POLYTECHNIC OF MEĐIMURJE IN ČAKOVEC

COURSE SYLLABUS

ACADEMIC YEAR:	2020/2021

1. GENERAL COURSE INFORMATION

1.1 Course name	**Mathematics 1**				
1.2 Study program/s	Undergraduate professional study of Sustainable Development				
1.3 Course status (O,E)	O	**1.6 Mode of instruction (number of hours)**	**Lectures**	30	
1.4 Course code			**Exercises**	45	
1.5 Course abbreviation			**Seminars**		
1.6 Semester	1.		**E-learning**		
1.7 ECTS	6	**1.7 Place and time of instruction**	Polytechnic of Međimurje		

2. TEACHING STAFF

2.1 Course leader/s-title	Tibor Rodiger	**contact**	trodiger@mev.hr
	Drago Francišković	**contact**	dfranciskovic@mev.hr
2.2 Assistant/s- title		**contact**	
		contact	
2.3 Instruction held by-title		**contact**	

3. COURSE DESCRIPTION

3.1 Course goals	The student should learn the chapters in mathematics necessary to solve engineering problems
3.2 Prerequisites	
3.3 Course outcomes	After successfully completing the course, students will be able to: I1 - Multiply, divide, potentiate and root complex numbers in trigonometric form I2 - Calculate expressions with matrices, determinant and vectors I3 - Solve the system of linear equations I4 - Develop an understanding of function definition, function composition and inverse function, classify functions and sketch graphs of basic functions without the help of derivations I5 - Understand the concept of limits, calculate the limits of a function I6 - Understand the concept of derivation, calculate the derivative of a function
3.4 Course content	

3.5 Types of coursework

x	Lectures	x	Exercises		Blended e-learning		Individual activities		Laboratory
	Seminars and workshops		Distant learning		Field classes		Multimedia and network		Mentorship
	Other								

3.6 Language of instruction	

3.7 Monitoring students' work (enter the

2.5	Class attendance		Seminars		Essay
0.5	Class activity		Project		Report/paper

							Continuous knowledge check
		Midterm exams		Practical task			
2.5		Written exam		Experimental work			
0.5		Oral exam		Research			

3.8 Assessment and evaluation of students' work during classes and at the final exam

Activity specification	Percent %	Points
Assessment during instruction		
Attendance	3%	3
Class activity	10%	10
Seminar/ project/ essay	0%	0
Midterm exam 1	35%	35
Midterm exam 2	35%	35
Exam assessment for the students who failed to fullfil all the obligatory requirements during the semester		
Written exam	*70%*	*70*
Oral exam	*17%*	*17*
Total:	**100%**	**100**

Written exam
The written exam is taken through two colloquia,
Oral exam
A student has the right to publicity during the oral exam. An assistant or another student must be present in the room. Exam questions must be written down to determine if all outcomes have been verified. The oral exam is mainly used as an upgrade to the written one

3.9 Assessment criteria – analysis per learning outcomes

	Attendance	Activity	Mid-term exam 1	Mid-term exam 2	Oral exam	Total
Ways of evaluating learning outcomes						
Outcome 1			5		2	7
Outcome 2			20		4	24
Outcome 3			10		2	12
Outcome 4				10	3	13
Outcome 5				10	3	13
Outcome 6				15	3	18
Outcome not-related	3	10				13
Total	3	10	35	35	17	100

Grading of outcomes (in order to pass the mid-term exam/exam the student must achieve at least 50% points for each learning outcome)

Points	Grade
89 – 100	excellent (5)
76 – 88	very good (4)
63 – 75	good (3)
50 – 62	pass (2)
0 – 49	fail (1)

3.10 Specific features related with taking the course

If the student collects 40% of the points of each outcome and a total of 50% of the points from the colloquium, he directly takes the oral exam.
Once won points in colloquia for each learning outcome are no longer deleted unless the student decides to correct the result for each learning outcome, whereby the points won until then are deleted and newly earned points for that learning outcome are entered.

	Students who did not take the colloquium access the written part of the exam where all learning outcomes are checked. Points for teaching activity are awarded in lectures and exercises, depending on the student's activity. The final grade is obtained in the oral part of the exam.
3.11 Students obligations	Full-time students are required to attend at least 70% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. Part-time students are required to attend at least 30% of the total number of hours of lectures and exercises in order to exercise the right to take the exam. If the student has not fulfilled all the obligations set by the course, he is obliged to attend the lectures again and meet the conditions for taking the exam. Attendance can be offset by online tuition, organised webinars and added assignments given by teachers. One lesson lasts 45 minutes, and several hours form a teaching unit. Absence from one teaching unit is counted as one absence. Delays and apologies are recorded separately. In that case, if the student missed more than 50% of classes, and has a justifiable reason/apology, the request should be submitted to the Department Council, which then decides on the justification of student absences with the obligatory opinion of the course leader.
3.12 Written assignments	
3.13 Required reading	1.	T. Bradić, R. Roki, J. Pečarić, M. Strunje: Matematika za tehnološke fakultete, Element, Zagreb, 1998.
	2.	T. Rodiger: Derivacije – riješeni zadaci, MEV, Čakovec, 2015.
3.14 Additional reading	1.	Ivan Slapničar: Matematika 1 i 2digitalni udžbenik s interaktivnim animacijama i interaktivnom provjerom znanja, http://www.fesb.hr/mat2.
	2.	P. Javor: Uvod u matematičku analizu, Školska knjiga, Zagreb, 1993.
	3.	B. P. Deminovič i suradnici: Zadaci i riješeni primjeri iz Matematičke analize, Golden marketing –Tehnička knjiga, Zagreb, 2003
	4.	B.Kovačić, L.Marohnić, T.Strmečki: Repetitorij matematike za studente elektrotehnike, TVZ, Zagreb, 2014

4 ADDITIONAL COURSE INFORMATION

4.1 Quality control	The quality of the program, teaching process, teaching skills and level of mastery of the material will be established by conducting a written evaluation based on questionnaires, and in other standardised ways and in accordance with the by-laws of the Polytechnic of Međimurje in Čakovec.
4.2 Contact the teacher	Students can contact the teacher during the office hours and during classes, while for short questions and explanations they can contact him/her 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 in 48 hours at the latest. It is desirable for students to come as often as possible for any possible questions during the teacher's office hours.
4.3 Information about the course	It is the obligation of each student to be regularly informed about the course. All notifications about the classes 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	1. Presentation of information, ideas, problems and solutions to professional and general audience 2. Adaptability to new technologies and techniques as part of the lifelong learning process 3. Ethical and moral approach to work 4. Critical evaluation of arguments, assumptions and data in order to form an opinion and contribute to solving the problem 5. Ability to apply knowledge of mathematics and physics to an engineering problem 6. Imagining and conducting experiments, analyzing and interpreting data

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 • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	Learning outcomes	Course outcome
1. 2.	Complex numbers	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Multiplication, division, exponentiation and rooting of complex numbers in trigonometric form.	O1
3. 4.	Matrices	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Addition, subtraction, scalar matrix multiplication, matrix multiplication, inverse matrix, matrix equations	O2
5. 6.	Matrices	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Addition, subtraction, scalar matrix multiplication, matrix multiplication, inverse matrix, matrix equations	O2
7. 8.	Determinant	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Determinant definition, determinant calculation, determinant	O2

			properties, matrix rank, inverse matrix calculation using determinant	
9. **10.**	Determinant	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Determinant definition, determinant calculation, determinant properties, matrix rank, inverse matrix calculation using determinant	O2
11. **12.**	System of linear equations	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	System solution, solution existence, Gauss-Jordan elimination method, system applications	O3
13. **14.**	System of linear equations	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	System solution, solution existence, Gauss-Jordan elimination method, system applications	O3
15. **16.**	Vectors	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Definition and properties of vectors, operations with vectors, scalar, vector and mixed product, linear independence of vectors, vector space.	O2
17. **18.**	Vectors	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Definition and properties of vectors, operations with vectors, scalar, vector and mixed product, linear independence of vectors, vector space	O2
19. **20**	Real numbers and real functions of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Number sets, function definition, function assignment, function domain,	O4

			properties of real functions, composition of functions, inverse function	
21. **22.**	Real numbers and real functions of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Number sets, function definition, function assignment, function domain, properties of real functions, composition of functions, inverse function	O4
23. **24.**	Limit value and continuity of the function	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Limes, properties of limes, continuity of function, asymptotes	O5
25. **26.**	Limit value and continuity of the function	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Limes, properties of limes, continuity of function, asymptotes	O5
27. **28.**	Derivation of the function of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Concept and interpretation of derivation, derivation of elementary functions, derivation of sum, difference, product and quotient, derivation of complex function	O6
29. **30.**	Derivation of the function of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Concept and interpretation of derivation, derivation of elementary functions, derivation of sum, difference, product and quotient, derivation of complex function	O6
EXERCISES/ SEMINARS				

Hours	Topic and description	Method • Direct teaching (lecture, instruction, pp presentation) • Discovery learning (individual, lead, discussion) • Group learning • Case study • Field classes…	Learning outcomes	Course outcome
1. 2. 3.	Complex numbers	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Multiplication, division, exponentiation and rooting of complex numbers in trigonometric form.	O1
4. 5. 6.	Matrices	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Addition, subtraction, scalar matrix multiplication, matrix multiplication, inverse matrix, matrix equations	O2
7. 8. 9.	Matrices	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Addition, subtraction, scalar matrix multiplication, matrix multiplication, inverse matrix, matrix equations	O2
10. 11. 12.	Determinant	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Determinant definition, determinant calculation, determinant properties, matrix rank, inverse matrix calculation using determinant	O2
13. 14. 15.	Determinant	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Determinant definition, determinant calculation, determinant properties, matrix rank, inverse matrix	O2

			calculation using determinant	
16. **17.** **18.**	System of linear equations	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	System solution, solution existence, Gauss-Jordan elimination method, system applications	O3
19. **20.** **21.**	System of linear equations	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	System solution, solution existence, Gauss-Jordan elimination method, system applications	O3
22. **23.** **24.**	Vectors	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Definition and properties of vectors, operations with vectors, scalar, vector and mixed product, linear independence of vectors, vector space	O2
25. **26.** **27.**	Vectors	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Definition and properties of vectors, operations with vectors, scalar, vector and mixed product, linear independence of vectors, vector space	O2
28. **29.** **30.**	Real numbers and real functions of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Number sets, function definition, function assignment, function domain, properties of real functions, composition of functions, inverse function	O4
31. **32.** **33.**	Real numbers and real functions of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Number sets, function definition, function assignment, function domain, properties of real functions,	O4

			composition of functions, inverse function	
34. **35.** **36.**	Limit value and continuity of the function	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Limes, properties of limes, continuity of function, asymptotes	O5
37. **38.** **39.**	Limit value and continuity of the function	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Limes, properties of limes, continuity of function, asymptotes	O5
40. **41.** **42.**	Derivation of the function of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Concept and interpretation of derivation, derivation of elementary functions, derivation of sum, difference, product and quotient, derivation of complex function	O6
43. **44.** **45.**	Derivation of the function of one variable	Direct teaching (presentation, pp presentation), learning by discovery (independent, guided)	Concept and interpretation of derivation, derivation of elementary functions, derivation of sum, difference, product and quotient, derivation of complex function	O6