ISRA UNIVERSITY

جامعة الإسراء

ISRA UNIVERSITY

Course Syllabus
According to JORDAN National Qualification Framework (JNQF)

Course Name: Calculus III

Course Number: 0403203

General Course Information:

Course title	**Calculus III**
Course number	**0403203**
Credit hours	**Three Credit hours (Theory)**
Education type	**[Face-to-Face]**
Prerequisites/corequisites	**Calculus II (1103102)**
Academic Program	**Civil engineering**
Program code	**403**
Faculty	**Engineering**
Department	**Civil engineering**
Level of course	**Second Year**
Academic year /semester	**Second Semester 2021-2022**
Awarded qualification	**B.Sc**
Other department(s) involved in teaching the course	**Non**
Language of instruction	**English**
Date of production/revision	**16-5-2022**

Course Coordinator:

Coordinator's name	**Dr. Wissam Alkhadour**
Office No	**4207**
Office Phone extension number	
Office Hours	**Sun, Tue, [12:00-1:30] Thur. [11:00-1:00] Wed.[10:00-11:00]**
Email	**Wesam.alkhadour@iu.edu.jo**

Other Instructors:

Instructor name	
Office No	
Office Phone extension number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	Vectors, line equations, quadratic surfaces, vector functions and their engineering applications, functions in several variables, partial derivatives, maximum and minimum values, multiple integrals and their use in calculating areas, volumes and centers of gravity, integrals in cylindrical coordinates and spheres, linear and surface integrals, theories of major vector analysis..
Arabic	المتجهات، معادلات الخط والمستوى والسطوح التربيعية، الدوال المتجهة وتطبيقاتها الهندسية، الدوال في عدة متغيرات ودراسة نهاياتها واتصالها، الانحدار، المشتقات الجزئية وقاعدة السلسلة، القيم العظمى والقيم الصغرى، مضروبيات لاجرانج، التكاملات المتعددة واستخدامها في حساب المساحات والحجوم ومراكز الثقل، التكاملات في الاحداثيات الاسطوانية والكروية، التكاملات الخطية والسطحية، نظريات تحليل المتجهات الرئيسية.

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

Calculus, Thomas, Addison-Wesley 2010, 12th edition.
http://www.burhantiryakioglu.com/

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Calculus, Early Transcendentals, by W. Briggs and L. Cochran, second edition.
2. Worldwide Multivariable Calculus, by David B. Massey.

Course Educational Objectives (CEOs):

1.	Competence in solving problems related to vectors in 2- and 3- dimensions and their applications.
2.	Competence in determining and writing equations of surfaces in space and competence in solving problems related to functions in several variables.
3.	Competence in determining the derivatives of various functions and using these to solve problems in maxima, minima, curvature, graphics, velocity, and acceleration.
4.	Competence in determining single, double, and triple integrals of various functions and solve problems using the fundamental theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
5.	Apply the computational and conceptual principles of calculus to the solutions of real-world problems.

Intended Learning Outcomes (ILO's):

	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	Relationship to CEOs	Contribution to PLOs	Bloom Taxonomy Levels*	Descriptors**
A	**Knowledge and Understanding:**				
A1	The students will be able to **Recognize the rectangular coordinate systems in three dimensions, and the analytic geometry of lines, planes, and other basic surfaces**	1	1&7	2	K ,C
A2					
A3					
B	**Intellectual skills:**				
B1					
B2					
B3					

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C	Subject specific skills:				
C1	The students will be able to utilize calculus of vector-valued functions and apply these concepts to describe basic characteristics of curves and to explain various physical phenomena.	1	1&7	3	K ,C
C2	The students will be able to solve calculus operations on functions of several variables, including partial derivatives, and directional derivatives. utilize partial derivatives to find maxima and minima of functions of two variables, maxima and minima of functions of two or three variables under a constraint using Lagrange multipliers.	2&3	1&7	3	K ,C
C3	The students will be able to solve double integrals in the rectangular and polar coordinates, triple integrals in the rectangular, cylindrical and spherical coordinates, and line and surface integrals	4	1&7	3	K ,C
D	Transferable skills:				
D1	The students will be able to **utilize the computational and conceptual principles of double and triple integrals to the solutions of mechanics problems, such as center of mass, and moment of inertia.**	5	1&7	3	K ,C

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*Bloom Taxonomy Levels

Level #	1	2	3	4	5	6
Level Name	Knowledge	Comprehension	Application	Analysis	Evaluation	Synthesis

** Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.

Program Learning Outcome (PLOs):

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (CE) program will demonstrate:	Descriptors**		
	K	S	C
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	K		
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			C
3. An ability to communicate effectively with a range of audiences.		S	
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			C
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.		S	
6. An ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgment to draw conclusions.		S	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	K		C

** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)

Weekly Schedule *(please choose the type of teaching)*

✓ **Face to Face**

☐ **Hybrid** *(2 Lectures Face – To - Face **+1 Lecture** Asynchronous)*

☐ **Hybrid (1 Lectures** *Face – To - Face **+1 Lecture** Asynchronous)*

☐ **Online** *(2 Lectures Synchronous +1 lecture Asynchronous)*

Week	First Hour (Sunday)	Second Hour (Tuesday)	Third Hour (Thursday)	Ach. ILOs	Ach. PLOs	Descriptors*
1	Course syllabus, Rectangular coordinates in 3D-space, Vectors	Rectangular coordinates in 3D-space, Vectors.	Rectangular coordinates in 3D-space, Vectors.	A1	PLO1	K ,C

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2	Vectors, Dot product, projections, Cross product	Vectors, Dot product, projections, Cross product	Vectors, Dot product, projections, Cross product.	A1	PLO1	K ,C
3	Lines and Planes in space	Lines and Planes in space	Lines and Planes in space	A1	PLO1	K ,C
4	Lines and Planes in space	Lines and Planes in space	Lines and Planes in space	A1	PLO1	K ,C
5	Calculus of vector-valued functions	Calculus of vector-valued functions	Calculus of vector-valued functions	C1	PLO1,7	K ,C
6	Integrals of vector functions, Arc length in Space	Integrals of vector functions, Arc length in Space	Integrals of vector functions, Arc length in Space	C1	PLO1,7	K ,C
7	Functions of Several Variables	Functions of Several Variables	Functions of Several Variables	C2	PLO1,7	K ,C
8	Partial Derivatives, The chain rule	Partial Derivatives, The chain rule	Partial Derivatives, The chain rule	C2	PLO1,7	K ,C
9	Extreme values and Saddle Points	Extreme values and Saddle Points	Extreme values and Saddle Points	C2	PLO1,7	K ,C
10	Lagrange multipliers	Lagrange multipliers	Mid-Term Exam	C2	PLO1,7	K ,C
11	Double integrals in the rectangular and polar coordinates	Double integrals in the rectangular and polar coordinates	Double integrals in the rectangular and polar coordinates	C3	PLO1,7	K ,C
12	Double integrals in the rectangular and polar coordinates	Double integrals in the rectangular and polar coordinates	Double integrals in the rectangular and polar coordinates	C3	PLO1,7	K ,C
13	Triple integrals in the rectangular, cylindrical and spherical coordinates	Triple integrals in the rectangular, cylindrical and spherical coordinates	Triple integrals in the rectangular, cylindrical and spherical coordinates	C3	PLO1,7	K ,C
14	Triple integrals in the rectangular, cylindrical and spherical coordinates	Triple integrals in the rectangular, cylindrical and spherical coordinates	Triple integrals in the rectangular, cylindrical and spherical coordinates	C3	PLO1,7	K ,C
15	Moments and Centre of Mass	Moments and Centre of Mass	Final Exam	D1	PLO1,7	K ,C

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Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:
- **Interactive videos**
- **Practice Labs**
- **Discussion Forums**
- **✓Quizzes**
- **Other Interactive online activities**
- **Reports**

Course Policies:

A- Attendance policies:

   The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

   Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

   Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

   Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20%**
- Midterm **30%**
- Final Exam **50%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required equipment:

- **PC / Laptop with webcam and mic**
- **Internet Connection**
- **Access to the IU E-Learning Platform at: https://elearn.iu.edu.jo/course/view.php?id=2105**
- **E-learning plan**
- **Satisfaction questionnaires for online and face-to-face learning**
- **Software for e-learning**
- **Training**

Assessment Tools implemented in the course:

- ✓ Final Exam
- ✓ Midterm Exam
- ✓ Quizzes

- • ✓ Homework
- • Practice Labs
- • Discussion Forums
- • Periodic reports for learning assessment
- • Improvement plans for online or face-to-face teaching
- • Others:.......

Responsible Persons and their Signatures:

Course Coordinator	Dr. Wissam Alkhadour	Completed Date	16/ 5 / 2022
		Signature	

Received by (Department Head)	Dr.	Received Date	17/ 5/ 2022
		Signature	

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