

DEPARTMENT OF MECHATRONIC ENGINEERING
COURSE SYLLABUS

Course Details						
Code		Academic Year			Semester	
MAT103		1			Fall	
Title		T	A	L	ECTS	
Calculus 1		3	2		6	
Language	German					
Level	Undergraduate	✓	Graduate		Postgraduate	
Department / Program	Mechatronic					
Forms of Teaching and Learning	Face-to-Face, Group Study, Individual Study.					
Course Type	Compulsory	✓	Elective			
Objectives	<p>This course gives students</p> <ul style="list-style-type: none">- The ability to model real conditions using functions,- a deeper understanding of the basic terms and concepts of differential and integral calculus,- knowledge of working with sequences and series,- the ability to use learned knowledge and digital technologies to solve applicationrelated problems. <p>Knowledge & Understanding: 70% Analysis & methodology: 30%</p>					
Content	<ul style="list-style-type: none">- Equations, inequalities, sets of solutions- Coordinate systems, straight line, slope- Functions, function graphs- Sequences of numbers, convergence and completeness- Limits of functions, continuity- Differences, rates of change, tangents- Differential calculation, derivation of functions- Applications of differential calculus- Integral calculus, definite and indefinite integral- The fundamental theorem of calculus- Applications of integral calculus- Infinite series, Taylor series, Fourier series					
Prerequisites	-					
Coordinator	PD.Dr.habil. Emre IŞIK					
Lecturer(s)	PD.Dr.habil. Emre IŞIK					
Assistant(s)	BSc. Mustafa Korkut Özarslan					
Work Placement						
Recommended or Required Reading						
Books / Lecture Notes	<ul style="list-style-type: none">- Thomas, George B. , Analysis I. Pearson Deutschland, Hallbergmoos 2013.- Lothar, Papula, Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2. Wiesbaden, 2011.					

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	- Single Variable Calculus [Online Kurs]. MIT OpenCourseWare, 2010. URL: http://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/ [16-03-2020]		
Other Sources			
Additional Course Material			
Documents	https://www.geogebra.org/u/canan.yildiz OneNote Notizbuch MAT103		
Assignments			
Exams			
Course Composition			
Mathematics und Basic Sciences	100		%
Engineering			%
Engineering Design			%
Social Sciences			%
Educational Sciences			%
Natural Sciences			%
Health Sciences			%
Expert Knowledge			%
Assessment			
Activity	Count	Percentage (%)	
Midterm Exam	1	40	
Quiz			
Assignments	1	10	
Attendance			
Recitations			
Projects			
Final Exam	1	50	
Total		100	
ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	1	62	62
Assignments	10	3	30
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	2	28

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Laboratory			
Projects			
Final Exam	1	3	3
Total Work Load			168
ECTS Points (Total Work Load / Hour)			6

Learning Outcomes

1	Understands the fundamental concepts of analysis: Derivation as a “rate of change”, calculated as the limit of a difference quotient; The integral as an infinite “sum”, calculated as a limit of Riemann sums.
2	Can analyze properties and behavior of functions and sketch function graphs (using asymptotes, critical points, derivation tests to determine slope and curvature behavior).
3	Can use differential calculus to solve application-related problems (e.g. optimization problems, related rates of change).
4	Can use the integral calculation among other things for the calculation of curve lengths, volumes and areas.
5	Can calculate definite and indefinite integrals using appropriate integration methods.
6	Can determine the convergence or divergence of improper integrals and solve convergent improper integrals.
7	Can determine the convergence or divergence of infinite series
8	Can calculate the Taylor series of any function near a point.
9	
10	
11	
12	

Weekly Content

1	Equations, inequalities, sets of solutions
2	Coordinate systems, straight line, slope
3	Functions, function graphs
4	Sequences of numbers, convergence and completeness
5	Limits of functions, continuity
6	Differences, rates of change, tangents
7	Differential calculus, derivation of functions
8	Applications of differential calculus
9	Midterm exams
10	Integral calculus, definite and indefinite integrals
11	Fundamental theorem of calculus
12	Applications of integral calculus

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13	Infinite series, Taylor series, Fourier series						
14	Infinite series, Taylor series, Fourier series						
15	Summary, recitation						
Contribution of Learning Outcomes to Program Objectives (1-5)							
	P1	P2	P3	P4	P5	P6	P7
1	5	5	4			3	1
2	5	5	4			3	1
3	5	5	4			3	1
4	5	5	4			3	1
5	5	5	3			3	1
6	5	5	3			3	1
7	5	5	3			3	1
8	5	5	3			3	1
9							
10							
11							
12							
Contribution Level		1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High					
https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=5946							
Compiled by:		Ali Korucu					
Date of Compilation:		09.09.2022					