Department of Mathematical Sciences

Course Description for
Math 470 – Fall 2009/2010

A- *General Information:*

Course Title	Mathematical Modeling
Course Code	MATH 470
Credit Hours	3
Prerequisites	MATH 275
Coordinator	Ass. Prof. Fathalla A. Rihan
Lecturer's' E-mail	frihan@uaeu.ac.ae
Office Hours	U,T Time 9-10 am

B- *Professional Information:*

1 – *Overall Aims of Course*

The main aim of this course is to provide graduates with a strong mathematical background with the skills necessary to apply their expertise to the solution of real problems; This course is an introductory survey of mathematical modeling with emphasis on modeling of physical and biological problems in terms of differential equations. The course also introduces formulation of the problem, derivation of the solution, and interpretation of the results.

On completion of this course the student will be able to demonstrate a good understanding for basic modeling with difference and differential equations. The student will be able to investigate and model meaningful and practical problems from real life using mathematical models. The student should also be able to solve and simulate these models to predict the behavior of the phenomena.

2 - *Intended Learning Outcomes of Course (ILOs)*

a- Knowledge and Understanding:

   a1- General concepts of mathematical modeling,
   a2- General concepts of difference and differential models,
   a3- Population dynamics, logistic equations, infection diseases
   a4- General concept of numerical solution of differential models

b- Intellectual Skills

b1- Model some real phenomena using difference and differential equations

b2- Develop mathematical representation of a problem.

b3- The ability to formulate a real problem in mathematical terms, and then solve and Analyze the model.

c- Professional and Practical Skills

c1 Build up a mathematical model

c2 write down the equations

c3 use them to predict the phenomena and see if there is a small changes.

C4 investigate the sensitivity of the model

d- General and Transferable Skills

d1-Deal with science research and real life science

d2-Une information technology and ability to learn independently.

d3 To analyze and solve problems, and to reason logically and creatively

3. Contents

Topics	Week #
Review and introduction to topics in Differential Equations, and solutions	**1**
Introduction in Matlab code to solve and simulate the models	**2**
Description and the philosophy of mathematical modeling	**3**
Modeling with difference and differential equations, Stability, Equilibrium points	**4**
Population dynamics, logistics equation, competition and prey-predator models	**5**
Dynamics of infection diseases, Chemical Reactions, Exponential Growth, Exponential Decay	**6**
Curve fitting of models to experimental data	**7**
General Review and Exit Exam	**8**

4 – Teaching and Learning Methods

_4.1_ Presentation to students in classrooms.

4.2 Direct study of notes or books

4.3 Solving problems in practical hours.

4.4 Quiz during the lectures

4.5 Case studies and seminars

4.6 Assignments

4.7 Refer the students to a website to get knowledge directly from their resources

5- Student Assessment Methods

5-a - Methods

5.1 Reports, assignments, and exercises to assess knowledge and understanding.

5.2	Regular oral, practical and written quizzes to assess intellectual skills.
5.3	Practical projects, final practical and oral exams to assess professional skills.
5.4	Reports, assignments, and discussions to assess general and transferable skills.
5.5	Students work in small groups in case studies and give oral presentations and write reports.

5-b   Assessment schedule

Assessment 1	2nd week.	
Assessment 2	4th week.	
Midterm exam	4th week	
Seminar and presentation	8th week	

Weighting of Assessment

Class work	:	10 %
Assignments	:	10 %
Midterm exam	:	30 %
Two Quizzes	:	20 %
Practical projects	:	15 %
Exit Exam		15 %
Total	:	100%

6- List of References

6.1- Course Notes

6.2- F. Giordano et. al,   Mathematical Modeling, Third Edition , Thomson (UK, US), 2003

6.3 Topics in Mathematical Modeling by K.K. Tung

6.4- Periodicals, Web Sites, … etc

7- Facilities Required for Teaching and Learning

Whiteboard , markers, and computer with data show

Course coordinator
DR . Fathalla A. Rihan

Date: 25 /08 /2009