جامعة آل البيت
دائرة ضمان الجودة والتخطيط

بسم الله الرحمن الرحيم

جامعة آل البيت

College of Science
Department of Mathematics
Course syllabus: Calculus (1)
First semester 2019/2020

1. Instructor Information:

Instructor Name	Proof. Mousa Abu Elshour		
Office Hours	Sunday ,Tuesday, Thursday	10-11, 12-1 9-10, 10-11	
Office Number and Telephone Extension	2111		
Email	drmousa67@yahoo.com		

2. Course Description:

Multiple integrals and triple integrals, cylindrical and spherical coordinates, Jacobian. line integral, surface integral, Green's theorem, Stoke's theorem, divergence theorem

3. Course Information:

Course number: 401102	Course Title: advanced calculus	Level : second year
Course Nature: Theoretical	Prerequisite: 401201	Lecture time: Sun. Tue. Thu. 9:00 – 10:00
Academic year: 2019 – 2020	Semester: First	Credit Hours: 3

4. Course Objectives:

Main concepts of calculus are derivatives (rates of change of a function) and integrals (which, in particular, provide a way to recover a function from the knowledge of its derivative). Knowledge and the ability to work with these concepts is essential for further studies of mathematical subjects, as well as for applications of mathematical techniques in other sciences. This course will focus on understanding calculus concepts, analytical reasoning and developing crucial skills in order to calculate, analyze, interpret and communicate the results clearly. Specific course learning objectives are listed below:

After completing this course, students should demonstrate competency in the following skills:

1. Use double integrals to represent the volume of a solid region and to find surface area
2. Evaluate a double integral as an iterated integral
3. Write and evaluate double integrals in polar coordinates
4. Use a triple integral to find the volume of a solid region
5. Write and evaluate triple integrals in cylindrical and spherical coordinates
6. Use a Jacobian to change variables in a double integral
7. Perform line and surface integrals.
8. Describe and use the fundamental theorem for line integrals and comprehend how it relates to path independence in conservative fields.
9. Paraphrase and apply Green's Theorem, Stokes' Theorem, and the Divergence Theorem.

5. Intended Student Learning Outcomes:

Successful completion of the course should lead to the following outcomes:

1. Solve problems in multiple integration using rectangular, cylindrical, and spherical coordinate systems
2. Select and apply appropriate models and techniques to define and evaluate line and surface integrals; these techniques will include but are not limited to Green's, Divergence, and Stoke's theorems
3. A analyze, solve and interpret the various applications.

6. Course Content:

The Weeks	The Subjects
1	Multiple-Sigma Notation, The Double Integral Over A Rectangle **R**, The **P**- Upper And Lower Sum For Given Function
2	The Double Integral As A Volume And Area, Evaluating Simple Double Integrals Directly From Definitions
3	The Double Integral Over A Region, Some Properties Of The Double Integral , The Evaluation Of Double Integrals By Repeated Integrals.
4	Symmetry In Double Integration, Evaluating Double Integrals Using Polar Coordinates
5	Further Applications Of The Double Integral: The Center Of Mass Of A Plate, Centroids , Kinetic Energy And Moment Of Inertia
6	Triple Integral: Some Properties Of The Triple Integral .The Evaluation Of Triple Integrals By Repeated Integrals.
7	Introduction To Cylindrical Coordinates, Evaluating Triple Integrals Using Cylindrical Coordinates
8	Introduction To Spherical Coordinates, Evaluating Triple Integrals Using Spherical Coordinates
9	Jacobians; Changing Variables In Multiple Integration
10	Line Integral, The Fundamental Theorem For Line Integrals
11	Another Notation For Line Integrals, Line Integrals With Respect To Arc Length Green's Theorem.
12	Parameterized Surfaces; Surface Area
13	Surface Integrals, The Flux Of A Vector Field
14	The Vector Differential Operator ∇ , Divergence $\nabla \cdot \mathbf{V}$, Curl $\nabla \times \mathbf{V}$
15	The Divergence Theorem, Stokes's Theorem
16	Review

7. Teaching and learning Strategies and Evaluation Methods:

Learning Outcomes	Teaching Strategies	learning Strategies	Evaluation Methods
1- Multiple integrals (double and triple), multiple integrals in Cartesian and polar coordinates systems. 2- Change of variables of multiple integrals and applications. 3- Line integrals (Green's Theorem and Stokes' Theorem) and applications. 4- Applications by using computer and mathematical software.	-Lectures containing open discussions and brainstorm. -Learn to use the library in the self-learning. -Students are assigned duties in the form of working groups using computer. - Using the Internet and the library to make researches related to the course requests. - Writing on the blackboard - Ask students questions and discuss them - Solve various issues - Writing on the blackboard - Ask students questions and discuss them - Solve various issues - Writing on the blackboard - Ask students questions and discuss them - Solve various issues	At the beginning of studying each topic some examples will be laid out and discussed with the students Give homework assignments	- Classroom presentations - Discussion - First exam - Classroom presentations - Discussion - Second exam - Classroom presentations - Discussion - Final exam

8. Assessment:

Assessment	Grade Proportion	Week/Dates
Class Work (Quizzes, Homework and Attendance of the lecture)		
First exam	**25 %**	**7th Week**
Second exam	**25 %**	**12th Week**
Final exam	**50 %**	**End of Semester**
Total	**100 %**	

9. Text Book:

The main reference	Calculus, EARLY TRANSCENDENTALS
Author(s)	HOWARD ANTON, IRL BIVENS and STEPHEN DAVIS
Publisher	JOHN WILEY & SONS, INC.
Year	2012
The edition	10th edition
The reference website	https://arslanhelpyoucom.files.wordpress.com/2016/05/calculus-early-transcendentals-10th-ed-howard-anton-iril-bivens-stephen-davis-ebook.pdf

10. References and additional resources:

1)	James Stewart, Calculus: Early Transcendentals, 7th Edition, Brooks/ Cole 2012. Call number in PU library: 515.15 STE
2)	*Calculus,* EARLY TRANSCENDENTALS, 12th by Thomas
3)	Calculus: Early Transcendentals, 4th Edition, Dennis Zill and Warren S. Wright, Jones and Bartlett Publishers 2011.