Department: Mathematics

Program: Bachelor's

Course Plan



First: Course Information Calculus 3 **Course Number** 0301201 **Course Name** 3 hours Theoretical 3 hours **Practical** 0 hours Credit Hours Prerequisite 0300102 **Section Number: 1 Lecture Time:** Level in JNQF 7 **Obligatory Faculty Requirement Elective University Requirement** П **Type Of Course Obligatory University Requirement Faculty Requirement Course Elective Specialty Requirement Obligatory Specialization Requirement Face-to-Face Learning Type of Learning Blended Learning (2 Face-to-Face + 1 Asynchronous) Online Learning (2 Synchronous + 1 Asynchronous)**

Third: Course Description

Vectors and analytic Geometry in the plane and in the 3D-space, Dot product and cross product, lines and planes in the 3D-space, Quadratic surfaces, Polar coordinates in the plane, cylindrical and spherical coordinates in the 3D-space, Functions of several variables, Level curves and level surfaces, limits and continuity, Partial differentiation, Chain Rule, Implicit differentiation, directional derivatives Tangent planes and normal lines, Extreme values and Lagrange multipliers, Multiple Integrals: double integral, Areas and volumes, double integrals using polar coordinates, Triple integrals.

Fourth: Course Objectives



issue:03

Issue Date:20/10/2023

Upon completion of this course, the student should be able to

- 1. Understanding the concepts of vectors, gradient, partial derivatives, double and triple integral, cylindrical and spherical coordinates.
- 2. Follow and to construct a formal mathematical formulas of tangent vectors and planes, and compute multi variables partial derivatives and compute multi integrals by different ways...
- 3. Demonstrate an understanding of the relationship of double and triple integrals to other branches of mathematics and to related fields.
- 4. Independently explore related topics using resources other than the text.

Fifth: Learning Source

| Main Reference | | | | Calculus | | | | | | | | | |
|-------------------|---------------------|-----|--------------------|----------------------------|--------|---------|-----------------------|---------|--|--------|--|--|--|
| Author: Anton | | | | e No.: 10 th Ed | litior | ı | Publication Year:2016 | | | | | | |
| Additional Source | : Websites | Cal | Calculus, by Salas | | | | | | | | | | |
| Teaching Type | Feaching Type 🔳 Cla | | | Laboratory | | Worksho | p 🗆 | MSTeams | | Moodle | | | |

| Level descriptor according to (JNQF) | CILOs Code | CILOs | Associated PILOs Code Choose one PILO for each CILO* | Assessment method** Choose at least two methods | Scores out of 100 State the total score identified for each CILO | Minimum acceptable Score/percentage (%) The percentage should not be less than 50% *** | |
|---|---------------|---|---|---|--|--|--|
| | K1 | Define and illustrate the concept of vectors, dot product, cross product | PK1 | First Exam, Second Exam, Final Exam | 10 | 5 (50%) | |
| ge | K2 | Comprehend basic properties of lines and planes. | PK2 | | | | |
| wled | K3 | Comprehend the theorem of line integrals | PK2 | First Exam. | | | |
| Knov | K4 | Comprehend basic properties of tangent vectors | PK2 | Second Exam, Final Exam, | 22 | 11 (50%) | |
| | K5 | Comprehend the fundamental formulas maximum and minimum values of functions | PK2 | Assignment | | | |
| | K6 | Comprehend the second derivative test for partial derivatives | PK2 | | | | |



| | K7 | Define and illustrate the concept of tangent plane | PK2 | | | |
|---------|------------|---|-----|---|----|----------|
| | S1 | Employ basic properties of vectors | PS1 | First Exam, Assignment | 6 | 3 (50%) |
| | S2 | Employ the properties of vector valued functions | PS2 | | | |
| | S 3 | Find the derivatives of vector valued functions. | PS2 | | | |
| | S4 | Determine whether the double integral can be solved by many techniques. | PS2 | First Exam. | | |
| s | S5 | Write the equations of lines and planes | PS2 | Second Exam, | 36 | 18 (50%) |
| Skill | S 6 | Discuss vector projection. | PS2 | Assignment | | |
| | S 7 | Find the polar coordinates and the Jacobean of integration | PS2 | | | |
| | S 8 | Solve double integral | PS2 | | | |
| | S9 | Solve the line integral | PS2 | | | |
| | S10 | Find the spherical and cylindrical coordinates | PS3 | Second Exam, | 10 | 5 (500/) |
| | S11 | Prove some fundamental theorems in double and triple integrals | PS3 | Final Exam | 10 | 5 (50%) |
| encies | C1 | Working in a team to handle some advanced topics in number theory | PC3 | Assignment | 4 | 2 (50%) |
| Compete | C2 | Develop the personal skills and capacity to carry responsibility | PC1 | Second Exam, Final Exam, Assignment | 12 | 6 (50%) |

*Refer to document () and page 2 in document () ** Refer to document ()

**80% of the students must achieve the minimum acceptable percentage or higher for each CILO

Seventh: Course Structure

| Intended Teaching Outcomes(ILOs) | Topics | Teaching Procedures* | Teaching Methods** | References |
|--|--|-------------------------|---|-------------------|
| | Introduction to the Course | Face-to-Face | Lectures, cooperative learning and discussion | Main Reference |
| K1, K2 | Review of derivatives | Face-to-Face | Lectures, cooperative learning and discussion | 232-300 |
| K1, K2, S1, S11 | Vectors in 3 dimensions | Face-to-Face | Lectures, cooperative learning and discussion | 185-215 |
| K1, K2, S1, S11 | Dot Product and it's applications | Face-to-Face | Lectures, cooperative learning and discussion | 767-782 |
| S1, S2, C1, C2 | Cross Product | Face-to-Face | Lectures, cooperative learning and discussion | 785-794 |
| K1, S2 | Applications of cross product in volumes and areas | Face-to-Face | Lectures, cooperative learning and discussion | 795-804 |
| K1, S2, S11 | Parametric Equations of Lines. | Face-to-Face | Lectures, cooperative learning and discussion | 795-804 |
| K1, S2, C1, C2 | Planes in 3-Spaces, | Face-to-Face | Lectures, cooperative learning and discussion | 803 |



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| K3, S2, S11, C1, C2Quadratic Surfaces 1Face-to-FaceLectures, corperative learning and discussion805-812K1, S2Quadratic Surfaces 2Face-to-FaceLectures, corperative learning and discussion813-820K1, S2, C1, C2Functions of two variables.Face-to-FaceLectures, corperative learning and discussion813-820S3, S11, C1Functions of three variablesFace-to-FaceLectures, corperative learning and discussion821-830K1, K4, S4Examples and exercisesFace-to-FaceLectures, corperative learning and discussion831-840K5, S5Properties of functions of several variablesFace-to-FaceLectures, corperative learning and discussion841-847K4, K5, S4, S5, C2Limits and ContinuityFace-to-FaceLectures, corperative learning and discussion841-847K1, K4, S4Partial derivativesFace-to-FaceLectures, corperative learning and discussion848-857K1, K4, S4Partial derivativesFace-to-FaceLectures, corperative learning and discussion848-857K1, K5, S4, S5, C2Partial derivativesFace-to-FaceLectures, corperative learning and discussion848-857K1, K5, S4, S5, C2Partial derivativesFace-to-FaceLectures, corperative learning and discussion848-857K1, K5, S4, S5, C2Partial derivativesFace-to-FaceLectures, corperative learning and discussion847-847K1, K6, S6, S7Maximum and minimum rectangular particleFace-to-FaceLectures, corperative lear | | 5, 52, 511 | | 1 acc-10-1 acc | learning and discussion | |
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| S7, S10, S11, K1 | Examples and applications | Face-to-Face | Lectures, cooperative learning and discussion | 1050-1060 | | | | | | |
| S7, S10, S11, K1 | Quadratic surfaces in spherical coordinates | Face-to-Face | Lectures, cooperative learning and discussion | 1060-1070 | | | | | | |
| S7, S10, S11, K1 | Applications on transforming to different coordinates | Face-to-Face | Lectures, cooperative learning and discussion | Main reference | | | | | | |
| S7, S10, S11, K1 | Examples and discussion | Face-to-Face | Lectures, cooperative learning and discussion | Main reference | | | | | | |
| S7, S10, S11, K1 | Exercises from the Book | Face-to-Face | Lectures, cooperative learning and discussion | Main reference | | | | | | |
| Final Exam | | | | | | | | | | |

Eighth: Assessment methods

| Methods | Direct Teaching | Specific Course Output to be measured *State the score identified for each CILO for each method of assessment out of 100 **If any CILO will not be assessed in the course, mark NA. | | | | | | | | | | | | | | | | | | | |
|-------------|--------------------|---|----------------|----|----|----------------|----------------|----|-----------|----------------|------------|------------|----|------------|----|----------------|----|-----|-----|----|----------------|
| | | К1 | К2 | К3 | К4 | К5 | К6 | К7 | S1 | S2 | S 3 | S 4 | S5 | S 6 | S7 | S 8 | S9 | S10 | S11 | C1 | C2 |
| First Exam | 20 | 2 | 1 | 1 | | | | | 4 | 3 | 2 | | | 2 | 2 | 2 | | 1 | | | |
| Second Exam | 20 | 2 | | | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | 4 |
| Final Exam | 50 | <mark>6</mark> | <mark>8</mark> | | | <mark>4</mark> | <mark>4</mark> | | | <mark>6</mark> | 2 | | 2 | | | <mark>3</mark> | 2 | 7 | | | <mark>6</mark> |
| Assignment | 10 | | | | | | | | 2 | | | | | 2 | | | | | | 4 | 2 |
| Total | 100 | 10 | 10 22 | | | | | 6 | 36 | | | | | • | 10 | | 4 | 12 | | | |

ninth: Course Policies

- All course policies are applied on all teaching patterns (online, blended, and face-to-face Learning) as follows:
 - a. Punctuality.
 - b. Participation and interaction.
 - c. Attendance and exams.
- Academic integrity: (cheating and plagiarism are prohibited).



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