The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:
Advanced Calculus

Course Syllabus

1	**Course title**	Advanced Calculus
2	**Course number**	0331301
3	**Credit hours**	3
	Contact hours (theory, practical)	3
4	**Prerequisites/corequisites**	Calculus III (0301201)
5	**Program title**	B.Sc.
6	**Program code**	
7	**Awarding institution**	The University of Jordan
8	**School**	Science
9	**Department**	Mathematics
10	**Course level**	Obligatory Specialization requirement
11	**Year of study and semester (s)**	3th year, 1st and 2nd semesters
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English
14	**Delivery method**	√ Face to face learning ☐Blended ☐Fully online
15	**Online platforms(s)**	√Moodle √Microsoft Teams ☐Skype ☐Zoom ☐Others…………
16	**Issuing/Revision Date**	05/11/2022

17 Course Coordinator:

Name : Prof. Baha Alzalg Contact hours : Sun Tue Thr 10:30-11:30 AM

Office number : 204 Math Bldg Phone number : +962 6-535-5000 Ext. 22086

Email: b.alzalg@ju.edu.jo

18 Other instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19 Course Description:

As statedin the approvedstudy plan.

Vector differential calculus: gradient, divergence, curl; curvilinear coordinates; vector integral calculus: line integral, surface integral, volume integral, Green's theorem, Stoke's theorem, divergence theorem; implicit and inverse function theorems; Leibnitz theorem; calculus of variations (functionals of one variable).

20 Course aims and outcomes:

A- Aims:

1. Evaluate the line integral (work) in several ways.
2. Be able to recognize conservative fields. In case the field is conservative, student should be able to find its potential the work does by this field any path.
3. Be able to use Green's the to compute the work.
4. The student should be able compute the surface integral over famous surfaces.
5. The student should be able to use the divergence theorem and stocker Theorem.
6. student should be able to apply implicit and inverse function Theorems.

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)
1. Apply appropriate theories, principles and concepts relevant to Advanced Calculus.	●							
2. To learn about scalar fields and vector fields and look at real life quantities that are scalar fields or vector fields such as the temperature of an object in space, the force, and the velocity.	●				●			
3. To learn the famous differential operators: Gradient, Divergence, Curl, and Laplacian and explain the importance of these operators.	●							●
4. To study six main theorems and their applications: Greens Theorem; Stokes Theorem; Divergence Theorem; Implicit Function Theorem; Inverse mapping Theorem; Leibnitz Theorem	●				●			
5. To be able to select a reasoned argument to the solution of familiar and unfamiliar problems relevant to Advanced Calculus.					●			
6. Plan practical activities using procedures appropriate to Advanced Calculus.								●

21 . Topic Outline and Schedule:

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Functions of several variables: Limits	1	Face to Face	Moodle		Quiz	Textbook
	1.2			Face to Face	Moodle		Quiz	Textbook
	1.3			Face to Face	Moodle		Quiz	Textbook
2	2.1	Functions of several variables: Continuity	1	Face to Face	Moodle		Quiz	Textbook
	2.2			Face to Face	Moodle		Quiz	Textbook
	2.3			Face to Face	Moodle		Quiz	Textbook
3	3.1	Functions of several variables: Partial derivatives	1, 5	Face to Face	Moodle		Quiz	Textbook
	3.2			Face to Face	Moodle		Quiz	Textbook
	3.3			Face to Face	Moodle		Quiz	Textbook
4	4.1	Gradient	1	Face to Face	Moodle		Quiz	Textbook
	4.2			Face to Face	Moodle		Midterm	Textbook
	4.3			Face to Face	Moodle		Midterm	Textbook
5	5.1	Divergence, Curl	1	Face to Face	Moodle		Midterm	Textbook
	5.2			Face to Face	Moodle		Midterm	Textbook
	5.3			Face to Face	Moodle		Midterm	Textbook
6	6.1	Line integral	1, 5	Face to Face	Moodle		Midterm	Textbook
	6.2			Face to Face	Moodle		Midterm	Textbook
	6.3			Face to Face	Moodle		Midterm	Textbook
7	7.1	Surface integral	1, 5	Face to Face	Moodle		Midterm	Textbook
	7.2			Face to Face	Moodle		Midterm	Textbook
	7.3			Face to Face	Moodle		Midterm	Textbook
8	8.1	Volume integral	1, 5	Face to Face	Moodle		Midterm	Textbook
	8.2			Face to Face	Moodle		Midterm	Textbook

	8.3			Face to Face	Moodle		Midterm	Textbook
9	9.1	Greens Theorem	5	Face to Face	Moodle		Midterm	Textbook
	9.2			Face to Face	Moodle		Midterm	Textbook
	9.3			Face to Face	Moodle		Midterm	Textbook
10	10.1	Stokes Theorem	5	Face to Face	Moodle		Midterm	Textbook
	10.2			Face to Face	Moodle		Midterm	Textbook
	10.3			Face to Face	Moodle		Midterm	Textbook
11	11.1	Divergence Theorem	5	Face to Face	Moodle		Midterm	Textbook
	11.2			Face to Face	Moodle		Quiz	Textbook
	11.3			Face to Face	Moodle		Quiz	Textbook
12	12.1	Implicit Function Theorem	5	Face to Face	Moodle		Quiz	Textbook
	12.2			Face to Face	Moodle		Quiz	Textbook
	12.3			Face to Face	Moodle		Quiz	Textbook
13	13.1	Inverse mapping Theorem	5	Face to Face	Moodle		Quiz	Textbook
	13.2			Face to Face	Moodle		Quiz	Textbook
	13.3			Face to Face	Moodle		Quiz	Textbook
14	14.1	Leibnitz Theorem	5	Face to Face	Moodle		Exam	Text Book
	14.2			Face to Face	Moodle		Exam	Textbook
	14.3			Face to Face	Moodle		Exam	Textbook
15	15.1	Calculus of variation: Functional of one variable	1, 8	Face to Face	Moodle		Exam	Textbook
	15.2			Face to Face	Moodle		Exam	Textbook
	15.3			Face to Face	Moodle		Exam	Textbook

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Midterm	30		1, 5		On Campus
Quiz(s)	20		1, 8		On Campus
Final Exam	50		1, 5		On Campus

23 Course Requirements

> Each student must have:
> - Account on Microsoft Teams

24 Course Policies:

1. Attendance is absolutely essential to succeed in this course. You are expected to attend every class; please notify your instructor if you know you are going to be absent. All exams must be taken at the scheduled time. Exceptions will be made only in extreme circumstances, by prior arrangement with the instructor.
2. If a student is absent for more than 10% of lectures without an excuse of sickness or due to other insurmountable difficulty, then he/she shall be barred from the final examination also he/she will get a failing grade in this course.
3. Medical certificates shall be given to the University Physician to be authorized by him. They should be presented to the Dean of the Faculty within two weeks of the student's ceasing to attend classes.
4. Test papers shall be returned to students after correction. His/her mark is considered final after a lapse of one week following their return.
5. Cheating is prohibited. The University of Jordan regulations on cheating will be applied to any student who cheats in exams or on home works.

25 References:

A- Required book (s), assigned reading and audio-visuals:
1. Calculus early transcendental, 7th Edition by James Stewart.
2. Advanced Calculus 5th Edition, by Wilfred Kaplan.

B- Recommended books, materials, and media:
1. Calculus early transcendental, 10th Edition by H. Anton, I. Bivens and S. Davis.
2. Advanced Calculus, 3th Edition, by R. C. Buck.

26 Additional information:

| |
| |

| Name of Course Coordinator: Prof. Baha AlzalgSignature: ----------------------- Date: 5/11/2022 |
| Head of Curriculum Committee/Department: Prof. Ahmad Al Zghoul-- Signature: --------------------------------------- |
| Head of Department: -Prof. Manal Ghanem - Signature: -M. Ghanem |
| Head of Curriculum Committee/Faculty: --------------------------------------- Signature: ---- |
| Dean: Mahmoud Jaghoub Signature: --: -------------------------------------- |