



# Mathematical Modeling

**Module Name:** Mathematical Modeling

**Module Number:** 250471

Level: 4

Credit Hours: 3 Credit Hours

Prerequisite / Co-Requisite: 250102 and 250241

**Lecturer :** Dr. Khaled Hyasat, Associate Professor

Office Number: 907

Office Hours: 10:10—11:00 (Sunday, Tuesday , Thursday )  
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**Module Coordinator:** Dr. Khaled Hyasat

## **Aims (Module Purpose):**

This module aims to make students understand the principles of mathematical modeling, and related numerical analysis and computer simulation techniques for real-life applications.

## **Teaching Methods:**

Duration: 16 weeks in first semester, 48 hours in total

Lectures: 32 hours in total, 2 per week (including two 1-hour midterm exams)

Tutorials: 16 hours, 1 per week

## **Learning Outcomes:**

*At the end of this module, student will be able to:*

- \* Have an understanding of the basic concepts of mathematical modeling
- \* Have an understanding of the topics of statistical modeling.
- \* Be familiar with the topics include Monte Carlo simulation, differential equation, matrix algebra, Markov process , and optimization
- \* Apply the principles of mathematical modeling in some real-life problems.

## **Contribution to Program Learning Outcomes:**

(A1 , B1).



**Faculty: Science**  
**Department: Basic Sciences**

**Module Outline:**

Week	Subject	
	Day	
(1)	08/10 –12/10	Modeling basics
(2)	15/10 – 19/10	Discrete dynamic systems
(3)	22/1-0 –26/10	Discrete stochastic systems
(4)	29/10-2/11	Statistical modeling
(5)	5/11-9/11	Matrix algebra
(6)	12/11-16/11	Modeling with matrix
(7)	19/11-23/11	<b>Empirical modeling</b> <b>First Exam will be held in this week</b>
(8)	26/11-30/11	Continuous models
(9)	3/12-7/12	Modeling with differential equation
(10)	10/12-14/12	Modeling with differential equation
(11)	17/12-21/12	Solving ODE
(12)	26/12-28/12	Modeling with random number <b>Second Exam will be held in this week</b>
(13)	2/01-9/01	Optimization
(14)	15/01-21/01	Optimization
(15)	22/01-28/01	Integral transform
(16)	29/01-07/02	<b>Final Exams will be held in this period</b>

**Modes of Assessment:**

Modes of Assessment:	Score	Date
First Exam	20%	
Second Exam	20%	
Assignment / Project / Quizzes	10%	
Final Exam ( written.)	50%	

*\* Make-up exams will be offered for valid reasons only with consent of the Dean. Make-up exams may be different from regular exams in content and format.*

**Attendance Policy:**

*Lecture attendance is mandatory. Student is allowed maximally 15% absentia of the total module hours.*



*More than this percentage, student with an excuse will be drawn from the module. Otherwise, student will be deprived from the module with zero mark assigned.*

**Expected Workload**

*On average you should expect to spend at least (9) hours per week on this module.*

**Text Book and References:**

**Text book:**

Title: Principles of Mathematical Modeling, Second Edition  
Author: Clive L. Dym,  
Publisher: Elsevier, 2004

*In addition to the above, the students will be provided with handouts by the lecturer.*

**References:**

*Students will be expected to give the same attention to these references as given to the Module textbook:*

Title: Concepts Of Mathematical Modeling, International Edition  
Author: Walter J. Meyer  
Publisher: McGraw-Hill International Editions

Title: Mathematical Modeling and Computer Simulation  
Author(s): Daniel Maki and Maynard Thompson  
Publisher: Thomson Brooks/ Cloe 2006

University websites: [www.philadelphia.edu.jo](http://www.philadelphia.edu.jo)