



# Course Specification

— (Bachelor)

**Course Title:** Discrete Mathematics

**Course Code:** 2024210-3

**Program:** Bachelor in Mathematics

**Department:** Mathematics and Statistics Department

**College:** Faculty of Sciences

**Institution:** Taif University

**Version:** 1

**Last Revision Date:** 14/10/2023



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## A. General information about the course:

### 1. Course Identification

1. Credit hours: 3(3,0 ,0)

#### 2. Course type

A.  University  College  Department  Track  Others

B.  Required  Elective

3. Level/year at which this course is offered: **Level 4 / Second Year**

#### 4. Course general Description:

This course provide the knowledge for the students to recognize basic counting principles, inclusion-exclusion principles and pigeonhole principle, realize basic concepts the mathematical proofs, construct the ordinary generating functions and the exponential generating functions, classify homogenous and nonhomogeneous recurrence relations, summarize basic concepts in graph theory like graph connectivity, Eulerian graphs, Hamiltonian graphs, develop solutions of real life problem like Salesman, shortest path and scheduling and recognize construction of trees and its applications

#### 5. Pre-requirements for this course (if any):

Set theory (2022106-3)  
Linear Algebra (2022204-3)

#### 6. Co-requirements for this course (if any):

None

#### 7. Course Main Objective(s):

- Recognizing Basic counting principles, inclusion-exclusion principles, generating functions and recurrence relations.
- Using graphs to model practical problems.

### 2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3Hr /Week	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>		
4	Distance learning		





### 3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	NA
3.	Field	NA
4.	Tutorial	NA
5.	Others (specify)	NA
<b>Total</b>		<b>45</b>

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	Recognize Basic counting principles, Generating functions and recurrence relations.	K1	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
1.2	Outline Basic concepts in graph theory.	K1	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Assignments</li> </ul>
<b>2.0</b>	<b>Skills</b>			
2.1	Evaluate basic concepts of Discrete Mathematics.	S1	<ul style="list-style-type: none"> <li>Interactive classes</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Quizzes</li> <li>Assignments</li> </ul>
2.2	Apply the techniques mathematics for proving some basic theories.	S2	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> </ul>
2.3	Use graph theory tools for solving real life problem like Salesman, shortest path and scheduling.	S2	<ul style="list-style-type: none"> <li>Lectures</li> <li>Self-learning through the website</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> <li>Assignments</li> </ul>
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Work effectively within groups and independently	V1	<ul style="list-style-type: none"> <li>Interactive classes.</li> <li>Give students tasks of duties</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of design projects that have elements of interpersonal skills</li> </ul>
3.2	Articulate ethical behavior associated with institutional Guidelines in classroom.	V3	<ul style="list-style-type: none"> <li>Lectures</li> <li>Group discussions</li> </ul>	<ul style="list-style-type: none"> <li>Exams</li> <li>Quizzes</li> </ul>



### C. Course Content

No	List of Topics	Contact Hours
1.	Basic counting principles	3
2.	Generating functions	3
3.	Recurrence relations.	3
4.	Mathematical proofs.	3
5.	Basic concepts in graph theory.	3
6.	Connectivity of graphs.	3
7.	<b>First Midterm exam</b>	3
8.	Planar graphs	3
9.	Coloring and scheduling chromatic polynomials	3
10.	Eulerian graphs.	3
11.	Hamiltonian graphs.	3
12.	Salesman problem, finding the shortest path problem.	3
13.	<b>Second Midterm exam</b> , Directed graphs	3
14.	Trees and its applications	3
15.	Trees and its applications.	3
<b>Total</b>		<b>45</b>

### D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	Continuous Evaluation	10 %
2.	Assignments, report	Continuous Evaluation	10 %
3.	Midterm 1 Exam	8-9	15%
4.	Midterm 2 Exam	12-13	15%
5.	Final Exam	15-16	50%

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).





## E. Learning Resources and Facilities

### 1. References and Learning Resources

<b>Essential References</b>	<p>1. Discrete Mathematics with Applications by Koshy, Thomas 2004, Publisher: Academic Press, Date: 01/01/2004, ISBN-10: 0-12-421180-1, ISBN-13: 978-0-12-421180-3</p> <p>2. Discrete Mathematics, Gallier, Jean, 2011 Publisher: Springer New York, Date: 01/01/2011 ISBN-10: 1-4419-8046-6, ISBN-13 978-1-4419-8046-</p>
<b>Supportive References</b>	<p><b>S. C. Althoen and R. J. Bumcrot: Introduction to Discrete Mathematics, PWS-Kent, 1988.</b></p> <p>(1) R. J. Wilson: Introduction to graph theory, second Edition, Longman, 1979.</p> <p>(2) M.i Behzad, G. Chartrand, and L. Foster: Graphs &amp; Digraphs, Wadsworth, 1979.</p> <p>(3) N. Deo: Graph Theory with Applications to Engineering and Computer Science. Prentice-Hall, 1974.</p>
<b>Electronic Materials</b>	Lectures available in Blacboard
<b>Other Learning Materials</b>	

### 2. Required Facilities and equipment

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
<b>Technology equipment</b> (Projector, smart board, software)	Data show, Blackboard
<b>Other equipment</b> (Depending on the nature of the specialty)	None

## F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct & Indirect
Effectiveness of students assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct & Indirect
Other		

**Assessors** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)





## G. Specification Approval

<b>COUNCIL /COMMITTEE</b>	Department Council
<b>REFERENCE NO.</b>	4
<b>DATE</b>	October 2023

