CENG213 – Discrete Computational Structures

Course Code	Course Name	Semester	
CENG213	Discrete Computational Structures	Fall ☒ Spring ☐ Summer ☐	
Hours		**Credit**	**ECTS**
Theory	**Practice** / **Lab**	3	6
3	0 / 0		

Course Details	
Department	Software Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☒ Elective ☐
Course Objectives	The goal of this course is in general to teach students how to think logically and mathematically and to give them the mathematical background needed for further work in computer science. In particular, this course is aimed to introduce the computational structure concepts with an emphasis on applications in computer science.
Course Content	Fundamentals of logic, set theory, relations, functions, induction, graph theory, trees, introduction to algebraic structures, lattices
Course Method/ Techniques	Lecture ☒ Question & Answer ☒ Presentation ☐ Discussion ☐
Prerequisites/ Corequisites	

Work Placement(s)	

Textbook/References/Materials

- Discrete Mathematics and Its Applications, 8th Edition, Kenneth H. Rosen
- Mathematics for Computer Science, Eric Lehman, Tom Leighton, and Albert Meyer
- A Course in Discrete Structures, Rafael Pass and Wei-Lung Dustin Tseng

Course Category				
Mathematics and Basic Sciences	☒		Education	☐
Engineering	☒		Science	☐
Engineering Design	☒		Health	☐
Social Sciences	☐		Profession	☐

Weekly Schedule

No	Topics	Materials/Notes
1	Fundamentals of logic	Sections 1.1-1.3
2	Fundamentals of logic	Sections 1.4-1.5
3	Quantifiers, Proof Methods	Sections 1.6-1.8
4	Basic Structures of Discrete Math: Sets, Functions	Sections 2.1-2.3
5	Basic Structures of Discrete Math: Sequences, Sums, Matrices	Sections 2.4-2.6
6	Algorithms, Complexity	Sections 3.1-3.3
7	Number Theory	Sections 4.1-4.4
8	Midterm Exam	
9	Induction and Recursion	Sections 5.1-5.5
10	Counting	Sections 6.1-6.3
11	Recurrence Relations	Sections 8.1-8.6
12	Relations	Sections 9.1-9.5
13	Graphs	Sections 10.1-10.3
14	Graphs	Sections 10.4-10.6
15	Trees	Sections 11.1-11.5
16	Final Exam	

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance	1	5
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework	1	20
Presentation / Seminar		
Project		
Report		
Seminar		
Midterm Exam	1	30
Final Exam	1	45
	Total	**100%**
Contribution of Midterm Studies to Success Grade		40
Contribution of End of Semester Studies to Success Grade		60
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	14	3	42
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	15	3	45
Quiz/Studio/Criticize			
Homework	1	10	10
Presentation / Seminar			
Project			
Report			
Midterm Exam and Preparation for Midterm	1	25	25
Final Exam and Preparation for Final Exam	1	30	30
Total Workload			**152**
Total Workload / 25			**6.08**
ECTS Credit			**6**

Course Learning Outcomes	
No	**Outcome**
L1	build necessary mathematical background for computer science and engineering
L2	understand propositional and predicate logic
L3	master formal proof methods, including proof by induction and contradiction
L4	understand key concepts of sets, functions, and relations
L5	understand algorithm analysis using Big-O notation and related concepts
L6	solve problems using counting techniques, combinatorics and recurrence relations
L7	understand and use graph structures, breadth first search and depth first search
L8	understand and use tree structures and traversal techniques
L9	build a foundation for advanced areas like databases, cryptography, and machine learning

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**	**Total**
L1	5	4				3						12
L2	4	5				3						12
L3	5	4				3						12
L4	5	4				3						12
L5	4	5				3						12
L6	5	5				3						13
L7	4	5				3						12
L8	5	4				3						12
L9	3	3				3						9
											Total	106