DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
MAT103	1			Fall
Title	**T**	**A**	**L**	**ECTS**
Analysis I	3	2	-	6

Language	German					
Level	**Undergraduate**	✓	**Graduate**		**Postgraduate**	
Department / Program	Civil Engineering					
Forms of Teaching and Learning	Formal					
Course Type	**Compulsory**	✓	**Elective**			
Objectives	The students should • master the differential and integral calculus for functions of a variable as a prerequisite for dealing with mathematical models in engineering, • develop understanding and ability to work with functions in one-dimensional space, • master the vector calculation, • About the methodological basis for mathematical • have a solid foundation in the natural and engineering sciences, • Have a sound knowledge of the scientific and mathematical contents, principles and methods. • master basic terms and techniques and apply them to various (e.g. physical) problems, • Use digital technologies effectively to solve problems. Knowledge &Understanding: 70% Analysis &methodology: 30%					
Content	• Real numbers, number representations, difference, interval • Equations, inequalities, solution sets • Coordinates stems, 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 • Fundamental theorem of analysis • Applications of integral calculus • Infinite series, Taylor series, Fourier series					
Prerequisites	-					
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement						

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Recommended or Required Reading	
Books / Lecture Notes	Thomas, George B. , Analysis I. Pearson Deutschland, Hallbergmoos 2013. - Lothar, Papula, Mathematik für Ingenieure und Naturwissenschaftler, Band 1+2. Wiesbaden, 2011.
Other Sources	Single Variable Calculus [Online Kurs]. MIT Open CourseWare, 2010. URL: http://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/ [16-03-2020]

Additional Course Material	
Documents	-
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 Point sand 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

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

Recitations	14	2	28
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 calculation, derivation of functions
8	Applications of differential calculus
9	**Midterm**
10	Integral calculus, definite and indefinite integral

DEPARTMENT OF CIVIL ENGINEERING
COURSE SYLLABUS

11	Fundamental theorem of analysis
12	Applications of integral calculus
13	Infinite series, Taylor series, Fourier series
14	Infinite series, Taylor series, Fourier series
15	Summary

Contribution of Learning Out comes 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
Compiledby:	
Date of Compilation:	