COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Mathematics			**NQF level**	6
Course Title	Advanced Calculus	**Code**	505202	**Prerequisite**	505201
Credit Hours	3	**Theory**	3	**Practical**	0
Course Leader	Osama Ala'yed	**email**	alayedo@Jadara.edu.jo		
Lecturers	Osama Ala'yed	**emails**	alayedo@Jadara.edu.jo		
Lecture time	8:30-10:00 Sun- Tues	**Classroom**	D313		
Semester	First Semester	**Production**	2020	**Updated**	2021

ShortDescription
Multiple integrals: double integral, double integrals in polar coordinates, triple integrals, triple integrals in cylindrical and spherical coordinates, change of variables in multiple integrals, Jacobian, Vector integral calculus: line integral, surface integral, volume integral, Green's theorem, divergence theorem, and Stoke's theorem.
Course Objectives
On completion of this course, students should be able to: 1. Use a suitable coordinate system to evaluate double or triple integrals. 2. Evaluate the line integral (work) in several ways. 3. Use Green's theorem to compute the work. 4. Compute the surface integral over famous surfaces. 5. Use the divergence theorem and stocker Theorem.

Learning Outcomes
A. Knowledge - Theoretical Understanding
a1. Demonstrate the basic concepts and theorems of multiple integrals and vector integral calculus.
B. Knowledge - Practical Application
a2. Solve problems in multiple integration using rectangular, cylindrical, and spherical coordinate systems.
C. Skills - Generic Problem Solving and Analytical Skills
b1. Calculate the line integral along plane or space curves and the surface integral over surfaces in 3-space.
D. Skills - Communication, ICT, and Numeracy
E. Competence: Autonomy, Responsibility, and Context
c1. Evaluate different types of integrals using Green's, Stokes' and Divergence theorems.
Teaching and Learning Methods

Lectures, discussions, and solving selected problems
Assessment Methods
Participation question, quiz, homework, and exams

Course Contents					
Week	**Hours**	**CLOs**	**Topics**	**Teaching & Learning Methods**	**Assessment Methods**
1	1.5	a1, a2	Iterated integrals	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
	1.5		Double integrals over general regions		
2	3	a1, a2	The double integrals as the limit of Riemann sums	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
3	3	a1, a2	The evaluation of double integrals using polar coordinates	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
4	3	a1, a2	Further Applications of the Double Integral	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
5	3	a1, a2	Triple integrals, Reduction to repeated integral	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
6	1.5	a1, a2	Triple integrals in cylindrical coordinates	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
	1.5		Triple integral in spherical coordinates		
7	1.5	a1, a2	Jacobeans	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
	1.5		changing variables in multiple integration		
8	3	a1, b1	Line integrals, The fundamental theorem for line integrals	Lectures, discussions, and solving selected	Participation question, quiz,

				problems	homework
9	1.5 1.5	a1, b1	Another Notation for Line Integrals **Midterm Exam 30%**	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
10	3	a1, c1	Line Integrals with Respect to Arc Length, Green's theorem	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
11	1.5 1.5	a1, c1	Parameterized surfaces Surface area	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
12	3	a1, c1	Surface integrals	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
13	3	a1, c1	The vector differential operator	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
14	3	a1, c1	The divergence theorem	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
15	3	a1, c1	Stokes theorem	Lectures, discussions, and solving selected problems	Participation question, quiz, homework
16	Final Exam				

Infrastructure	
Textbook	Stewart, J., Clegg, D. K., & Watson, S. (2020). *Calculus: early transcendentals*. Cengage Learning.
References	1) Anton, H., Bivens, I. C., & Davis, S. (2016). *Calculus: Early Transcendental Single Variable*. John Wiley & Sons. 2) Salas, S. L., Etgen, G. J., &Hille, E. (2006). *Calculus: one and several variables*. John Wiley & Sons.
Required reading	Salas, S. L., Etgen, G. J., &Hille, E. (2006). *Calculus: one and several variables*. John Wiley & Sons.
Electronic materials	

Other	

Course Assessment Plan						
Assessment Method		**Grade**	**CLOs**			
			a1	**a2**	**b1**	**c1**
First(Midterm)		30	4	22	4	0
Second (if applicable)						
Final Exam		50	0	12	18	20
Coursework		20				
Coursework assessment methods	Assignments	5	0	0	0	5
	Case study					
	Discussion and interaction	10	4	2	2	2
	Group work activities					
	Labtests and assignments					
	Presentations					
	Quizzes	5	0	0	5	0
Total		100	8	36	29	27

Plagiarism
Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code). Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.