4/1/4. Course Specification:

COURSE SPECIFICATIONS

Form

Course Title: **Mathematical Biology (2)**

Course Code: **4047502-4**

Course Specifications

Institution: Umm Al-Qura University Date : 8 / 10 / 2018
College/Department : Faculty of Applied Science/ Department of Mathematical Sciences

A. Course Identification and General Information

1. Course title and code: Mathematical Biology (2) 4047502-4			
2. Credit hours: 4Credit Hours			
3. Program(s) in which the course is offered: PhD in Mathematics			
4. Name of faculty member responsible for the course: Dr. Muntaser Safan			
5. Level/year at which this course is offered : Leve 2/ Ph. D.			
6. Pre-requisites for this course (if any): Introduction to Mathematical Biology 4046503-4			
7. Co-requisites for this course (if any):			
8. Location if not on main campus: Al-Abidiyah campus and Al-Zahir campus			
9. Mode of Instruction (mark all that apply)			
a. traditional classroom	✓	What percentage?	85
b. blended (traditional and online)		What percentage?	
c. e-learning	✓	What percentage?	15
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? The main purpose for this course is to introduce advanced topics and quantitative techniques for the study of Mathematical Biology and Physiology.
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field) 1. Updating references used in teaching process. 2. Using e-learning facilities more efficiently. 3. Encouraging students to collect problems from web based references and supervise discussions in the class.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description: This is a 4 credit Ph. D. course introducing advanced topics in Mathematical Biology and Physiology. The course comprises approximately 60 hours of lectures. The role of the course is to introduce topics such as epidemic models, modeling Vector-Borne disease, spatial heterogeneity, simple birth-death process and time-lag models. It is assumed that students entering this course have previously taken the course of Introduction to Mathematical Biology.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
Chapter 1 – Epidemic Models with Demography - Modeling populations with varying size. - SIR model with demographic parameters. - Analysis in reduced dimensions. - Dimensionless SIR model: local stability analysis. - Basic reproduction number and forward bifurcation. - Global stability analysis of equilibria.	4	16
Chapter 2 – Modeling Vector-Borne Diseases - A simple model for vector-borne disease. - Model analysis, equilibria. - Basic reproduction number, stability.	3	12
Chapter 3 – Spatial Heterogeneity in Epidemiological Models - Meta population models. - Spatial models with diffusion.	2	8
Chapter 4 – Simple Birth-Death Process - Pure birth process. - Pure death process. - Simple linear and death process. - Simple immigration-birth-death process.	3	12
Chapter 5 – Time-Lag Models of Population Growth - Reaction time-lag – deterministic analysis. - Reaction time-lag – stochastic analysis. - More general deterministic models.	3	12

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other :	Total

Contact Hours	60	--				60
Credit	4	--				4

3. Additional private study/learning hours expected for students per week.
Four hours weekly for homework and revisions.

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column. **First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	Have an enhanced knowledge and understanding of mathematical biology and physiology.	Lectures- Discussion-solve problems	Short quizzes, periodical and final exams.
1.2	Have the ability to recall the learned material of the course.	Lectures- Discussion-solve problems	Short quizzes, periodical and final exams.
2.0	**Cognitive Skills**		
2.1	Be able to apply the learned material of the course in real life problems.	Lectures- Discussion-solve problems	Short quizzes, periodical and final

			exams.
2.2	Be able to integrate related topics from separate parts of the course.	Lectures –Discussion-solve problems	Short quizzes, periodical and final exams
3.0	**Interpersonal Skills & Responsibility**		
3.1	Have the ability to prove theorems and develop lemmas using different techniques.	Lectures –Discussion-solve problems	Short quizzes, periodical and final exams
3.2	Be able to describe and analyze models using related equations.	Lectures –Discussion-solve problems	Short quizzes, periodical and final exams
4.0	**Communication, Information Technology, Numerical**		
4.1	Have the ability to use computers programs in obtaining numerical solutions.	Discussion - Use Matlab, Mathematica or some numerical packages to solve some problems numerically.	Homework projects
5.0	**Psychomotor**		
	Not applicable		

5. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Periodic exam (1)	6	20
2	Periodic exam (2)	10	20
3	Homework + Quizzes	Over all weeks	20
4	Final exam	End of semester	40

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week) - Office hours are specified throughout the week (6 hours/week) - Contacts with students by e-mail, SMS, and e-learning facilities.

E Learning Resources

1. List Required Textbooks - Mathematics in Population Biology, Horst Thieme. Princeton University Press (2003). - Modelling Biological Populations in Space and Time, Eric Renshow. Cambridge University Press (1991).
2. List Essential References Materials (Journals, Reports, etc.)
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software. Matlab, Mathematica and Numerical Packages

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Properly equipped classroom.
2. Computing resources (AV, data show, Smart Board, software, etc.) - Classroom equipped with desktop computers. - Projectors and related items. - Numerical packages. - Compilers
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) Non

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Student feedback on effectiveness of teaching is arranged electronically at the end of the term by the University.
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department - Course report. - Lecture development.
3 Processes for Improvement of Teaching Several workshops on the improvement of teaching are conducting yearly by the University.
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) Non
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement. Reviewing process of courses for improvement and development is done normally every five years.

Name of Instructor: Dr. Muntaser Safan

Signature:_____Date Report Completed: 8 / 10 / 2018

Name of Field Experience Teaching Staff : _____

Program Coordinator:_____

Signature: _____ Date Received:_____