DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGIES
COURSE SYLLABUS

Course Details

Code	Academic Year			Semester
EBT302	3			6
Title	**T**	**A**	**L**	**ECTS**
Numerical Analysis	2	1	0	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technology					
Forms of Teaching and Learning	Face-to-face					
Course Type	**Compulsory**		**Elective**	**X**		
Objectives	The course aims to enable students to use computer programs to solve complex problems in various fields of study.					
Content	The course covers topics such as Computer Arithmetic, Error Analysis, Systems of Linear Equations, Matrix Factorization, Nonlinear Equation Systems, Newton's Method, Banach Fixed-Point Theorem, Ordinary Differential Equations, and Eigenvalue Problems.					
Prerequisites	None					
Coordinator	Prof. Dr. Afif Sıddiki					
Lecturer(s)	Prof. Dr. Afif Sıddiki					
Assistant(s)						
Work Placement	None					

Recommended or Required Reading

Books / Lecture Notes	Numerical Analysis, Brooks/Cole, 7th Edition, Richard L. Burden, J. Douglas Faires, 2001.
Other Sources	Dahmen & Reusken: Numerik für Ingenieure und Naturwissenschaftler, SpringerVerlag, 2008. Schwarz & Köckler: Numerische Mathematik, Vieweg+Teubner, 8. Auflage, 2011.

Additional Course Material

Documents	
Assignments	
Exams	

Course Composition

Mathematics and Basic Sciences	60	%
Engineering	20	%

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Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	20	%
Health Sciences		%
Expert Knowledge		%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments	2	20
Attendance		
Recitations		
Projects		
Final Exam	1	50
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	8	112
Assignments	1	8	8
Presentation / Seminar Preparation			
Midterm Exam	1	3	3
Recitations	14	1	14
Laboratory			
Projects			
Final Exam	1	3	3
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Students acquire the ability to perform numerical solutions.
2	Students gain the ability to use mathematical knowledge, formulate mathematical models, and solve them.
3	Students develop the ability to generate solutions for complex or analytically difficult/impossible problems using simple arithmetic operations.
4	Students acquire the ability to analyze the accuracy and stability of methods.

Weekly Content

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1	Mathematical Preliminaries
2	Solution of Nonlinear Equations
3	Solution of Nonlinear Equations
4	Interpolation and Polynomial Approximation
5	Interpolation and Polynomial Approximation
6	Inverse Interpolation and Curve Fitting
7	Curve Fitting
8	Midterm Exam
9	Solution of Linear Equation Systems
10	Solution of Linear Equation Systems
11	Numerical Differentiation and Integration
12	Numerical Differentiation and Integration
13	Numerical Differentiation and Integration
14	Numerical Solutions of Nonlinear Equation Systems
15	Numerical Solutions of Nonlinear Equation Systems
16	Final Exam

Contribution of Learning Outcomes to Program Objectives (1-5)									
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
1	5	5	5	5	5	5	5	5	5
2	5	5	5	5	5	5	5	5	5
3	5	5	5	5	5	5	5	5	5
4	5	5	5	5	5	5	5	5	5
Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High									

Compiled by:	
Date of Compilation:	