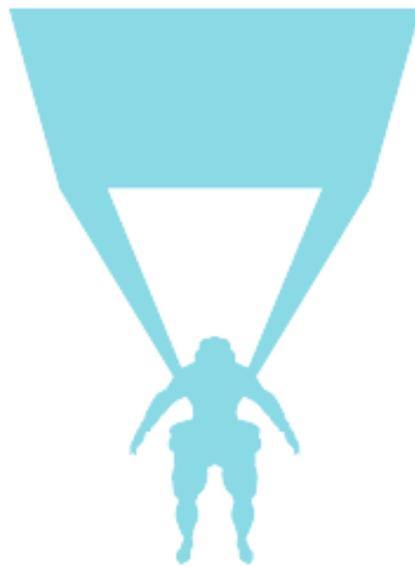


**ŠIBENIK UNIVERSITY OF APPLIED SCIENCES**  
**PROFESSIONAL UNDERGRADUATE STUDY OF**  
**COMPUTING**

Trg Andrije Hebranga 11  
22000 Šibenik



Šibenik, July 2025

**ŠIBENIK UNIVERSITY OF APPLIED SCIENCES**  
**PROFESSIONAL UNDERGRADUATE STUDY OF**  
**COMPUTING**

Trg Andrije Hebranga 11  
22000 Sibenik

**Erasmus+ Course Catalogue**

**Academic year 2026/27**

Dean: PhD. Ljubo Runjić, college prof.

Head of department: PhD. Ivan Livaja, college prof.

Šibenik, May 2026.

## Course list

COURSE	HOLDER	Lectures	ECTS
Mathematics 1	Beljo Ivana	30	6
Mathematics 2	Beljo Ivana	30	6
Basics of programming	Hrga Milan	30	6
Introduction to computer networks	Klarin Zvonimir	30	6
Introduction to web technologies	Hrga Milan	30	6
English language for IT	Goran Crnica	30	3
Probability and statistics	Ana Perišić	30	6
Mobile Application Development	Marko Pavelić	30	6
Database	Ivan Livaja	30	6
Design and analysis of information systems	Frane Urem	30	6
Object-oriented programming	Marko Pavelić	30	6
Software engineering	Frane Urem	30	6

## Full Course Curricula

<b>General information</b>		
<b>Lead instructor</b>	<i>Marko Pavelić, MSc ICT, lecturer</i>	
<b>Course name</b>	Object oriented programming	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	2	
<b>Number of credits and mode of delivery</b>	ECTS student workload coefficient	6
	Number of hours (L+P+S)	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
The goal of the course is to familiarize students with the fundamental principles of object-oriented programming and principles. Course is based on Java programming language as an example of OOP paradigm.		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Write a simple program based on object-oriented principles and UML paradigms</li> <li>2. Select the option of developing applications in object-oriented or procedural programming language</li> <li>3. Organize application parts into classes, interfaces, and packages in accordance with object-oriented programming principles</li> <li>4. Create an object-oriented model of the class hierarchy on which the implementation of the application will be based</li> <li>5. Self-assess whether more complex classes need to be structured into simpler ones for better modularity</li> <li>6. Organize the classes so that they use the other application components over other classes</li> </ol>		
<b>1.4. Course content</b>		
The course includes the acquisition of knowledge from the object oriented programming using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration and simulation methods, collaborative learning according to the class schedule:		
<ol style="list-style-type: none"> <li>1. Introduction to Object Oriented Design</li> <li>2. Objects and Classes, Class and Object Parts, Inheritance with Examples</li> <li>3. Constructors and Object Creation</li> <li>4. Defining Relationships Between Objects, Polymorphism, Object Encapsulation</li> <li>5. UML – Introduction, Class Diagrams</li> <li>6. Interfaces and Abstract Classes</li> <li>7. Generics</li> <li>8. Collections</li> <li>9. Working with Files</li> <li>10. Inner and Nested Classes</li> <li>11. Collections and Custom Classes</li> </ol>		

- 12. Stream API
- 13. Programming in Object Oriented Languages - Syntax and Language Architecture - practical examples
- 14. Programming in Object Oriented Languages - Syntax and Language Architecture - practical examples
- 15. Programming in Object Oriented Languages - Syntax and Language Architecture - practical examples

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input checked="" type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2		Final exam
Description	Preparation for teaching units Understanding previous content	Preparation/learning Theoretical knowledge		Preparation/learning Theoretical knowledge	

		Participation in solving tasks together	Scoring and grading according to correct answers in the test.	Scoring and grading according to correct answers in the test.
	Points: min. - max.	0 - 20	0 - 80	0 - 80
	Minimum number of points - passing threshold	10	40	40
	Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
<ol style="list-style-type: none"> <li>Attend classes regularly</li> <li>Actively participate in classes</li> </ol>				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### **1.9. Required readings and number of copies relative to the number of students currently taking the course**

<b>Title</b>	<b>Number of copies</b>	<b>Number of students</b>
Booch, Grady, Object-Oriented Analysis and Design with Applications, Addison-Wesley, 1997.		
Eckel B. Thinking in JAVA. Prentice Hall Professional; 2003.		

#### **1.10. Supplementary readings**

#### **1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences**

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

## General information

**Lead instructor**

*Marko Pavelić, MSc ICT, lecturer*

**Course name**

**Mobile Application Development**

**Study programme**

**Professional undergraduate study in Computing**

**Course status**

**E**

**Year**

**3**

**Number of credits and mode of delivery****ECTS student workload coefficient**

**6**

**Number of hours (L+P+S)**

**30 + 30 + 0**

## Course description

### 1.1. Course aims

Acquiring knowledge in mobile application programming based on Android OS. To train students for independent and team work in the application, methodology, methods and techniques of mobile application programming. By acquiring and using knowledge from the course, students will understand that creating a mobile application consists of multiple networked segments that need to be taken into account.

### 1.2. Course enrolment requirements

There are no course enrolment requirements.

### 1.3. Intended course learning outcomes

1. Define the architecture and role of wireless telecommunications in modern human life.
2. Distinguish between types of wireless telecommunications systems and their role.
3. Evaluate standard architectural components of mobile applications and apply them when implementing user requirements.
4. Implement the data layer of a mobile application.
5. Evaluate the architecture of the mobile ecosystem in accordance with the given project task.
6. Implement a mobile application using advanced graphical interface elements in accordance with the given project task.

### 1.4. Course content

The course includes acquiring knowledge of mobile application development using the following teaching methods: lecture, presentation, practice, problem-based learning, teamwork, independent reading of suggested literature, demonstration methods, collaborative learning according to the class schedule:

1. Introduction to the course and detailed syllabus
2. Introduction to the programming framework for developing mobile applications (Outcome: 1, 2)
3. Elements of mobile applications (Outcome: 3)
4. Basic elements of the graphical interface of mobile applications (1) (Outcome: 3)
5. Basic elements of the graphical interface of mobile applications (2) (Outcome: 3)
6. Basic elements of the graphical interface of mobile applications (3) (Outcome: 3)
7. Basic elements of mobile application functionality (1) (Outcome: 4)
8. Basic elements of mobile application functionality (2) (Outcome: 4)
9. Basic elements of mobile application functionality (3) (Outcome: 5)
10. Advanced concepts of mobile applications (1) (Outcome: 5)
11. Advanced concepts of mobile applications (2) (Outcome: 5)
12. Advanced concepts of mobile applications (3) (Outcome: 5, 6)
13. Development of a mobile application (1) (Outcome: 5, 6)
14. Mobile Application Development (2) (Outcome: 5, 6)

15. Mobile Application Development (3) (Outcome: 5, 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other

**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Number of hours</b>	<b>ECTS</b>	<b>points min. - max.</b>
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2		Final exam
Description	Preparation for teaching units Understanding previous content Participation in solving tasks	Preparation/learning Theoretical knowledge		Preparation/learning Theoretical knowledge	

		together		
Points: min. - max.		0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold		10	40	40
Total points		0 - 100		
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
1. Attend classes regularly				
2. Actively participate in classes				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
1. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.				
2. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.				
3. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Head First Android Development 2e: A Brain-Friendly Guide Paperback – Dawn Griffiths , David Griffiths ISBN:9781491974056		

#### 1.10. Supplementary readings

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers` surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>Ivana Beljo, univ. spec. oec., dipl. ing. mat., senior lecturer</i>	
	<i>Luca Olivari, mag. math., lecturer</i>	
<b>Course name</b>	<b>Mathematics 1</b>	
<b>Study programme</b>	<b>Professional undergraduate study in Computing</b>	
<b>Course status</b>	<b>M</b>	
<b>Year</b>	<b>1</b>	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	<b>6</b>
	<b>Number of hours (L+P+S)</b>	<b>30 + 30 + 0</b>
<b>Course description</b>		
<b>1.1. Course aims</b>		
Introducing students to the fundamental concepts of functions of single variable, which they can apply in different courses. Adopting analytical skills, logical and critical thinking skills.		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Calculate the limit of a given function</li> <li>2. Differentiate single-variable functions</li> <li>3. Examine the behavior of a single-variable function</li> <li>4. Solve an integral using the appropriate method of integration</li> <li>5. Apply methods of functional analysis to model and solve problems in various sciences</li> </ol>		
<b>1.4. Course content</b>		
<p>The course includes the acquisition of knowledge from the basics of functions of one variable using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:</p> <ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Function, Basic terms, Elementary functions. (Learning outcome: 1)</li> <li>3. Composition of the functions. (Learning outcome: 1)</li> <li>4. Limit of a function. Continuity of a function. (Outcome: 1, 2)</li> <li>5. Derivatives. Derivative of basic functions. (Outcome: 2, 3)</li> <li>6. Derivatives of a composite function. (Outcome: 3)</li> <li>7. Intervals of monotonicity and extrema of a function. (Outcome: 2, 3)</li> <li>8. Asymptotes of a function. (Outcome: 2, 3)</li> <li>9. Examination of the behavior of a function. Convexity and concavity of a function. (Outcome: 1, 2, 3)</li> <li>10. Application of differential calculus. (Outcome: 3, 5)</li> <li>11. Indefinite integral. Methods of integration. (Outcome: 4)</li> <li>12. Substitution method. (Outcome: 4)</li> </ol>		

- 13. Integration by parts. (Outcome: 4)
- 14. Definite integral. (Outcome: 4)
- 15. Application of the definite integral. (Outcome: 4, 5)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input checked="" type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input type="checkbox"/>	Participation in class	<input type="checkbox"/>	Seminar paper	<input type="checkbox"/>	Experimental work	<input type="checkbox"/>
Written exam	<input type="checkbox"/>	Oral exam	<input type="checkbox"/>	Essay	<input type="checkbox"/>	Research	<input type="checkbox"/>
Project	<input type="checkbox"/>	Continuous assessment of knowledge	<input type="checkbox"/>	Student report	<input type="checkbox"/>	Practical work	<input type="checkbox"/>
Portfolio	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2	Final exam	
Description	Preparation for teaching units Understanding previous content Participation in	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

		solving tasks together	Scoring and grading according to correct answers in the test.	Scoring and grading according to correct answers in the test.
Points: min. - max.		0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold		10	40	40
Total points	0 - 100			
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
1. Attend classes regularly				
2. Actively participate in classes				
Final exam - evaluation criteria				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
<ol style="list-style-type: none"> <li>1. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>2. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>3. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>				

**Final grade**

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the colloquium or final exam. (minimum -classes 50% + colloquium or final exam 50%)(minimum threshold – classes 50% + colloquium or final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

**1.9. Required readings and number of copies relative to the number of students currently taking the course**

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Marušić, S.: Matematika I, Zagreb, 2007.	10	50
Beljo, I., Olivari, L.: Matematika (available on the e-learning system)	50	50

**1.10. Supplementary readings**

Teaching material and exercises

**1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences**

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>Milan Hrga, mag. ing. comp., lecturer</i>	
<b>Course name</b>	Basics of programming	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	1	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
To teach students how to solve simple problems and implement computing algorithms by using contemporary structural and procedural programming languages		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Implement the designed simple algorithm according to the guidelines using the basic elements in the selected programming language.</li> <li>2. Design a simple problem solution by constructing functions in the selected programming language.</li> <li>3. Implement a simple data-type in the selected programming language according to the described problem.</li> <li>4. Create a solution using the data structure in the selected programming language</li> <li>5. Apply complex mathematical and logical operations on the data container to store more data in the selected programming language.</li> <li>6. Construct a program for reading and writing data to file in the selected programming language</li> </ol>		
<b>1.4. Course content</b>		
<p>The course includes the acquisition of knowledge from the basics of programming fundamentals of one variable using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:</p> <ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Programming languages history, first C-program, variables (Learning outcome: 1)</li> <li>3. Number systems, variable types (Learning outcome: 1)</li> <li>4. Algorithm definition, expressions and operators (Learning outcome: 1)</li> <li>5. Program flow control (Learning outcome: 1, 2)</li> <li>6. Loops (Learning outcome: 1, 2, 3)</li> <li>7. Arrays (Learning outcome: 2, 3)</li> <li>8. Functions (Learning outcome: 2, 3, 4)</li> <li>9. Pointers (Learning outcome: 3, 4, 5)</li> <li>10. Pointers and functions (Learning outcome: 3, 4, 5)</li> <li>11. Pointers and arrays, dynamic memory allocation, recursion (Learning outcome: 3, 4, 5)</li> <li>12. Character arrays (strings), formatted input and output (Learning outcome: 3, 4, 5)</li> <li>13. Formatted files and structures (Learning outcome: 4, 5, 6)</li> <li>14. Unformatted files and unions (Learning outcome: 4, 5, 6)</li> </ol>		

15. Advanced programming techniques (function pointers, variable number of parameters, important algorithms overview) (Learning outcome: 4, 5, 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other

**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Number of hours</b>	<b>ECTS</b>	<b>points min. - max.</b>
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2	Final exam	
Description	Preparation for teaching units Understanding previous content Participation in solving tasks	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

		together	Scoring and grading according to correct answers in the test.	Scoring and grading according to correct answers in the test.
	Points: min. - max.	0 - 20	0 - 80	0 - 80
	Minimum number of points - passing threshold	10	40	40
	Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
<ol style="list-style-type: none"> <li>Attend classes regularly</li> <li>Actively participate in classes</li> </ol>				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
J.Šribar, B. Motik: Demistificirani C++, Zagreb, 2014.	10	50
A.Lovrenčić, M. Konecki: Programiranje u 14 lekcija ,Varaždin, 2017.	10	10

#### 1.10. Supplementary readings

Frank Friedman, Elliot Koffman: Problem Solving, Abstraction and Design Using C++, Pierson/Addison Wesley, 5th ed.

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers` surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>Goran Crnica, prof., senior lecturer</i>	
<b>Course name</b>	English language for IT	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	1	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	<b>3</b>
	<b>Number of hours (L+P+S)</b>	<b>30 + 15 + 0</b>
<b>Course description</b>		
<b>1.1. Course aims</b>		
The goal of the course is the acquisition and development of business English language skills with an emphasis on the application of professional IT vocabulary.		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Define keywords from the field of English for IT</li> <li>2. Apply grammatical structures and vocabulary from the field of English for IT</li> <li>3. Independently present content from the area of English language for IT</li> <li>4. Analyze moderately difficult professional texts</li> <li>5. Critically argue your views on the topic of English for IT</li> <li>6. Use part of the general language competencies at level B1 of the Common European Language Framework (CEF) to create new ideas</li> </ol>		
<b>1.4. Course content</b>		
The course includes the acquisition of knowledge of the English language in the field of IT using the following teaching methods: lectures, presentations, work on the text, exercises, team work, independent reading of the proposed literature, holding discussions, collaborative learning according to the class schedule:		
<ol style="list-style-type: none"> <li>1. Introduction to the course and detailed lesson plan</li> <li>2. Companies; Career skills: Talking about your job and hierarchy (Learning outcome: 1)</li> <li>3. Present tenses; Self-evaluation test (present tenses) (Learning outcome: 1, 2)</li> <li>4. Leadership; Career skills: Getting things done (Learning outcome: 1, 2, 3)</li> <li>5. Past tenses; Self-evaluation test (past tenses) (Learning outcome: 1, 2, 3, 4)</li> <li>6. Strategy; Giving; Career skills: Giving short presentations (Learning outcome: 2, 3, 4)</li> <li>7. Future tenses; Self-evaluation test (future forms) (Learning outcome: 2, 3, 4)</li> <li>8. Review 1 (Unit 1-3 language and vocabulary); Discussion on review 1 (Learning outcome: 1, 2, 3, 4)</li> <li>9. Pay; Career skills: Evaluating performance (Learning outcome: 4, 5)</li> <li>10. Present perfect and past simple; Self-evaluation test (present perfect and past simple) (Learning outcome: 4, 5, 6)</li> <li>11. Development; Career skills: Showing cause and effect (Learning outcome: 4, 5)</li> <li>12. Modal verbs and modal verbs of likelihood; Self-evaluation test (modal verbs and modal verbs of likelihood) (Learning outcome: 4, 5, 6)</li> <li>13. Marketing; Career skills: Considering alternatives (Learning outcome: 4, 5, 6)</li> </ol>		

14. Comparatives and superlatives; Self-evaluation test (comparatives and superlatives) (Learning outcome: 4, 5, 6)

15. Review 2 (Unit 4-6, language and vocabulary); Final discussion (Learning outcome: 4, 5, 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other

**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge		Student report		Practical work	
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Number of hours</b>	<b>ECTS</b>	<b>points min. - max.</b>
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2	Final exam	
Description	Preparation for teaching units Understanding previous content Participation in	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

		solving tasks together	Scoring and grading according to correct answers in the test.	Scoring and grading according to correct answers in the test.
Points: min. - max.		0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold		10	40	40
Total points	0 - 100			
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
<ol style="list-style-type: none"> <li>Attend classes regularly</li> <li>Actively participate in classes</li> </ol>				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Trappe, T., & Tullis, G. (2005). Intelligent Business Coursebook: Intermediate Business English. Pearson Longman	10	50

#### 1.10. Supplementary readings

Krasnenko, O. M., Kucheriava, L. V., & Rebenko, M. Yu. (2019). Professional English in IT: Textbook. NUBiP Ukraine.

<https://learnenglish.britishcouncil.org/business-english>

<https://breakingnewsenglish.com/technology.html>

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

**General information**

<b>Lead instructor</b>	<i>Ivana Beljo, univ. spec. oec., dipl. ing. mat., senior lecturer</i>	
	<i>Luca Olivari, mag. math., lecturer</i>	
<b>Course name</b>	<b>Mathematics 2</b>	
<b>Study programme</b>	<b>Professional undergraduate study in Computing</b>	
<b>Course status</b>	<b>M</b>	
<b>Year</b>	<b>1</b>	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	<b>6</b>
	<b>Number of hours (L+P+S)</b>	<b>30 + 30 + 0</b>

**Course description****1.1. Course aims**

The goal is to introduce students to the basic concepts of linear algebra and discrete mathematics, which can later be applied in other courses, as well as to develop skills in analytical and logical thinking and reasoning.

**1.2. Course enrolment requirements**

There are no requirements for enrolling in the course, but taking the course is only possible after successfully passing the course Mathematics 1.

**1.3. Intended course learning outcomes**

1. Perform basic computational operations with matrices and vectors.
2. Recommend a method for solving systems of linear equations and solve the system.
3. Perform basic set operations and solve problems in logic.
4. Define basic concepts and solve problems in combinatorics.
5. Solve a linear problem using recursive techniques.
6. Apply basic concepts of graph theory to practical problems.

**1.4. Course content**

The course includes the acquisition of knowledge from the basics of derivatives and integrals using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:

1. Introduction into the course and detailed plan.
2. Matrices and determinants. (Outcome: 1, 2)
3. Inverse matrix. (Outcome: 1, 2)
4. Systems of linear equations. (Outcome: 1, 2)
5. Matrix operations and applications. (Outcome: 1, 2)
6. Vectors. (Outcome: 1, 2)
7. Scalar, vector, and mixed product of vectors. (Outcome: 1, 2)
8. Mathematical logic. (Outcome: 3)
9. Sets. Logical sets. (Outcome: 3)
10. Fundamentals of combinatorics. (Outcome: 4)
11. Variations, permutations, combinations without and with repetition. (Outcome: 4)
12. Recursion and induction. (Outcome: 5)
13. Fundamentals of graph theory. (Outcome: 6)
14. Optimization algorithms. Shortest path problem. Chinese postman problem. Traveling salesman problem. (Outcome: 6)

15. Optimization algorithms. Minimum spanning tree. Critical path problem. (Outcome: 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other

**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	<b>Activities</b>	<b>Outcomes</b>	<b>Number of hours</b>	<b>ECTS</b>	<b>points min. - max.</b>
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2	Final exam	
Description	Preparation for teaching units Understanding previous content Participation in solving tasks	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

		together		
Points: min. - max.		0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold		10	40	40
Total points	0 - 100			
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
1. Attend classes regularly				
2. Actively participate in classes				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
1. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.				
2. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.				
3. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Marušić, S.: Matematika I, Zagreb, 2007.	10	50
Beljo, I., Olivari, L.: Matematika (available on the e-learning system)	50	50

#### 1.10. Supplementary readings

Teaching material and exercises

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>Zvonimir Klarin, mag .ing. comp., lecturer</i>	
<b>Course name</b>	Introduction to Computer Networks	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	1	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
<ul style="list-style-type: none"> <li>- Understanding the architecture of a computer network</li> <li>- Mastering the terminology and technologies of computer networks</li> <li>- Acquiring basic knowledge about transmission media, network devices, and standards</li> <li>- Using reference models to explain network communication</li> <li>- Applying tools for network traffic analysis</li> <li>- Designing and addressing smaller networks</li> <li>- Implementing smaller networks in a network simulator</li> <li>- Understanding the principles and application of structured cabling in network infrastructures</li> </ul>		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Define the role of computer networks and network technologies in the context of modern business.</li> <li>2. Define the technologies used in computer networks with regard to their role in communication.</li> <li>3. Use OSI and TCP/IP reference models to explain communication in a computer network.</li> <li>4. Define the steps in the process of establishing communication between two computers.</li> <li>5. Analyze computer communication in a computer network using software tools.</li> <li>6. Develop skills for solving addressing problems in simple networks.</li> </ol>		
<b>1.4. Course content</b>		
<p>The course includes the acquisition of knowledge of a computer network using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:</p> <ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Overview of computer networks: history, topologies, network components, and trends (Learning outcome: 1)</li> <li>3. Basics of data transmission and network protocols, overview of standards, reference models, and addressing (Learning outcome: 1, 2)</li> <li>4. Overview of OSI layers, Internet architecture, network devices (Learning outcome: 2, 3)</li> <li>5. Physical layer of the OSI model: standards, media, structured cabling (Learning outcome: 3)</li> <li>6. Data link layer of the OSI model: data sublayers, Ethernet technologies (Learning outcome: 3)</li> <li>7. Data layer of the OSI model: Ethernet technologies (Outcome: 3)</li> <li>8. Network layer of the OSI model: IP encapsulation, IP packet headers, routing (Outcome: 3)</li> </ol>		

9. IPv4 addressing: IPv4 address, subnet mask, determining the network address, unicast, broadcast, and multicast addresses (Outcome: 4, 5, 6)
10. IPv4 addressing: private and public IPv4 addresses, class-based addressing, IPv4 subnetting (Outcome: 4, 5, 6)
11. IPv6 addressing: types of IPv6 addresses, IPv6 subnetting (Outcome: 4, 5, 6)
12. Address resolution and ICMP protocols (Outcome: 4, 5, 6)
13. Transport layer of the OSI model: TCP and UDP protocols, ports, flow control, and congestion control (Outcome: 4, 5, 6)
14. Application layer of the OSI model: TCP/IP application layer protocols (Outcome: 4, 5, 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1+ Colloquium 2	Final exam	

	Description	Preparation for teaching units Understanding previous content Participation in solving tasks together	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.
	Points: min. - max.	0 - 20	0 - 80	0 - 80
	Minimum number of points - passing threshold	10	40	40
	Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation	
	50 points	90-100	5 (excellent)	
		80-89.9	4 (very good)	
		65-79.9	3 (good)	
		50-64.9	2 (enough)	
<b>Conditions for taking the final exam</b>				
1. Attend classes regularly 2. Actively participate in classes				
<b>Final exam - evaluation criteria</b>				
The final exam consists of: written / oral exam.				
The course can be passed in three ways:				
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>				

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Cisco Networking Academy (2020) Introduction to Networks Companion Guide (CCNAv7), Pearson, 1st Edition	10	50

#### 1.10. Supplementary readings

A. Bažant i dr.: Osnove arhitekture mreža, Element, Zagreb, 2014.

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>Milan Hrga, mag. ing. comp., lecturer</i>	
<b>Course name</b>	Introduction to Web Technologies	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	1	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
To introduce students to practical and theoretical aspects of using HTML and CSS, the basic markup languages for making the Web based content and layout. Students will learn how to design and code Web pages. The process of building a modern Web site will be presented (from buying a domain name to Web site finalization).		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Create the website structure according to the detailed specification.</li> <li>2. Stylize the layout of the website.</li> <li>3. Structure the layout of the website using client scripting.</li> <li>4. With standard client scripting libraries enhance the website structure.</li> <li>5. Analyze user needs for a content management system in accordance with the assigned project task.</li> <li>6. Propose a content management system solution that meets the analyzed user criterium.</li> <li>7. Implement a solution based on a content management system that meets the analyzed user criterium.</li> </ol>		
<b>1.4. Course content</b>		
The course includes the acquisition of knowledge of web technologies using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:		
<ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Basics of web pages building. Website design technologies (Learning outcome: 1)</li> <li>3. Marketing Aspects in Website Design (Learning outcome: 1, 2)</li> <li>4. Basic syntax. Absolute and relative links (Learning outcome: 1, 2, 3)</li> <li>5. Introduction to HTML5 (Learning outcome: 1, 2, 3, 4)</li> <li>6. Introduction to CSS3 (Learning outcome: 1, 2, 3, 4)</li> <li>7. Position of a code in CSS and the relation to HTML. (Learning outcome: 1, 2, 3, 4)</li> <li>8. Website layout and basic design (Learning outcome: 5, 6, 7)</li> <li>9. Creating horizontal and vertical menus (Learning outcome: 5, 6, 7)</li> <li>10. Introduction to JavaScript (Learning outcome: 5, 6, 7)</li> <li>11. Responsive Website Design Technology (RWD) (Learning outcome: 5, 6, 7)</li> <li>12. Image navigation and image manipulation (Learning outcome: 5, 6, 7)</li> <li>13. Multimedia content (Learning outcome: 5, 6, 7)</li> <li>14. Web browser development tools (Learning outcome: 5, 6, 7)</li> <li>15. Future-learning technologies (Learning outcome: 5, 6, 7)</li> </ol>		

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input checked="" type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

Monitoring and evaluation of students' work	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	Evaluation criteria	Activities in class	Colloquium 1+ Colloquium 2	Final exam	
Description	Preparation for teaching units Understanding previous content Participation in solving tasks together	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.		

Points: min. - max.	0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold	10	40	40
Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation
	50 points	90-100	5 (excellent)
		80-89.9	4 (very good)
		65-79.9	3 (good)
		50-64.9	2 (enough)
<b>Conditions for taking the final exam</b>			
<ol style="list-style-type: none"> <li>1. Attend classes regularly</li> <li>2. Actively participate in classe</li> </ol>			
<b>Final exam - evaluation criteria</b>			
The final exam consists of: written / oral exam.			
The course can be passed in three ways:			
<ol style="list-style-type: none"> <li>1. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>2. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>3. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>			

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
Poglavlja W3Schoolsa s e-tutorijalima o HTML-u, XHTML-u i CSS-u ( <a href="http://www.w3schools.com/">http://www.w3schools.com/</a> )	50	50
Ben Frain: Responsive Web Design with HTML5 and CSS, 2020	10	50

#### 1.10. Supplementary readings

M. MacDonald, HTML5 - The Missing Manual, O'Reilly, 2014.

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>PhD Ana Perišić, college professor</i>	
<b>Course name</b>	Probability and statistics	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	2	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
Acquiring knowledge in probability theory and statistics, mastering skills necessary for independent statistical analysis, and acquiring skills in the use of statistical programming tools.		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Perform data grouping and calculate basic statistical quantities over grouped and ungrouped data.</li> <li>2. Determine the probability distribution of discrete random variables and calculate probabilities.</li> <li>3. Determine the probability distribution function of a continuous random variable and calculate probabilities.</li> <li>4. Calculate the probability of simple and complex events over finite and infinite outcome space.</li> <li>5. Calculate the probability of an event using the total probability formula and the Bayes formula.</li> <li>6. Estimate the parameters, calculate the standard error. Construct a confidence interval.</li> <li>7. Conduct a statistical test.</li> <li>8. Determine and interpret the parameters of the linear regression model between two quantities by the least squares method.</li> </ol>		
<b>1.4. Course content</b>		
<p>The course includes the acquisition of knowledge in probability and statistics using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:</p> <ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Descriptive statistics. Tabular and graphical methods. (Learning outcome: 1)</li> <li>3. Measures of central tendency, dispersion measures, measures of asymmetry, measures of kurtosis. Standardized value. Data distribution rules. (Learning outcome: 1)</li> <li>4. Probability. Discrete probability space. Infinite probability space. Geometric probability. (Learning outcome: 4)</li> <li>5. Conditional probability. Independence. The formula of total probability. Bayesian formula. (Learning outcome: 4, 5)</li> <li>6. Discrete random variables. Marginal distributions. Conditional distributions. Examples of discrete distributions. (Learning outcome: 2)</li> <li>7. Continuous random variables. Functions of distribution and density functions, Functions of random variables. (Learning outcome: 3)</li> </ol>		

8. Examples of continuous distributions. (Learning outcome: 3)
9. Point estimators. Unbiasedness. Standard error. (Learning outcome: 6)
10. Confidence intervals. (Learning outcome: 6)
11. Interval estimates for the expectation, variance, proportion. (Learning outcome: 6)
12. Hypothesis testing and associated errors. (Learning outcome: 7)
13. Comparison of parameters. (Learning outcome: 6, 7)
14. Chi-square test (goodness of fit test. independence test. homogeneity test) (Learning outcome: 7)
15. Linear regression, Correlation (Learning outcome: 8)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input checked="" type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1/written	Colloquium 2/written	

Description	Preparation for teaching units	Preparation/learning	Preparation/learning
	Understanding previous content	Theoretical knowledge	Theoretical knowledge
	Participation in solving tasks		
Points: min. - max.	0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold	10	40	40
Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation
	50 points	90-100	5 (excellent)
		80-89.9	4 (very good)
		65-79.9	3 (good)
		50-64.9	2 (enough)
<b>Conditions for taking the final exam</b>			
1. Attend classes regularly			
2. Actively participate in classes			
<b>Final exam - evaluation criteria</b>			
The final exam consists of: written / oral exam.			
The course can be passed in three ways:			
1. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.			
2. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.			
3. Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.			

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
N. Elezović, Vjerojatnost i statistika. Element, Zagreb. ISBN 978-953197-591-9	10	50
H.Wickham, G.Grolemund. R for Data Science (dostupno online besplatno)	50	50

#### 1.10. Supplementary readings

1. Priručnici za korištenje R-a (npr. W.N. Venables i D.M. Smith

(M.Kumbatović, Kasum D.), Uvod u korištenje R-a)

2. Andrew Bruce, Peter Gedeck. Practical Statistics for Data Scientists. O'Reilly Media, Inc, USA.

3. N.Elezović. Vjerojatnost i statistika : Diskretna vjerojatnost ISBN 978-953-197-539-1

4. N.Elezović. Vjerojatnost i statistika : Slučajne varijable. ISBN 978-953-197-540-7

5. N.Elezović. Vjerojatnost i statistika : Matematička statistika, stohastički procesi. ISBN 978-953-197-542-1

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>PhD Ivan Livaja, senior lecturer</i>	
<b>Course name</b>	Databases	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	2	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
Students will develop skills in the use of databases, i.e. successfully communicate with clients, users and colleagues verbally and in writing, using appropriate terminology, including the ability to communicate about the profession in a foreign language.		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Use common commands to manage data in a relational database.</li> <li>2. Create queries over the relational database using system and aggregate functions and grouping.</li> <li>3. Apply subqueries when creating a more complex query over a relational database.</li> <li>4. Construct views and triggers in a relational database.</li> <li>5. Use common commands to create CRUD operations in a relational database</li> <li>6. Ability to design and normalized database</li> </ol>		
<b>1.4. Course content</b>		
The course includes the acquisition of knowledge in databases using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:		
<ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan.</li> <li>2. Primary and foreign, database design (Learning outcome: 1)</li> <li>3. Data types (Learning outcome: 1)</li> <li>4. Basic DDL and DML clauses (Learning outcome: 1, 2)</li> <li>5. String, date, and agregate functions, NULL values (Learning outcome: 1, 2)</li> <li>6. Cartesian product, natural join. Join (Learning outcome: 1, 2, 3)</li> <li>7. Group by, having (Learning outcome: 1, 2, 3)</li> <li>8. Subselect (Learning outcome: 3)</li> <li>9. Query optimization (Learning outcome: 2, 3, 4)</li> <li>10. Keys, indexes, full text indexes (Learning outcome: 5)</li> <li>11. Data normalization (Learning outcome: 6)</li> <li>12. Construction of the ERA diagram based on the requirements specification (Learning outcome: 6)</li> <li>13. Implementation of the database based on the diagram (Learning outcome: 6)</li> <li>14. Creating and restoring database backups (Learning outcome: 6)</li> <li>15. Working with another database system and tools (Learning outcome: 1, 2, 3, 4, 5, 6)</li> </ol>		

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>				[x] lectures [ ] seminars and workshops [x] practicals [ ] remote learning [ ] field work	[ x ] independent work [ ] multimedia and network [ ] laboratory [ ] supervision [ ] other	
<b>1.6. Student obligations</b>						
Regular and conscientious attendance of all forms of teaching.						
<b>1.7. Monitoring student work (mark the appropriate boxes with an X)</b>						
Class attendance	[x]	Participation in class	[x]	Seminar paper	Experimental work	
Written exam	[x]	Oral exam	[x]	Essay	Research	
Project		Continuous assessment of knowledge	[x]	Student report	Practical work	
Portfolio						
<b>1.8. Assessment and evaluation of student work during classes and the final exam</b>						
<b>Monitoring and evaluation of students' work</b>		<b>Activities</b>	<b>Outcomes</b>	<b>Number of hours</b>	<b>ECTS</b>	<b>points min. - max.</b>
		1. Attending and activities in class	1 – 5	90	3	0 - 20
		2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
		3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
		<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
		4. Final exam (written + oral)	1 – 5	90	3	0 - 80
		<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
		<b>Evaluation criteria</b>	Activities in class	Colloquium 1/written	Colloquium 2/written	
		Description	Preparation for teaching units Understanding previous content Participation in solving tasks together	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.	Preparation/learning Theoretical knowledge Scoring and grading according to correct answers in the test.	

Points: min. - max.	0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold	10	40	40
Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation
	50 points	90-100	5 (excellent)
		80-89.9	4 (very good)
		65-79.9	3 (good)
		50-64.9	2 (enough)
<b>Conditions for taking the final exam</b>			
<ol style="list-style-type: none"> <li>Attend classes regularly</li> <li>Actively participate in classes</li> </ol>			
<b>Final exam - evaluation criteria</b>			
The final exam consists of: written / oral exam.			
The course can be passed in three ways:			
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>			

**Final grade**

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

**1.9. Required readings and number of copies relative to the number of students currently taking the course**

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
Robert Manger, Baze podataka, Element, 2012.	10	50
Nastavni materijali na e-learning sustavu VUŠ-a za kolegij : Uvod u baze podataka	50	50

**1.10. Supplementary readings**

C.J. Date (2003). An Introduction to Database Systems, 8th Edition, Addison Wesley  
Mladen Varga (2012). Upravljanje podacima, Element

**1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences**

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

<b>General information</b>		
<b>Lead instructor</b>	<i>PhD Frane Urem, college professor with tenure</i>	
<b>Course name</b>	Design and Analysis of Information Systems	
<b>Study programme</b>	Professional undergraduate study in Computing	
<b>Course status</b>	M	
<b>Year</b>	2	
<b>Number of credits and mode of delivery</b>	<b>ECTS student workload coefficient</b>	6
	<b>Number of hours (L+P+S)</b>	30 + 30 + 0
<b>Course description</b>		
<b>1.1. Course aims</b>		
<b>1.2. Course enrolment requirements</b>		
There are no course enrolment requirements.		
<b>1.3. Intended course learning outcomes</b>		
<ol style="list-style-type: none"> <li>1. Create a software system specification according to user requirements.</li> <li>2. Create a suitable UML diagram for a specific aspect of software system applications and their components.</li> <li>3. Independently create a functionality specification document based on collected and ranked user requirements.</li> <li>4. Design the application according to the given architecture.</li> <li>5. Design programming tasks based on user requirements and recommend their distribution by project iterations.</li> <li>6. Implement the conceptual data model in the selected database.</li> <li>7. Develop a software solution using ORM tools</li> </ol>		
<b>1.4. Course content</b>		
<p>The course includes the acquisition of knowledge in design and analysis of information systems using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:</p> <ol style="list-style-type: none"> <li>1. Introduction into the course and detailed plan</li> <li>2. Introduction into design and analysis of information systems (Learning outcome: 1)</li> <li>3. Information System. (Learning outcome: 2)</li> <li>4. Information System. (Learning outcome: 2)</li> <li>5. Basics of methodologies for the development of information systems. (Learning outcome: 3)</li> <li>6. Basics of methodologies for the development of information systems. (Learning outcome: 3)</li> <li>7. Management of the IS (Information System) development project. (Learning outcome: 4)</li> <li>8. Management of the IS (Information System) development project. (Learning outcome: 4)</li> <li>9. System analysis. (Learning outcome: 5)</li> <li>10. System analysis. (Learning outcome: 5)</li> <li>11. System analysis. (Learning outcome: 5)</li> <li>12. System design. (Learning outcome: 6, 7)</li> <li>13. System design. (Learning outcome: 6, 7)</li> <li>14. System design. (Learning outcome: 6, 7)</li> <li>15. Development, implementation, and maintenance of systems. (Learning outcome: 6, 7)</li> </ol>		

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures <input type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> practicals <input type="checkbox"/> remote learning <input type="checkbox"/> field work	<input type="checkbox"/> independent work <input type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> supervision <input type="checkbox"/> other
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**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

Class attendance	<input checked="" type="checkbox"/>	Participation in class	<input checked="" type="checkbox"/>	Seminar paper		Experimental work	
Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	
Portfolio							

**1.8. Assessment and evaluation of student work during classes and the final exam**

<b>Monitoring and evaluation of students' work</b>	Activities	Outcomes	Number of hours	ECTS	points min. - max.
	1. Attending and activities in class	1 – 5	90	3	0 - 20
	2. Colloquium 1/written	1 – 3	45	1,5	0 - 40
	3. Colloquium 2/written	4 – 5	45	1,5	0 - 40
	<b>In total - continuous teaching (1+2+3)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	4. Final exam (written + oral)	1 – 5	90	3	0 - 80
	<b>In total – examination term (1+4)</b>	<b>1 – 5</b>	<b>180</b>	<b>6</b>	<b>0 – 100</b>
	<b>Evaluation criteria</b>	Activities in class	Colloquium 1/written	Colloquium 2/written	
Description	Preparation for teaching units Understanding previous content Participation in solving tasks together	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

Points: min. - max.	0 - 20	0 - 80	0 - 80
Minimum number of points - passing threshold	10	40	40
Total points	0 - 100		
Overall rating	Passing threshold	Score range	Evaluation
	50 points	90-100	5 (excellent)
		80-89.9	4 (very good)
		65-79.9	3 (good)
		50-64.9	2 (enough)
<b>Conditions for taking the final exam</b>			
<ol style="list-style-type: none"> <li>Attend classes regularly</li> <li>Actively participate in classes</li> </ol>			
<b>Final exam - evaluation criteria</b>			
The final exam consists of: written / oral exam.			
The course can be passed in three ways:			
<ol style="list-style-type: none"> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold and at least 50% in each learning outcome.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both midterm colloquia by achieving the minimum point threshold, but without achieving the minimum of 50% in each learning outcome. In this case, it is possible to take the oral part of the final exam, where the learning outcomes for which the minimum threshold was not met will be examined.</li> <li>Regular attendance and active participation in classes, as well as achieving the minimum point threshold for continuous assessment. Passing both the written and oral parts of the final exam, where it is necessary to achieve the minimum point threshold and at least 50% in each learning outcome. This method of passing also applies when a student requests a higher grade.</li> </ol>			

### Final grade

Formation of the final grade according to the Regulations on studying is the sum of the percentages of acquired knowledge, skills and competencies achieved during classes and the percentages achieved on the final exam. (classes 50% + final exam 50%)

% of acquired knowledge, skills and competencies	Numerical evaluation	ECTS - grade
90-100%	5 (excellent)	A
80 – 89.9%	4 (very good)	B
65 – 79.9 %	3 (good)	C
50 -64.9 %	2 (enough)	D

#### 1.9. Required readings and number of copies relative to the number of students currently taking the course

Title	Number of copies	Number of students
F. Urem, Projektiranje i analiza IS-a, Veleučilište u Šibeniku, 2016., ISBN: 978-953-7566-30-2	10	50

#### 1.10. Supplementary readings

1. J. A. Hoffer, J. F. George, J. S. Valacich: Modern Systems Analysis and Design, 3/e, Prentice Hall College Div, 2001.
2. Eeles, P.; O. Sims, Building Business Objects. John Wiley & Sons, 1998.

#### 1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

Indicators of the quality assurance system: Student survey, internal evaluation of teaching, thematic sessions of the council on the quality of teaching and results, monitoring of annual data from HZZZ (Croatian Employment Service) on the annual state of student employment, employers' surveys and Alumni associations and others.

### General information

Lead instructor	PhD Frane Urem, college professor with tenure	
Course name	Software Engineering	
Study programme	Professional undergraduate study in Computing	
Course status	M	
Year	3	
Number of credits and mode of delivery	ECTS student workload coefficient	6
	Number of hours (L+P+S)	30 + 30 + 0

## Course description

### 1.1. Course aims

This course aims to equip students with efficient use of tools and techniques in software development within project teams. Students will learn to use version control systems, apply different methods of testing application functionalities and features, and develop the ability to create user manuals independently. Additionally, the course will focus on understanding and categorizing agile process frameworks and devising methods for tracking projects in line with the organization's or work group's characteristics. Finally, students will acquire skills necessary for estimating the scope of software releases in the context of agile planning and estimation.

### 1.2. Course enrolment requirements

There are no course enrolment requirements.

### 1.3. Intended course learning outcomes

1. Use the basic functionalities of a selected version control system in a project team.
2. Independently apply different testing types for applications' functionalities and features.
3. Independently create a basic user manual for using a given application.
4. Devise a method for tracking a project based on the organization's or work group's characteristics.
5. Categorize offered features concerning roles, ceremonies, or artifacts in a chosen agile process framework.
6. Calculate the scope estimate of a software release in agile planning and estimation.

### 1.4. Course content

The course includes the acquisition of knowledge in software engineering using the following teaching methods: lectures, presentations, exercises, problem-based teaching, team work, independent reading of the proposed literature, demonstration methods, collaborative learning according to the class schedule:

1. Introduction into the course and detailed plan
2. Introduction to version control systems: Overview of systems like Git and SVN and their basic functionalities. (Learning outcome: 1)
3. Basic operations in version control systems: Detailed learning about commit, push, pull, merge, and branch operations. (Learning outcome: 2)
4. Advanced version control techniques: Understanding and applying advanced functionalities like conflict resolution and change history. (Learning outcome: 3)
5. Agile frameworks and methodologies: Overview of agile process frameworks such as Scrum and Kanban. (Learning outcome: 3)
6. Basics of software testing: Introduction to different types of testing and their importance in the development cycle. (Learning outcome: 2, 3, 4)
7. Unit testing: Creating and executing tests to check individual components of the application. (Learning outcome: 4)
8. Integration testing: Testing interactions between modules or services within the application. (Learning outcome: 5)
9. System testing: Checking the functionality of the entire application and its interface. (Learning outcome: 5)
10. Acceptance testing: Testing according to business requirements and end-user expectations. (Learning outcome: 5)
11. Creating user manuals: Techniques and tools for writing clear and helpful user instructions. (Learning outcome: 5, 6)
12. Roles and responsibilities in agile teams: Understanding how features are categorized in an agile context. (Learning outcome: 5, 6)
13. Ceremonies and artifacts in agile methodologies: In-depth exploration of agile ceremonies like daily stand-up meetings, retrospectives, and sprint reviews. (Learning outcome: 5, 6)

14. Tracking and reporting in agile projects: Tools and methods for monitoring progress and reporting in agile teams. (Learning outcome: 6)
15. Estimation and planning in an agile environment: Techniques for calculating the scope and duration of iterations and releases. (Learning outcome: 6)

<b>1.5. Modes of delivery (mark the appropriate boxes with an X)</b>	<input checked="" type="checkbox"/> lectures	<input checked="" type="checkbox"/> independent work
	<input type="checkbox"/> seminars and workshops	<input type="checkbox"/> multimedia and network
	<input checked="" type="checkbox"/> practicals	<input type="checkbox"/> laboratory
	<input type="checkbox"/> remote learning	<input type="checkbox"/> supervision
	<input type="checkbox"/> field work	<input type="checkbox"/> other

**1.6. Student obligations**

Regular and conscientious attendance of all forms of teaching.

**1.7. Monitoring student work (mark the appropriate boxes with an X)**

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Written exam	<input checked="" type="checkbox"/>	Oral exam	<input checked="" type="checkbox"/>	Essay		Research	
Project		Continuous assessment of knowledge	<input checked="" type="checkbox"/>	Student report		Practical work	<input checked="" type="checkbox"/>
Portfolio							

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	<b>Evaluation criteria</b>	Activities in class	Colloquium 1/written	Colloquium 2/written	
Description	Preparation for teaching units Understanding previous content	Preparation/learning Theoretical knowledge	Preparation/learning Theoretical knowledge		

		Participation in solving tasks together		
Points: min. - max.		0 - 20	0 - 80	0 - 80
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50 -64.9 %	2 (enough)	D

#### **1.9. Required readings and number of copies relative to the number of students currently taking the course**

<i>Title</i>	<i>Number of copies</i>	<i>Number of students</i>
F. Urem, Recenzirani nastavni materijali iz predmeta, dostupno na sustavu za e-učenje	50	50

#### **1.10. Supplementary readings**

- I. Sommerville (2016), "Software Engineering: Global Edition", Pearson Higher Ed
- B. Unhelkar (2017), "Software Engineering with UML", CRC Press

#### **1.11. Methods of quality monitoring that ensure the acquisition of knowledge, skills and competences**

Control of the students' work quality and the acquisition of the necessary knowledge and skills will be ensured through interactive work. By keeping records of students' attendance and activities in class and the information gathered about students' progress through colloquia, the information necessary for further instructions to students will be obtained in order to increase the efficiency of their work. Students will be informed about their rights and obligations, teaching methods and necessary literature.

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