DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	**Academic Year**			**Semester**
EBT104	1			2
Title	**T**	**A**	**L**	**ECTS**
Scientific Programming	2	0	2	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**	**X**	**Elective**			
Objectives	The course aims to teach students the fundamental concepts of programming, data structures, and algorithms.					
Content	Topics covered in the course will include scientific data analysis and modeling techniques, along with the applications of various programming languages and tools.					
Prerequisites	None					
Coordinator	Asst. Prof. Dr. Dilek GÖKSEL DURU					
Lecturer(s)	Asst. Prof. Dr. Dilek GÖKSEL DURU					
Assistant(s)	None					
Work Placement	None					

Recommended or Required Reading	
Books / Lecture Notes	Algorithmik: Die Kunst des Rechnens, David Harel, Springer, Deutschland, 2006 (Orjinal: Algorithmics: The Spirit of Computing, David Harel, Addison-Wesley, Great Britain , 2004) Einführung in die Informatik, Heinz-Peter Gumm, Oldenbourg Wissenschaftsverlag, München, 2013. Algorithmik: Die Kunst des Rechnens, David Harel, Springer, Deutschland, 2006 (Orjinal: Algorithmics: The Spirit of Computing, David Harel, Addison-Wesley, Great Britain , 2004)
Other Sources	-

Additional Course Material	
Documents	-
Assignments	-
Exams	1 Midterm Exam, 1 Final Exam

Course Composition		
Mathematics und Basic Sciences		40 %
Engineering		40 %
Engineering Design		%

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

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz	0	
Assignments	0	
Attendance	0	
Recitations	0	
Projects	0	
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	11	3	33
Assignments	5	15	75
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations			
Laboratory	14	2	28
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	The student gains the ability to select and effectively use appropriate programming languages and tools for scientific problems.
2	They learn the fundamental principles of data structures and algorithms and apply them in scientific applications.
3	By implementing modeling, simulation, and data analysis techniques in scientific computing, they solve problems.
4	Additionally, they develop sustainable and verifiable software using scientific software development processes.

Weekly Content

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1	Introduction to Scientific Programming and Fundamental Concepts
2	Introduction to Python Programming and Basic Structures
3	Functions, Modular Programming, and Library Usage
4	Data Structures and Algorithms – Lists, Dictionaries, Sets
5	File Operations, Data Reading/Writing, and Data Manipulation
6	Numerical Computations with NumPy
7	Data Visualization Techniques and Matplotlib
8	Midterm Exam
9	Data Analysis and Statistical Operations with Pandas
10	Algorithm Design and Complexity Analysis
11	Sorting and Searching Algorithms
12	Modeling and Simulation Techniques
13	High-Performance Computing and Parallel Programming
14	Scientific Software Development Processes
15	Project Presentations and General Evaluation
16	Final Exam

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

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
Ö1	3	5	5	4	4			4	
Ö2	3	1	4	2	4			4	
Ö3	3	3	4	5	4			4	
Ö4	3	3	4	5	4			4	

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

Compiled by:	Res. Assist. Kevser Celep
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