هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Applications in Bioinformation
Course Code:	DSC 411
Program:	Applied Statistics & Data Management
Department:	Mathematics
College:	College of Science
Institution:	Majmaah University, Saudi Arabia
Version:	2023
Last Revision Date:	9/26/2023

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A. General information about the course:

1. Course Identification

1. Credit hours: 3(2+2)					
2. Course type					
A.	☐University	☐College	☒Department	☐Track	Others
B.	☒Required		☐Elective		
3. Level/year at which this course is offered: (Level 7/4th Year)					
4. Course general Description:					

The course aims to provide a basic introduction to statistical and other mathematical methods and tools in health technology, medical engineering, biology, bioinformatics, and other life sciences as well as some insight into how mathematics and mathematical statistics appear as a natural component in life sciences and health technology. The development of the student's problem-solving skills utilizing statistical and other mathematical methods, both with and without computer assistance, is another goal.

Mathematical modelling of evolution, population dynamics and growth processes in biological and microbiological systems using difference equations, differential equations, dynamical systems, mathematical image analysis and signal processing in health technology, medicine and other life sciences, mathematics for ultrasound, x-ray and microwave technology in health science; optimization of decision-making processes in biological and medical research and healthcare; statistical and other computational methods for studying disease, health status, treatments and tools (surgery, heart disease, brain afflictions, dementia, disabling diseases, diabetes, cancer, etc.).

5. Pre-requirements for this course (if any)**:** DSC 323 (Machine Learning II)

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

After complete this course students will be able to understand :

1) provide an overview of, clearly explain, and independently apply basic modern mathematical models, methods, and tools for medical engineering, biology, bioinformatics, and life sciences

2) Show that you have the independence to recognize biological, engineering, and medical issues that can be resolved mathematically and that you can select the best approach.

3) Using appropriate language, describe the tools and approaches for solving modeling issues in medical mathematics, including biostatistics, image processing, and signal processing, in a well-organized and logically sound manner.

4) Independently investigate pertinent issues in health technology and the living sciences using fundamental modeling and algorithms.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	75%
2	E-learning		0%
3	Hybrid • Traditional classroom • E-learning	15	25%
4	Distance learning		0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		60

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

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.1	Mathematical modelling of evolution, population dynamics and growth processes in biological and microbiological systems using difference equations, differential equations, dynamical systems,	K1	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed teaching: Discovery Oral questions Indirect teaching: Peer Learning	Homework Quiz Midterms Final Exams E-exam Oral Exam
1.2				
...				
2.0	**Skills**			
2.1				
2.2				
2.3	mathematical image analysis and signal processing in health technology, medicine and other life sciences, mathematics for ultrasound, x-ray and microwave technology in health science;	S1	Direct teaching: Inquiry-based instruction PowerPoints Discussions Aimed teaching: Discovery Oral questions Indirect teaching: Peer Learning	Homework Quiz Midterms Final Exams E-exam Oral Exam
3.0	**Values, autonomy, and responsibility**			
3.1	optimization of decision-making processes in		Direct teaching: Inquiry-based instruction PowerPoints	Homework Quiz Midterms Final Exams E-exam Oral Exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	biological and medical research and healthcare; statistical and other computational methods for studying disease, health status, treatments and tools	V1	Discussions Aimed teaching: Discovery Oral questions Indirect teaching: Peer Learning	
3.2				
...				

C. Course Content

No	List of Topics	Contact Hours
1.	Mathematical modelling of evolution, population dynamics and growth processes in biological and microbiological systems using difference equations, differential equations, dynamical systems,	12
2.	Mathematical image analysis and signal processing in health technology, medicine	**12**
3.	and other life sciences, mathematics for ultrasound, x-ray and microwave technology in health science	**12**
4.	optimization of decision-making processes in biological and medical research and healthcare	**12**
5.	statistical and other computational methods for studying disease, health status, treatments and tools	**12**

Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1 & 2	6th week & 11th week	40%
2.	Quizes	Every 2 week	10%
3.	Assignments/ Class Activities	Every 2 weel	2.5%
4.	Assignments/ Class Activities	2 time in semester	2.5%
5	Electronic Test	One time in semester 15 week	5%
6	Final	After 15th week	40%
			100%

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

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Mathematical Biology: I. An Introduction (Interdisciplinary Applied Mathematics, 17) 3rd Edition by James D. Murray
Supportive References	Introduction to Mathematical Biology Modeling, Analysis, and Simulations • By Ching Shan Chou , • Avner Friedman
Electronic Materials	https://link.springer.com/content/pdf/10.1007/978-3-319-29638-8.pdf?pdf=button%20sticky
Other Learning Materials	https://www.mdu.se/en/malardalen-university/education/course-syllabus?id=29240

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with capacity of 30-students. Computer Lab of Mathematics Department
Technology equipment (projector, smart board, software)	Mathematical & Statistical software packages like: 1- R, SPSS, MATHEMATICA. 2- MATLAB. 3- MAPLE. SCIENTIFIC WORKPLACE, PYTHON
Other equipment (depending on the nature of the specialty)	Desktop or laptop with internet facility

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students/ internal committee	Direct (Students evaluation electronically organized by Deanship of registration and admission)/ Verification of students' papers
Effectiveness of Students assessment	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
Quality of learning resources	Staff members (Peer Reviewer)	Indirect (Frequent meetings consultation among the teaching staffs)
The extent to which CLOs have been achieved	Staff members (Peer Reviewer)	Direct (Meeting between course coordinators and the tutors)
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	