semester of the course execution:	V
Exam prerequisites:	-
Course objectives:	Familiarize students with computer ergonomics, computer peripherals and software support. Updating knowledge on the existing basics of ergonomics in the context of workplaces at the computer, both in everyday and in specific areas of computer application. Analysis of human-machine interaction, especially human-computer interaction. Analysis of users' abilities, limitations and health risks. Historical and technological development of computer user interfaces. Definition and understanding of the concept of universal design in everyday life and its application for the development of a digital inclusive society. Definition and analysis of the accessibility of software solutions for web and mobile platforms. Definition and specific examples of support technologies and analysis of the possibilities of new technologies (augmented and virtual reality, holographic technologies, haptic interfaces, BCI) as support technologies. Introduction to the concept of assisted communication for people with complex communication needs and examples of program solutions for its implementation. Presentation of multidisciplinary research in this area.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	presence of min. 60%
Exercises (auditory, linguistics):	30	presence of min. 60%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		Colloquium 1	Seminary work and presentation	Final exam (or preliminary exam)	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	Recognize the importance of norms and regulations in			8%	8%	4%	Until the end of ac. year



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	the field of ergonomics						
Outcome 2	Analyze possible health risks in the workplace with computers, as well as protection options and methods of prevention			8%	8%	4%	Until the end of ac. year
Outcome 3	Explain the basic principles of human-computer communication and the usability of elements of computer systems, as well as the reasons for the application and design of advanced user interfaces.			8%	8%	4%	Until the end of ac. year
Outcome 4	Independently evaluate usability and design ergonomically acceptable screen forms	30%			30%	15%	Until the end of ac. year
Outcome 5	Recognize the needs of users with disabilities and recognize adequate support technology for interaction with the computer			8%	8%	4%	Until the end of ac. year
Outcome 6	Independently analyze the properties and advantages of modern intelligent interfaces and elements of universal design.		30%		30%	15%	Until the end of ac. year



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Outcome 7	Recognize the importance and need for universal design and diversity of ICT system users in order to achieve inclusiveness.			8%	8%	4%	Until the end of ac. year
Total % grade points		30	30	40	100	50	
Share in ECTS		1.5	1.5	2			

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	Recognize the importance of norms and regulations in the field of ergonomics	4%	4%	8%	4%
Outcome 2	Analyze possible health risks in the workplace with computers, as well as protection options and methods of prevention	4%	4%	8%	4%
Outcome 3	Explain the basic principles of human-computer communication and the usability of elements of computer systems, as well as the reasons for the application and design of advanced user interfaces.	4%	4%	8%	4%
Outcome 4	Independently evaluate usability and design ergonomically acceptable screen forms	30%		30%	15%
Outcome 5	Recognize the needs of users with disabilities and recognize adequate support technology for interaction with the computer	4%	4%	8%	4%
Outcome 6	Independently analyze the properties and advantages of modern intelligent interfaces and elements of universal design.	20%	10%	30%	15%
Outcome 7	Recognize the importance and need for universal design and diversity of ICT system users in order to achieve inclusiveness.	4%	4%	8%	4%
Total % of grade points		70%	30%	100%	50%
Share in ECTS		3.5	1.5	5	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Introduction to the field of ergonomics. Definition, types and fields of application of ergonomics.	I1	Introduction to the subject area and organization of exercises. Description of topics for workshops.	I1, I2



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2.	A traditional and modern approach to computer workplace ergonomics.	I1, I2	Workplace at the computer. Possibilities of improvement. Aids. Methods of preserving health.	I2, I3, I4
3.	Man-machine system. Ergonomics of computer equipment.	I2, I3	Processing examples in the command line application. Interactive and default single-task (batch) mode of operation. Real-time processing. Examples of improving working shells.	I2, I4
4.	Health risks in the workplace with computer equipment and how to prevent them	I2, I3	Processing of examples in the application of graphic and visual user interfaces. Direct manipulation.	I2, I4
5.	Human-computer interaction. User capabilities and limitations.	I3	Practical examples of improving human-computer communication by adjusting visual and sound parameters of program interfaces. Elements of contextual help.	I3, I4
6.	Usability: definitions and standardization (ISO / NIST), measurement methods	I1, I2	Examples of methods of evaluating and measuring the usability of software support.	I3, I4
7.	Human senses and practical application of the principles of the psychological approach in the design of user interfaces.	I3, I4	Creating an example of an ergonomically acceptable program support interface (MS Access) and evaluating the results.	I4
8.	Development and application of user interfaces. Command line (CLI). Interactive systems.	I3, I4	Workshop: Mobile and classic computer graphic interfaces. Advantages and disadvantages of natural user interfaces. Acceptability and accessibility of websites.	I4, I7
9.	Graphical and visual user interfaces (GUI, VUI) and direct manipulation (DM)	I3, I4	Workshop: Advanced User Interfaces. Application of haptic interfaces and holograms. Virtual and augmented reality. Brain-computer interface.	I3, I4,
10.	Haptic and natural user interfaces (HUI, NUI), brain-computer interface (BCI)	I2, I3, I4	Workshop: Intelligent user interfaces. Application of digital assistants (agents). Machine learning and artificial intelligence	I3, I4,
11.	Fundamentals of Intelligent User Interfaces (IUI) and Artificial Intelligence (AI) Applications	I2, I3, I4	Workshop: Assistive technologies to help deaf and hard of hearing people work.	I5, I6
12.	Application of holographic elements in the context of virtual and augmented reality (VR, AR)	I2, I3, I4	Workshop: Assistive technologies to help blind and visually impaired people in life and work.	I5, I6
13.	Assistive technologies and assisted communication based on modern technological solutions.	I5, I6	Workshop: Assistive technologies to help children and adults with dyslexia in life and work.	I5, I6
14.	Digital accessibility and inclusion of society. User demographics in the context of digital technologies. Universal design.	I6, I7	Workshop: Methods of improving digital accessibility and inclusiveness of society. Contemporary factors of acceleration of digital transformation.	I7
15.	Preliminary examination		Colloquium	

References (compulsory / additional)

Compulsory:



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20. Kralj, Damir (2021.), Računalna ergonomija - prezentacije s predavanja.
21. Shneiderman, Ben; Plaisant, Catherine; Cohen, Maxine; Jacobs, Steven (2009.), Designing the User Interface: Strategies for Effective Human-Computer Interaction, Addison-Wesley.
22. Kirin, Snježana (2019), Uvod u ergonomiju, Veleučilište u Karlovcu.

Additional:

8. Kralj, Damir (2018), Primjena računala, Veleučilište u Karlovcu.
9. Nielsen, Jakob (1993), Usability Engineering, Morgan Kaufman.
10. ICT-AAC (2014.), Katalog znanja o potpomognutoj komunikaciji, Sveučilište u Zagrebu, Fakultet elektrotehnike i računarstva.



COURSE SYLLABUS

General information

Course title:	Fire and explosion protection technology
ISVU course code:	39245, 115364
Course instructor:	Zvonimir Matusinović, PhD, senior lecturer
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional undergraduate study programme with bachelor thesis
ECTS credits:	5
Semester of the course execution:	IV.
Exam prerequisites:	no
Course objectives:	The aim of the course is to give students basic knowledge and skills to identify possible emergent types and shapes of risks of fire and explosion in the areas of economic and social activities for the sake of enabling effecting planning, programming, monitoring, coordination and executive management assignments and tasks to ensure the safety and protection from fire and explosion including from the (malicious) dangerous actions endangering the internal technological, procedural, technical, operational and commercial fire and explosion safety and security. Students will be able to independently recognize typical threatening fire and explosion risk of internal and external nature and to estimate, explain and suggest the need to change/introduce the necessary procedural, operational and technical measures and actions in the field of engineering SiZoPiE. They will be able, as well, to plan and manage simple jobs and tasks of the SiZoPiE in accordance with general and special regulations governing the area of safety and security, including the necessary cooperation with companies authorized for diagnostics and maintenance of technical systems of SiZoPiE, with the competent inspection services, the fire department, with the police and with other national and internal security services and protection.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	Attendance 80%
Exercises (auditory, linguistics):	30	Attendance 100%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		ET1	ET2	ET3	ET4	ET5	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	II: Enumerate and describe the main characteristics of the basics features of each of the possible manifestations of types and forms of fire and								During the academic year



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	explosion in closed and open spaces depending on the typical characteristic of the space/activities/processes.								
Outcome 2	I2: Explain the characterizing types and forms of appearance of the risk of fire and explosion in the most vulnerable economic and assorted activities and possibilities (places, conditions and circumstances) of their realisation.								During the academic year
Outcome 3	I3: Distinguish prescribed systems of general and special safety and protection from fire and explosions (SiZoPiE) at national, regional and local level and in the framework of individual fire and/or explosion especially vulnerable activities/company/production of work processes (their indicative structure and content).								During the academic year
Outcome 4	I4: Classify and describe the characteristics of the general and specific regulations and activities of SiZoPiE in companies that handle the large quantities of fire and explosion hazardous substances.								During the academic year
Outcome 5	I5: Enumerate and describe how it works and compare the effectiveness of modern technical systems and available technical solutions in the field of engineering SiZoPiE.								During the academic year
Outcome 6	I6: Propose optimal types of technical systems of fire and explosion safety and security and the regulations established appropriate operational measures, activities and actions of SiZoPiE, depending on the types and forms of the present fire and/or explosion hazards and characteristics of available system.								During the academic year
Total % grade points									
Share in ECTS									

Knowledge evaluation on exams



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Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	I1: Enumerate and describe the main characteristics of the basics features of each of the possible manifestations of types and forms of fire and explosion in closed and open spaces depending on the typical characteristic of the space/acitivites/processes.	10	6	16	8
Outcome 2	I2: Explain the characterizing types and forms of apperance of the risk of fire and explosion in the moste vulnerable economic and assorted activities and possibilities (places, conditions and circumstances) of their realisation.	10	6	16	8
Outcome 3	I3: Distinguish prescribed systems of general and special safety and protection from fire and explosions (SiZoPiE) at national, regional and local level and in the framework of individual fire and/or explosion especially vulnerable activities/company/production of work processes (their indicative structure and content).	10	6	16	8
Outcome 4	I4: Classify and describe the characteristics of the general and specific regulations and activities of SiZoPiE in companies that handle the large quantities of fire and explosion hazardous substances.	10	6	16	8
Outcome 5	I5: Enumerate and describe how it works and compare the effectiveness of modern technical systems and available technical solutions in the field of engineering SiZoPiE.	10	6	16	8
Outcome 6	I6: Propose optimal types of technical systems of fire and explosion safety and security and the regulations established appropriate operational measures, activities and actions of SiZoPiE,depending on the types and forms of the present fire and/or explosion hazards and characteristics of available system.	10	10	20	10
Total % of grade points		60	40	100	
Share in ECTS		3	2	5	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outco me	Exercises course content and learning outcomes:	Outco me
1.	Definition and classification of fire and explosion and fire and explosion hazards.		Determination of the possible height of the flame of initial fire.	



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2.	The terms and classification of the conditions, manners and causes of fire and explosion and the factors that affecting their formation.		Determination of the possible rate of heat release of initial fire.	
3.	Properties, effects and possible consequences of the fire depending on the type and place of origin.		Determination of possible fire hazardous levels of radiation of the flame and overheated areas..	
4.	Properties, effects and possible consequences of the explosion depending on type and place of origin.		Determination of the possible release rate of initial fire smoke.	
5.	The components, structure and contents of modern systems of security and protection from fire and explosions (SiZoPiE) at the national, regional and local level.		Determination of opportunities of development of initial fire into „flame attack“.	
6.	The components, structure and contents of modern systems of SiZoPiE within individual fire and/or explosion especially vulnerable activities/companies.		Determination of possible impacts, consequences and prevention measures in case of a „fireball“.	
7.	The basics of effective technological fire and explosion prevention.		Determination of the possible impacts and consequences in the case of a physical explosion.	
8.	The process, procedural and technological solutions to control fuel and explosives.		Determination of the zones of possible impacts and consequences in the case of a chemical explosion substance in condensed phase.	
9.	The process, procedural and technological solutions to control strong oxidizing agents.		Determination of the zones of possible impacts and consequences in the case of a chemical explosion substance in dilute phase.	
10.	The process, procedural and technological solutions to control possible sources of ignition.		Determination of the insurance and evacuation zones around the possible danger of explosion..	
11.	Systems for fire detection and for evacuation of toxic fire gases, heat and for the prevention of smoking through confined spaces.		Determination of fire and explosive hazards and appropriate technical and operational measures of SiZoPiE in the example of storage of large quantities of flammable fluids.	
12.	Systems for danger detection and for the prevention, damping and venting explosions.		Determination of fire and explosive hazards and appropriate technical and operational measures of SiZoPiE in the example of storage of large quantities of explosives.	
13.	Systems for protection and to mitigate the effects and consequences of fire and explosion.		The case and the ways of checking the validity of different types of technical systems for fire alarm.	
14.	Methods, techniques and procedures for certification, testing, control and monitoring components of the SiZoPiE system.		The case and the ways of checking the validity of different types of technical systems for reporting the occurrence of flammable gas/vapor in the atmosphere.	
15.	The basic components of the plan and program of technological and fire and explosion prevention.		The case and the ways of checking the validity of different types of technical systems for automatic fire fighting or the prevention/development of physical or chemical explosion.	



COURSE SYLLABUS

References (compulsory / additional)

Compulsory:

Kulišić, D. (1998). Uzroci nezgoda, nesreća, požara, eksplozija i havarija, *Sigurnost*, **4**, 2: 95.-121.

Gulan, I. (1997). *Protupožarna tehnološka preventiva*, Biblioteka NADING, Zagreb.

Kulišić, D. (>2011). *Tehnologija zaštite od požara i eksplozija*, Course materials..

Additional (only parts, according to subject):

Currently applicable laws, regulations, decisions and technical standards in the field of active engineering of SiZoPiE, *Narodne novine*, >1991. g.

EN/CFPA-E (>2002). *European standards for fire safety and protection/CFPA-E Guidelines*, European standards/Confederation of Fire Protection Associations Europe (CFPAE), Brussels/Zurich.

NFPA (>2007). *NFPA Codes & Standards Handbook*, National Fire Protection Association, Quincy (MA).]



COURSE SYLLABUS

General information

Course title:	Construction and fire prevention
ISVU course code:	40191, 115378
Course instructor:	Zvonimir Matusinović, PhD, senior lecturer
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional undergraduate study programme with bachelor thesis
ECTS credits:	4
Semester of the course execution:	V.
Exam prerequisites:	no
Course objectives:	The course objective is to give students basics knowledge and skills to recognize key features of buildings, constructions, construction components and constructive materials of concern for the safety and protection of internal and external fire or explosion. Students will be able to independently recognize and estimate the possible fire and explosion hazards for the buildings, people, material goods in the buildings and for environment. They will also be able to estimate if any necessary technical and operational steps and activities for their removal should be taken. Aswell, they will be able to plan and manage simple tasks and tasks of construction of fire and explosion prevention in accordance with general and special regulations for that area of protection and safety, including the necessary cooperation with authorized companies for the technical maintenance of the buildings and their installations with the competent inspection and utilites, with the fire department, the police and other state, local and internal security services for protection and rescue.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	Attendance 80%
Exercises (auditory, linguistics):	15	Attendance 100%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	45	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		ET1	ET2	ET3	ET4	ET5	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	II: Enumerate and describe the main characteristics of: the place of accomodation of buildings, types of constructions, construction components and construction materials of importance for								During the academic year



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	passive fire and explosion safety and protection.								
Outcome 2	I2: Explain indicative types and forms of fire and explosion hazards to bearing constructions and necessary steps to conserve capacity until a certain time required by special regulations.								During the academic year
Outcome 3	I3: Distinguish types, explain policies and propose optimal passive fire protection systems to prevent the spread of fire, heat, and smoke fire gases inside the building and fire spread to neighboring buildings.								During the academic year
Outcome 4	I4: Distinguish types, explain policies and propose optimal passive explosion explosion systems to prevent and to moderate explosion effects inside the building and domino effects of explosion to the neighboring buildings.								During the academic year
Outcome 5	I5: Integrate PP and PE prevention with process, technology, building and construction projects.								During the academic year
Outcome 6	I6: Propose optimal types of construction and other technical solutions that enable: safe evacuation, rescue people, valuable property and protect rescuers in case of fire or the direct danger of explosion.								During the academic year
Total % grade points									
Share in ECTS									

Knowledge evaluation on exams

Exam prerequisites	
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OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	I1: Enumerate and describe the main characteristics of: the place of accommodation of buildings, types of constructions, construction components and construction materials of importance for passive fire and explosion safety and protection.	10	6	16	8
Outcome 2	I2: Explain indicative types and forms of fire and explosion hazards to bearing constructions and necessary steps to conserve capacity until a certain time required by special regulations.	10	6	16	8
Outcome 3	I3: Distinguish types, explain policies and propose optimal passive fire protection systems to prevent the spread of fire, heat, and smoke fire gases inside the building and fire spread to neighboring buildings.	10	6	16	8
Outcome 4	I4: Distinguish types, explain policies and propose optimal passive explosion explosion systems to prevent and to moderate explosion effects inside the building and domino effects of explosion to the neighboring buildings.	10	6	16	8
Outcome 5	I5: Integrate PP and PE prevention with process, technology, building and construction projects.	10	6	16	8
Outcome 6	I6: Propose optimal types of construction and other technical solutions that enable: safe evacuation, rescue people, valuable property and protect rescuers in case of fire or the direct danger of explosion.	10	10	20	10
Total % of grade points		60	40	100	
Share in ECTS		2,4	1,6	4	

Review of units per week with associated learning outcomes

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	The concepts, types and general characteristics of buildings, construction components and construction materials.		Determination of the net calorific values of fuel contents/interiors of residential, commercial, industrial or warehouse buildings.	
2.	The concept, contents, role and special tasks of the passive fire and explosion prevention.		Determination of the possible density of the fire load of the building and its benchmark level of fire risk.	
3.	Basic principles, types and forms of the fire and explosion safety and security of the buildings and the constructions depending on application and use.		Determination of thermal conductivity of certain types of construction materials based on the known parameters of their species, density and temperature.	
4.	Construtcional and technical solutions of protecting people, buildings and constructions, premises and their		Determination of the impact of moisture on the thermal conductivity of	



COURSE SYLLABUS

	contents from fire and explosion impacts.		construction materials non resistant to moisture.	
5.	Regulatory methods of classification, labeling and testing of construction materials and construction elements for the sake of determining their behaviour and quality in terms of fire or explosion.		Determination of specific heat capacity of certain types of construction materials at elevated temperatures based on the known parameters of their species and density..	
6.	Regulatory criteria of conditions of performance, maintenance, technical and administrative supervision as well as regulatory check of construction materials and construction components.		Determination of thermal diffusivity for certain types of building materials on the basis of known relevant parameters of influence.	
7.	Types and characteristics of fire resistance and conditions of use certain types of construction materials.		Determining the thermal inertia of certain types of constructive materials on the basis of known relevant parameters of influence..	
8.	Types and characteristics of fire resistance and conditions of use certain types of construction components.		Determination of fire development and creation of direct fire attack within closed interior with known density of the fire load and its partitions.	
9.	Types, characteristics, conditions and application of fire blocking agents.		Determining the size of the hazardous thermal expansion (dilatation) for demolition of construction for certain types of construction materials which are components of the supporting structures under the fire heat.	
10.	Types, characteristics, conditions and application of construction solutions for abduct smoke and heat of the fire.		Determination of optimum size of fire sections and the position and necessary parameters of fire resistance of fire walls and barriers on examples of special types of constructions.	
11.	Types, characteristics, conditions and application of zoning and construction solutions for protection and moderation of impact of air shock wave of explosion.		Interpretation of types and time of fire resistance of individual components of constructions based on the combination of prescribed label properties of their fire resistance. Evaluation of possible types and levels of resistance and protective action of some construction components to the effects of air shock wave and debris predictable power technological explosion.	
12.	Types, characteristics, conditions and application of zoning and construction solutions for the protection of the explosion debris.		Determination of the length of evacuation, the width of the exit, (temporary) safe location and the time of execution of evacuation in accordance with the nature and purpose of the construction and the characteristics of its users.	
13.	Types and characteristics construction measures for safe evacuation of buildings in case of fire or explosion.		The content and method of verifying validity of components of provided evacuation routes and their necessary technical equipment..	
14.	The key features of fire and explosion safety of acceptable paths, exits and safe zones for evacuation of buildings of different types and purposes.		Identifying types of threats that can protract/prevent the execution of evacuation plan of certain types of construction.	



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15.	The Basics components of the evacuation plan in case of fire or explosion.		The applicability analysis of the evacuation plan of one type of building in case of fire and explosion .	
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References (compulsory / additional)

Compulsory:

Matusinović, Z. (2016). *Konstruktivska protupožarna i protueksplozijska preventiva* (Prezentacija gradiva).
Fišter, S., Kopričanec-Matijevac, Lj. (2001). *Zaštita od požara u graditeljstvu*, Centar za stručno obrazovanje vatrogasnih kadrova, Zagreb.

Kopričanec-Matijevac, Lj. (2001). *Zaštita od požara i zaštita na radu: Vatrootpornost građevnih elemenata i konstrukcija na požar, ispitivanje vatrootpornosti, protupožarna zaštita konstrukcija*. U: *Program stručnog usavršavanja ovlaštenih inženjera arhitekture i građevinarstva*, D. Arbutina (ur.) Tehničko Veleučilište u Zagrebu – Graditeljski odjel, Zagreb, 2008., str. 9-44.

Additional (samo parcijalno, sukladno temi kolegija):

Kopričanec-Matijevac, Lj., *Zatvaranje otvora u protupožarnim konstrukcijama koje omeđuju požarne sektore*. (Internet PDF dokument).

Propisi RH (>1991). Aktualno važeći zakoni, pravilnici, uredbe, odluke i tehničke norme iz područja pasivnog inženjerstva sigurnosti i zaštite od požara i eksplozija (SiZoPiE), *Narodne novine*, Zagreb.



COURSE SYLLABUS

General information

Course title:	Flammable and explosive materials
ISVU course code:	40190, 115380
Course instructor:	Zvonimir Matusinović, PhD, senior lecturer
Course assistant:	-
Study programme and specialization in which the course is taught:	Professional undergraduate study programme with bachelor thesis
ECTS credits:	4.5
Semester of the course execution:	V.
Exam prerequisites:	No
Course objectives:	To familiarize students with the procedures of dealing with explosive and flammable substances. Division of explosives and the ADR Convention on Explosive Substances. Terms and conditions of storage of explosive materials. The mechanisms of detonation, deflagration and detonation thermodynamic theory. Chain reactions and mechanisms.

Course structure

Teaching mode	Number of contact hours per semester:	Student's requirements per teaching mode
Lectures:	30	attendance 80%
Exercises (auditory, linguistics):	30	attendance 100%
Exercises (laboratory, practical):		
Field work:		
Other:		
TOTAL:	60	

Monitoring of students' work and knowledge evaluation during the course

OUTCOMES		ET1	ET2	ET3	ET4	ET5	Total	Pass	Time frame for the recognition of the outcome
Outcome 1	I1: Being able to define flammable and explosive substances. Know the difference between explosives and explosive agents.								During the academic year
Outcome 2	I2: Understand the concept and basics of explosion as a special type of oxidation.								During the academic year
Outcome 3	I3: Classify certain types of explosives and get acquainted with their properties and application.								During the academic year



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Outcome 4	I4: Distinguish chain reactions and mechanisms of action of certain types of explosives.								During the academic year
Outcome 5	I5: Compare the intensity explosion and learn to determine the necessary amount of explosives for destruction in the construction industry.								During the academic year
Outcome 6	I6: Recognize hazards and precautions for handling explosive substances.								During the academic year
Total % grade points									
Share in ECTS									

Knowledge evaluation on exams

Exam prerequisites					
OUTCOMES		Written exam	Oral exam	Total	Pass
Outcome 1	I1: Being able to define flammable and explosive substances. Know the difference between explosives and explosive agents.	10	6	16	8
Outcome 2	I2: Understand the concept and basics of explosion as a special type of oxidation.	10	6	16	8
Outcome 3	I3: Classify certain types of explosives and get acquainted with their properties and application.	10	6	16	8
Outcome 4	I4: Distinguish chain reactions and mechanisms of action of certain types of explosives.	10	6	16	8
Outcome 5	I5: Compare the intensity explosion and learn to determine the necessary amount of explosives for destruction in the construction industry.	10	6	16	8
Outcome 6	I6: Recognize hazards and precautions for handling explosive substances.	10	10	20	10
Total % of grade points		60	40	100	
Share in ECTS		2,7	1,8	4,5	

Review of units per week with associated learning outcomes



COURSE SYLLABUS

Week	Lecture course content and learning outcomes:	Outcome	Exercises course content and learning outcomes:	Outcome
1.	Introduction to explosives		Calculation of explosives to demolish a residential building (size 100 x 40)	
2.	Division of explosives		Calculation of explosives to demolish the chimney (100m)	
3.	ADR - Convention of explosive substances		Calculation of explosives to demolish the basement (60x20)	
4.	Terms and conditions for storing explosive substances		Tour of the Fire Services Association of Karlovac	
5.	The mechanism of deflagration		Professional visit Mirnovec pyrotechnics	
6.	The mechanism of detonation		Presentation of seminar papers Group 1	
7.	Thermodynamics - the theory of detonation			
8.	Chain Reaction and mechanism			
9.	Explosives (types and obtaining)			
10.	Safety when handling the initial explosives			
11.	Transportation of explosives (road, sea and rail through)			
12.	Detonation parameters and budget for explosives			
13.	Determination of explosives for destruction			
14.	Gunpowders.			
15.	Fireworks and firework equipment.			

References (compulsory / additional)

Compulsory:

M. Sućeska, *Eksplodije i eksplozivi*, Brod.institut, Zagreb, 2001.

V. Pavelić, *Zapaljive i eksplozivne tvari*, Zagreb,

P.V. Maksimović, *Tehnologija eksplozivnih materija*, GZH, Zagreb, 1972.