

DEPARTMENT OF MOLECULAR BIOTECHNOLOGY  
COURSE SYLLABUS

Course Details				
<b>Code</b>	<b>Academic Year</b>			<b>Semester</b>
MAT201	3			5
<b>Title</b>	<b>T</b>	<b>A</b>	<b>L</b>	<b>ECTS</b>
Differential Equations	2	2	1	6
<b>Language</b>	German			
<b>Level</b>	<b>Undergraduate</b>	<b>X</b>	<b>Graduate</b>	<b>Postgraduate</b>
<b>Department / Program</b>	Material Science and Technology			
<b>Forms of Teaching and Learning</b>	Face-to-face			
<b>Course Type</b>	<b>Compulsory</b>	<b>X</b>	<b>Elective</b>	
<b>Objectives</b>	Students learn the basics of differential equations and they can model simple systems with first and second order ordinary differential equations, interpret their solutions and carry out numerical methods on the computer.			
<b>Content</b>	Linear Differential Equations of first, second and higher orders. Methods for analytical and numerical solutions. Applications in physics, chemistry and biology.			
<b>Prerequisites</b>	-			
<b>Coordinator</b>	-			
<b>Lecturer(s)</b>	Assist. Prof. Dr. Neşe Aral			
<b>Assistant(s)</b>	RA Elvan Burcu Koşma			
<b>Work Placement</b>	-			
Recommended or Required Reading				
<b>Books / Lecture Notes</b>	Boyce / DiPrima, Gewöhnliche Differentialgleichungen			
<b>Other Sources</b>	-			
Additional Course Material				
<b>Documents</b>	-			
<b>Assignments</b>	-			
<b>Exams</b>	-			
Course Composition				
<b>Mathematics und Basic Sciences</b>	100			%
<b>Engineering</b>				%
<b>Engineering Design</b>				%
<b>Social Sciences</b>				%
<b>Educational Sciences</b>				%

DEPARTMENT OF MOLECULAR BIOTECHNOLOGY  
COURSE SYLLABUS

Natural Sciences			%
Health Sciences			%
Expert Knowledge			%
<b>Assessment</b>			
<b>Activity</b>		<b>Count</b>	<b>Percentage (%)</b>
Midterm Exam		1	40
Quiz		-	-
Assignments		-	-
Attendance		-	-
Recitations		-	-
Projects		-	-
Final Exam		1	60
		<b>Total</b>	<b>100</b>
<b>ECTS Points and Work Load</b>			
<b>Activity</b>	<b>Count</b>	<b>Duration</b>	<b>Work Load (Hours)</b>
Lectures	14	5	70
Self-Study	14	2	28
Assignments	-	-	-
Presentation / Seminar Preparation	-	-	-
Midterm Exam	1	2	2
Recitations	14	3	42
Laboratory	-	-	-
Projects	-	-	-
Final Exam	1	2	2
		<b>Total Work Load</b>	<b>144</b>
		<b>ECTS Points (Total Work Load / Hours)</b>	<b>6</b>
<b>Learning Outcomes</b>			
1	Being able to model simple systems with differential equations		
2	Being able to identify basic differential equation types		
3	Being able to interpret solutions of differential equations		
4	Being able to use numerical methods on computer		
<b>Weekly Content</b>			
1	Definitions, classification of differential equations		
2	First order linear differential equations, separable equations, direction fields		
3	Exact differential equations, integration factors, homogeneous differential equations, Bernoulli equation		

DEPARTMENT OF MOLECULAR BIOTECHNOLOGY  
COURSE SYLLABUS

4	Second order differential equations with constant coefficients, characteristic equation
5	Reduction of order, behavior of solutions, method of d'Alembert
6	Nonhomogeneous equations of second order, method of undetermined coefficients
7	Forced oscillations, beats and resonance
8	Higher order differential equations
9	Variation of parameters for nonhomogeneous equations, Cauchy-Euler Equation
10	Numerical methods
11	Systems of first order linear differential equations
12	Radiocarbon dating, population growth models, epidemic spreading, chemical reactions
13	Nonlinear differential equations, stability
14	Exercises

**Contribution of Learning Outcomes to Program Objectives (1-5)**

	P1	P2	P3	P4	P5	P6	P7	P8
1	4	5	4	4	5	5	5	5
2	4	5	4	4	5	5	5	5
3	4	5	4	4	5	5	5	5
4	4	5	4	4	5	5	5	5

**Contribution Level** 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

**OBS LINK:** <https://obs.tau.edu.tr/oibs/bologna/index.aspx?lang=en&curOp=showPac&curUnit=01&curSunit=207>

**Compiled by:** Assist. Prof. Dr. Neşe Aral

**Date of Compilation:** 29.05.2022