



POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR: 2020/2021

1. GENERAL COURSE INFORMATION

1.1 Course name

Probability and Statistics

1.2 Study program/s

Undergraduate professional study of Computer Science

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1.3 Course status (O,E)	O - obligatory	1.6 Mode of instruction (number of hours)	Lectures	30
1.4 Course code			Exercises	30
1.5 Course abbreviation	ViS		Seminars	
1.6 Semester	III.		E-learning	
1.7 ECTS	6	1.7 Place and time of instruction	Lecture halls of the Polytechnic of Međimurje in Čakovec, according to the class schedule published on the website	
2. TEACHING STAFF				
2.1 Course leader/s-title	mr.sc. Drago Francišković, Senior Lecturer	contact	drago.franciskovic@mev.hr	
		contact		
2.2 Assistant/s- title		contact		
		contact		
2.3 Instruction held by-title	mr.sc. Drago Francišković, Senior Lecturer	contact	drago.franciskovic@mev.hr	
3. COURSE DESCRIPTION				
3.1 Course goals	Introduce students to the basic concepts of descriptive statistics, probabilities and statistical methods and tests. To enable students to use basic methods of descriptive statistics, regression analysis and to demonstrate the application of statistical tests. Encourage students to think, and train them to use the acquired knowledge in other subjects with the use of computers. Raise the general level of mathematical literacy and encourage students to orderliness, accuracy and systematics in problem solving and in written and oral expression.			
3.2 Prerequisites	Passed exam Mathematics I, passed Mathematics II.			
3.3 Course outcomes	<ol style="list-style-type: none"> 1. Apply methods of descriptive statistics (understand and create a table of frequencies; graphically display data; determine environmental measures and scatter measures). R5 2. Apply regression and correlation analysis and draw a conclusion (linear regression). R6 3. Explain the concept of events and the definition of probability, and apply the acquired knowledge and skills in determining the probability of events in various situations. R6 			

	4. Explain the concept of a random variable and functions related to them, and apply various distribution functions and probability functions of a random variable. R6 5. Apply some statistical tests. R5																																																
3.4 Course content																																																	
3.5 Types of coursework	x	Lectures	x	Exercises	x	Blended e-learning	x	Individual activities	x	Laboratory																																							
		Seminars and workshops	x	Distant learning		Field classes		Multimedia and network		Mentorship																																							
		Other	Self-learning from given materials																																														
3.6 Language of instruction																																																	
3.7 Monitoring students' work (enter the number of ECTS credits for each activity so that the total number of ECTS credits is equal to the total ECTS value of the course, 1 ECTS = 30 hours)	2	Class attendance			Seminars			Essay																																									
		Class activity			Project			Report/paper																																									
	2	Midterm exams			Practical task			2	Continuous knowledge check																																								
		Written exam			Experimental work																																												
		Oral exam			Research																																												
3.8 Assessment and evaluation of students' work during classes and at the final exam	<table border="1"> <thead> <tr> <th>Activity specification</th> <th>Percent %</th> <th>Points</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">Evaluation during classes</td> </tr> <tr> <td>Class attendance</td> <td>4,00%</td> <td>6</td> </tr> <tr> <td>Activity during classes</td> <td>12,00%</td> <td>18</td> </tr> <tr> <td>Test 1</td> <td>12,00%</td> <td>18</td> </tr> <tr> <td>Test 2</td> <td>12,00%</td> <td>18</td> </tr> <tr> <td>Test 3</td> <td>12,00%</td> <td>18</td> </tr> <tr> <td>Colloquium 1</td> <td>16,00%</td> <td>24</td> </tr> <tr> <td>Colloquium 2</td> <td>16,00%</td> <td>24</td> </tr> <tr> <td>Colloquium 3</td> <td>16,00%</td> <td>24</td> </tr> <tr> <td colspan="3" style="text-align: center;"><i>Evaluation of exam work for students who did not pass the colloquiums and tests</i></td> </tr> <tr> <td>Written exam</td> <td>86,00%</td> <td>126</td> </tr> <tr> <td>Total:</td> <td>100,00%</td> <td>150</td> </tr> </tbody> </table>										Activity specification	Percent %	Points	Evaluation during classes			Class attendance	4,00%	6	Activity during classes	12,00%	18	Test 1	12,00%	18	Test 2	12,00%	18	Test 3	12,00%	18	Colloquium 1	16,00%	24	Colloquium 2	16,00%	24	Colloquium 3	16,00%	24	<i>Evaluation of exam work for students who did not pass the colloquiums and tests</i>			Written exam	86,00%	126	Total:	100,00%	150
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3.9 Assessment criteria –analysis per learning outcomes	Ways of evaluating learning outcomes																																																
		Continuous knowledge check (tests 1, 2 and 3)	Seminar	Colloquium 1	Colloquium 2	Colloquium 3	Total																																										
	Outcome 1	12		14			26																																										
	Outcome 2	6		10			16																																										
	Outcome 3	18			24		42																																										
	Outcome 4	9				12	21																																										
	Outcome 5	9				12	21																																										
	Outside the outcome						24																																										
	Total	54		20	24	28	150																																										

	<p>Grading of outcomes (in order to pass the mid-term exam/final exam the student must achieve at least 50% points for each learning outcome)</p> <table border="0"> <thead> <tr> <th>Points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>127,50 – 150,00</td> <td>excellent (5)</td> </tr> <tr> <td>112,50 – 127,49</td> <td>very good (4)</td> </tr> <tr> <td>93,75 – 112,49</td> <td>good (3)</td> </tr> <tr> <td>75,00 – 93,74</td> <td>pass (2)</td> </tr> <tr> <td>0,00 – 74,49</td> <td>fail (1)</td> </tr> </tbody> </table>		Points	Grade	127,50 – 150,00	excellent (5)	112,50 – 127,49	very good (4)	93,75 – 112,49	good (3)	75,00 – 93,74	pass (2)	0,00 – 74,49	fail (1)
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127,50 – 150,00	excellent (5)													
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93,75 – 112,49	good (3)													
75,00 – 93,74	pass (2)													
0,00 – 74,49	fail (1)													
<p>3.10 Specific features related with taking the course</p>	<p>During the course, students will write 3 midterm exams. As a rule, midterms are written after every 4 to 5 weeks of classes and cover the learning outcomes covered during that period. As a rule, separate intermediate exams are written separately from theory (tests) and from practical tasks (colloquium). The type of questions and tasks in the midterm exams is defined by the teacher, but all questions and tasks cover the course material or learning outcomes.</p> <p>Regardless of the number of points achieved in an intermediate exam or according to a learning outcome, the student can access all subsequent intermediate exams and other knowledge tests. Only points that are at least 50% of the maximum amount of points per learning outcome are recognized for the final grade.</p> <p>Once student won points in intermediate exams (colloquiums) for each learning outcome are no longer deleted unless the student decides to improve the result for each learning outcome, whereby the points won until then are deleted and newly earned points for that learning outcome are entered if they are more favorable for the students.</p> <p>Student who have not passed all intermediate exams, have the opportunity to correct the exam deadlines on which, as a rule, they take the material in its entirety.</p> <p>Points earned by assignments, attendance and other activities are retained by the student throughout the academic year and can only be corrected exceptionally, with the express approval of the subject teacher.</p>													
<p>3.11 Students obligations</p>	<p>Students have the obligation to attend classes regularly, be active in class and work on learning, practicing and determining the teaching material at home in the fund of hours provided by the ECTS credit system.</p> <p>Full-time students must attend at least 70% of the total number of lecture hours and at least 70% of the total number of practice hours in order to register for the exam. Part-time students must attend at least 50% of the total number of hours of lectures provided for them and at least 50% of the total number of hours of exercises provided for them in order to be able to register for the exam. Otherwise they cannot take the exams and have to re-enroll the subject. Students who for some reason do not have to attend classes are required to periodically contact teachers during classes, by email or by coming to consultations, related to classes and teaching materials.</p> <p>Students who frequently disrupt classes will be removed from class, and their attendance will not be recorded.</p>													
<p>3.12 Written assignments</p>														
<p>3.13 Required reading</p>	<p>1.</p>	<p>I. Urbiha: Vjerojatnost i statistika, 2007. (free teaching materials available to students)</p>												
	<p>3.</p>	<p>Students' own notes from lectures and exercises.</p>												

3.14 Additional reading	1.	Ž. Pauše: Uvod u matematičku statistiku, Školska knjiga, Zagreb, 1993.
	2.	Statistička teorija i primjena, Tehnička knjiga, Zagreb, 1988.
	3.	M. Ilijašević, Ž. Pauše: Riješeni primjeri i zadaci iz vjerojatnosti i statistike, Zagreb, 1990.

4 ADDITIONAL COURSE INFORMATION

4.1 Quality control	In accordance with the acts of the Polytechnic of Međimurje in Čakovec.
4.2 Contact the teacher	Students can contact the teacher during the consultation period (two hours per week) and during classes, while for short questions and explanations they can contact any day during working hours by coming in person or by landline. It is also possible to ask questions by e-mail, which will be answered as soon as possible (except during weekends or holidays). It is recommended that students come for consultations as often as possible during the learning period, ie during the teaching period.
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the holding or possible postponement of classes will be posted on the bulletin board and on the website of the Polytechnic at least 24 hours in advance.
4.4 Course contribution to the study program	Apply the acquired learning skills, basic knowledge of the profession and problem solving necessary for continuing studies at a higher level. Apply relevant mathematical and statistical methods in software engineering.

5. ANALYSIS OF COURSE TOPICS (the number of hours is equal to the number of lectures and exercises of the course)

LECTURES				
Hours	Topic and description	Method	Learning outcomes	Course outcome
		<ul style="list-style-type: none"> • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes... 		
1.	Frequency table, histogram, cumulative function.	Direct teaching and independent work.	Describe and apply the adopted material in practice using a computer	O1
2.	Mode and median. Quartile, percentile, quantile. Arithmetic mean.	Direct teaching and independent work.	Describe and apply the adopted material in practice using a computer	O1
3.	Variance. Standard deviation. Comparison of different	Direct teaching and independent work.	Describe and apply the adopted	O1

	measurements. Comparing different results.		material in practice using a computer	
4.	Linear regression.	Direct teaching and independent work.	Describe and apply the adopted material in practice using a computer	O2
5.	1. test. An event. Classical definition of probability.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O1, O2, O3
6.	Probability of event. Counting principles. Combinatorics.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O3
7.	Probability axioms. Additive formula. Conditional probability. Total probability. Bayesian formula.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O3
8.	Independent events. Discrete random variable. Distribution of a discrete random variable. Expectation, variance, and standard deviation of a discrete random variable.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O3
9.	Probability function. Probability distribution function. Discrete uniform distribution.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O3
10.	2. test. Bernoulli's experiment. Bernoulli's scheme. Binomial random variable.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O3, O4
11.	Poisson random variable.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O4
12.	Continuous random variable. Normal (Gaussian) distribution. Standard normal distribution.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O4
13.	Statistical tests. Testing the expectation hypothesis with known variance.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O5
14.	Chi-square test.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O5

15.	Review of processed material. 3. test.	Direct teaching and independent work.	Describe and apply in practice the adopted materials	O1, O2, O3, O4, O5
EXERCISES/ SEMINARS				
Hours	Topic and description	Method <ul style="list-style-type: none"> • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes... 	Learning outcomes	Course outcome
1.	Frequency table, histogram, cumulative function.	Direct teaching and independent work	Adopt and apply the acquired skills in practice using a computer	O1
2.	Mode and median. Quartile, percentile, quantile. Arithmetic mean.	Direct teaching and independent work	Adopt and apply the acquired skills in practice using a computer	O1
3.	Variance. Standard deviation. Comparison of different measurements. Comparing different results.	Direct teaching and independent work	Adopt and apply the acquired skills in practice using a computer	O1
4.	Linear regression.	Direct teaching and independent work	Adopt and apply the acquired skills in practice using a computer	O2
5.	1. test. An event. Classical definition of probability.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O1, O2, O3
6.	Probability of event. Counting principles. Combinatorics.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O3
7.	Probability axioms. Additive formula. Conditional probability. Total probability. Bayesian formula.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O3
8.	Independent events. Discrete random variable. Distribution of a discrete random variable. Expectation, variance, and standard deviation of a discrete random variable.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O3
9.	Probability function. Probability distribution function. Discrete uniform distribution.	Direct teaching and independent work	Describe and apply in practice	O3

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10.	2. test. Bernoulli's experiment. Bernoulli's scheme. Binomial random variable	Direct teaching and independent work	Describe and apply in practice the adopted materials	O3, O4
11.	Poisson random variable.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O4
12.	Continuous random variable. Normal (Gaussian) distribution. Standard normal distribution.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O4
13.	Statistical tests. Testing the expectation hypothesis with known variance.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O5
14.	Chi-square test.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O5
15.	Review of processed material. 3. test.	Direct teaching and independent work	Describe and apply in practice the adopted materials	O1, O2, O3, O4, O5