EASTERN MEDITERRANEAN UNIVERSITY
COURSE OUTLINE

COURSE CODE	**MATH163**	**COURSE LEVEL**	**Undergraduate Spring 2019-2020**
COURSE TITLE	Discrete Mathematics		
COURSE TYPE	Core for the Computer Engineering, Mechanical Engineering, Industrial Engineering and Mathematics departments		
LECTURER(S)	Gr. 1 Prof. Dr. Rza Bashirov rza.bashirov@emu.edu.tr ext.1005 office AS141 Gr. 2 Dr. Cemaliye Kürt cemaliye.kurt@final.edu.tr ext. 1063 office AS302 Gr. 4 Prof. Dr. Rza Bashirov rza.bashirov@emu.edu.tr ext.1005 office AS141 Gr. 5 Prof. Dr. Benedek Nagy benedek.nagy@emu.edu.tr ext.3028 office AS145 Gr. 6 Prof. Dr. Benedek Nagy benedek.nagy@emu.edu.tr ext.3028 office AS145		
ASSISTANT(S)	Gr. 1 Mohammed Reza Saadet mes.sdt@gmail.com ext. 2194 office AS149 Gr. 2 Mohammed Reza Saadet mes.sdt@gmail.com ext. 2194 office AS149 Gr. 4 Laith Ali Khalaf laith.khalaf@emu.edu.tr ext. 1031 office AS249 Gr. 5 Merve Çil 18500568@emu.edu.tr ext. 2419 office AS300 Gr. 6 Merve Çil 18500568@emu.edu.tr ext. 2419 office AS300		
CREDIT VALUE	(3,1) 3	**ECTS VALUE**	5
PREREQUISITES	None		
COREQUISITES	None		
DURATION OF COURSE	One semester		
WEB LINK	http://opencourses.emu.edu.tr/course/view.php?id=366		

CATALOGUE DESCRIPTION

Sets: subsets, the power set, set operations, proof by Venn diagram, Cartesian product of sets. Relations: binary relations and their properties, equivalence relations and equivalence classes, partition of a set, partial orders, posets, Hasse diagram. Functions: domain, codomain (target) and range, one-to-one, onto, one-to-one correspondence and inverse functions, composition of functions. Propositional logic: well-formed propositions, theorem and contradiction, proof by truth table. Boolean algebra: basic Boolean functions, digital logic gates, minterm and maxterm expansions, simplifying Boolean functions with Karnaugh maps. Induction: the principle of mathematical induction. Recursion: some special sequences, recurrence relations, solving recurrence relations, the characteristic polynomial. Principles of counting: the principle of inclusion-exclusion, the addition and multiplication rules, the pigeonhole principle. Permutations and combinations: r-permutations, r-combinations, binomial coefficients, repetitions, derangements, the binomial theorem, Pascal's triangle. Graphs: terminology, subgraphs, pseudographs, bipartite graphs, complete and complete bipartite graphs, isomorphism, Eulerian pseudographs, the theorems on Eulerian circuits and Eulerian trails, Hamiltonian cycles, adjacency matrix. Trees: spanning trees, minimum spanning trees, Kruskal's algorithm, Prim's algorithm.

AIMS & OBJECTIVES

Discrete mathematics is the first non-calculus course for mathematics, computer science and engineering majors. This course introduces mathematical tools and techniques used to study discrete processes as opposed to continuous processes. Topics covered include discrete concepts such as basic set theory, functions, relations, recurrences, counting principles, fundamentals of propositional logic and Boolean algebra, graphs and trees. The course also introduces proof techniques of mathematics including proof by induction, proof by truth table, proof by Venn diagram, etc. This course is indeed prerequisite of logic

design, operational research, combinatorics, abstract algebra, mathematical modeling, geometry and topology courses.

GENERAL LEARNING OUTCOMES (COMPETENCES)

On completion of this module, student should be able to:

- Define sets and perform operations on sets
- Recognize binary relations and types of functions
- Describe Boolean algebra and its relation to logical circuits
- Use mathematical induction and the pigeon-hole principle to prove various statements involving natural numbers
- Use basic counting techniques such as permutations, combinations, the principle of inclusion and exclusion to enumerate elements of finite sets
- Recall basic definitions for graphs
- Identify basic properties of graphs
- Recall the definitions of some famous problems formulated on graphs such as the existence of Eulerian circuit and Hamiltonian circuit
- Identify trees and recall basic properties of trees; find a minimal spanning tree of a graph

On successful completion of this course, all students will have developed their skills in:

- analytical and critical thinking
- problem identification, formulation and solution
- application of methods and models of discrete mathematics to practical problems

On successful completion of this course, all students will have developed their appreciation of and respect for values and attitudes regarding the issues of:

- The awareness on how to create different engineering models and use them for problem solving exploring techniques and mechanisms provided by discrete mathematics

GRADING CRITERIA

Pass/fail grade as well as grade ranges will be determined at the end of the semester based on performance of the students demonstrated in examinations and quizzes.

RELATIONSHIP WITH OTHER COURSES

This course is indeed prerequisite of logic design, operational research, combinatorics, abstract algebra, mathematical modeling, geometry and topology courses.

LEARNING / TEACHING METHOD

The teaching method adopted for Discrete Mathematics consists of a combination of lectures and tutorials.

METHOD OF ASSESSMENT

Course Grade will be computed as follows:

1. Midterm Exam 1 %35
2. Quiz 1 %10

3. Quiz 2 %10
4. Final Exam %45

IMPORTANT NOTICES

1. Students are strongly encouraged to attend all exams on exam dates as scheduled. If a student misses exam for an authorized reason (hospitalization, death in the family, major illness, representation of the university in sports competitions and other events, etc.) he/she needs to provide an excuse document (a doctor's medical report, circular issued by a vice rector, etc.) to the course instructor to get permission to sit in make-up exam. This should be done within five days following the examination he/she missed.
2. No make-up quizzes will be allowed for any reason.
3. No make-up exams will be given to offset a poor exam grade.
4. Students' attendance is effective predictor of academic achievement. Analysis conducted for Discrete Mathematics class of the previous semesters revealed that students scored higher in the class had also higher attendance rates. But reciprocal is not correct. Students must know that neither extra point will be given for good attendance not a point will be cut for insufficient attendance.
5. In the quizzes and exams students must confirm their identity by providing student ID card or passport. Students who are unable to provide an ID card will not be allowed to attend the examination.
6. Students need to attend the examinations in the rooms they are allocated to. No student will be allowed to attend the examination in a room other that he/she is allocated to.
7. Students may check their examination papers during specified day and period, which will be announced by the instructor.
8. One general make up examination will be given at the end of the semester after the final examination period. Students attending make-up examination will be responsible from all subjects.
9. In accordance with the decision of the Faculty Board of the Faculty of Arts and Sciences, dated September 18, 2019 and numbered 19/23-1, the minimum conditions for the NG grade are determined as follows:
    - Low rate of the student participation (below 50%) in the classes including lectures and tutorial hours, or low rate of the student participation (below %50) in the weighted grade assessments (examinations and quizzes);
    - Low rate of the student participation (below 50%) in laboratory hours (valid for the courses involving laboratory hours).

TEXTBOOKS

1. Goodaire E. G., Parmenter M. M., Discrete Mathematics with Graph Theory, Prentice Hall, 2006.
2. McEliece, R. J., Ash, R. B., Ash, C. Introduction to Discrete Mathematics, McGraw-Hill, 1989.

INDICATIVE BASIC READING LIST

NONE

EXTENDED READING LIST

NONE

SEMESTER OFFERRED

2019-2020 Spring Semester

TIME-TABLE

Period	Monday	Tuesday	Wednesday	Thursday	Friday
08:30-09:20	MATH163(06)/CL114 TUTORIAL				MATH163(02)/AS302 OFFICE HOUR
09:30-10:20	MATH163(06)/CL114			MATH163(05,06)/AS145 OFFICE HOUR	
10:30-11:20	MATH163(05,06)/AS145 OFFICE HOUR			MATH163(01)/ASG14 MATH163(06)/CL103	MATH163(02)/ASG14 MATH163(02,04)/AS141 OFFICE HOUR
11:30-12:20				MATH163(01)/ASG14 MATH163(06)/CL103	MATH163(02)/ASG14 MATH163(02,04)/AS141 OFFICE HOUR
12:30-13:20	MATH163(01)/ASG14 TUTORIAL MATH163(02)/CL101	MATH163(04)/ASG15 TUTORIAL MATH163(05)/CLA23 TUTORIAL	MATH163(02)/AS302 OFFICE HOUR		
13:30-14:20	MATH163(01)/ASG14 MATH163(02)/CL101 TUTORIAL	MATH163(04)/ASG15 MATH163(05)/CLA23	MATH163(02)/AS302 OFFICE HOUR		
14:30-15:20				MATH163(04)/ASG14 MATH163(05)/CL101	
15:30-16:20				MATH163(04)/ASG14 MATH163(05)/CL101	

CONTENT & SCHEDULE

Week	Date	Topics
1	17 – 21 Feb	Sets, operations on sets. Binary relations, equivalence relations.
2	24 – 28 Feb	Partial orders, Hasse diagram, Functions, domain, target and range of the function, one-to-one functions.
3	2 – 6 Mar	Injective, surjective, bijective and inverse functions, composition of the functions.
4	9 – 13 Mar	The cardinality of a set. Basic Boolean functions. Truth tables.
5	16 – 20 Mar	Digital logic gates, minterm and maxterm expansions. The basic theorems of Boolean algebra.
6	23 – 27 Mar	Simplifying Boolean functions with Karnaugh maps. Mathematical induction, recursively defined sequences.
Quiz 1 will be conducted on 2 April, Thursday from 17:00 to 18:00 (room allocation and quiz topics will be announced from the course web page)		
7	30 Mar – 3 Apr	Solving recurrence relations, characteristic polynomials.
8-9	**6 – 17 Apr**	**Midterm examinations**
10	20 – 24 Apr	The principle of Inclusion-Exclusion. The Addition and Multiplication rules.
11	27 Apr – 1 May	The Pigeon-Hole Principle.
12	4 – 8 May	Permutations, combinations. Repetitions, derangements. The Binomial Theorem.
Quiz 2 will be conducted on 7 May, Thursday from 17:00 to 18:00 (room allocation and quiz topics will be announced from the course web page)		
13	11 – 15 May	Graphs and trees. Definitions and basic properties, isomorphism, Eulerian circuits, Hamiltonian circuits, adjacency matrix.
14	18 – 22 May	Properties of trees, spanning trees. Minimal spanning trees, Kruskal's and Prim's algorithms.
	27 May – 13 Jun	**Final examinations**

Special days:

- 23 April is a National Sovereignty & Children's Day, a non-working day in TRNC.
- 1 May is Workers' and Spring Day, a non-working day in TRNC.
- 19 May is Atatürk Commemoration, Youth and Sports Day, a non-working day in TRNC.

CHEATING AND PLAGIARISM

1. In accordance with Article 6 – c – vii of the Regulations for Student Disciplinary Code, a short term suspension is imposed for attempting to cheat or to help others cheat in any examination.
2. In accordance with Article 6 – e – i of the Regulations for Student Disciplinary Code, a long term suspension is imposed for cheating or helping others cheat in any examination or project.
3. In accordance with Article 6 – e – xi of the Regulations for Student Disciplinary Code, a long term suspension is imposed for having someone else sit for the exam for oneself or sitting for an exam for the place of someone else.