DOKUZ EYLUL UNIVERSITY

FACULTY OF ENGINEERING OFFICE OF THE DEAN

COURSE / MODULE / BLOCK DETAILS

ACADEMIC YEAR / SEMESTER

Offered by: Faculty of Engineering			
Course Title: INTRODUCTION TO QUANTUM COMPUTING			Course Org. Title: INTRODUCTION TO QUANTUM COMPUTING
Course Level: Bachelor's Degree			Course Code: MTH 3503
Language of Instruction: English			Form Submitting/Renewal Date 09/02/2023
Weekly Course Hours: 2			Course Coordinator: DOÇ.DR. ZERRİN IŞIK
Theory	Application	Laboratory	National Credit: 2
2	0	0	ECTS Credit: 4

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COURSE / MODULE / BLOCK DETAILS

ACADEMIC YEAR / SEMESTER

Offered to: Name of the Department:	Course Status: Compulsory/Elective
Metallurgical and Materials Engineering	Technical Elective
Civil Engineering	Technical Elective
Electrical and Electronics Engineering	Technical Elective
Computer Engineering	Technical Elective
Civil Engineering (Evening)	Technical Elective

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Instructor/s:
DOÇ.DR. ZERRİN

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Course Objective:
The aim of the course is to teach the fundamentals of Quantum computing and to analyze simple Quantum algorithms. Some algorithms will be implemented on real hardware (IBM-Q) / simulator.

Learning Outcomes:	
1	Learning the theoretical concepts of quantum computing
2	Learning relevant terminology
3	Gain the ability to analyze quantum algorithms
4	Gaining experience in implementing basic quantum algorithms
5	Performing hardware experiments with the simulator

Learning and Teaching Strategies:
Lectures, exams, practice

Assessment Methods:

Name	Code	Calculation formula
MIDTERM EXAM	MTE	
PROJECT	PRJ	
FINAL EXAM	FIN	
FINAL COURSE GRADE	FCG	MTE * 025 + PRJ * 025 + FIN * 050
RESIT	RST	
FINAL COURSE GRADE (RESIT)	FCGR	MTE * 025 + PRJ * 025 + RST * 050

Further Notes about Assessment Methods:

Assessment Criteria:
In addition to midterm and final exams, the performance of the student in the course is evaluated with project / practice assignments.

Textbook(s)/References/Materials:
Textbook: N. David Mermin, "Quantum Computer Science - An Introduction", Cambridge University Press, 2007.

Course Policies and Rules:
Participation is mandatory (70% theoretical courses and 80% practices)

Contact Details for the Instructor:

Office Hours:
To be announced

Course Outline:

Week	Topics:	Notes:
1	History of Quantum Computing	
2	Double Slit Experiment and Entanglement	
3	Qubits, Operators, and Measurements	
4	Quantum Circuits - I	
5	Quantum Circuits - II	
6	Quantum Teleportation	
7	Deutsch-Jozsa?s Algorithm	
8	Simon?s Problem	
9	Quantum Fourier Transform	
10	Quantum Phase Estimation	
11	Shor's Algorithm - I	

12	Shor's Algorithm - II
13	Grover's Algorithm
14	The Future of Quantum Computers

ECTS Table			
Course Activities	**Number**	**Duration (hour)**	**Total Work Load (hour)**
In Class Activities			
Lectures	14	2	28
Exams			
Midterm	1	2	2
Midterm	1	2	2
Out of Class activities			
Preparations before/after weekly lectures	14	2	28
Preparation for midterm exam	1	4	4
Preparation for final exam	1	4	4
Preparing assignments	4	8	32
Total Work Load (hour)			100
ECTS Credits of the Course= Total Work Load (hour) / 25			4