



مركز الاعتماد
و ضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name: Calculus III

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|----|--|--------------------------|
| 1 | Course title | Calculus III |
| 2 | Course number | (0301201) |
| 3 | Credit hours (theory, practical) | 3 |
| | Contact hours (theory, practical) | 3 |
| 4 | Prerequisites/corequisites | (0301102) |
| 5 | Program title | B.Sc. |
| 6 | Program code | |
| 7 | Awarding institution | The University of Jordan |
| 8 | Faculty | Science |
| 9 | Department | Mathematics |
| 10 | Level of course | College requirement |
| 11 | Year of study and semester (s) | all Semesters |
| 12 | Final Qualification | B.Sc. in Mathematics |
| 13 | Other department (s) involved in teaching the course | None |
| 14 | Language of Instruction | English |
| 15 | Date of production/revision | 1.11.2017 |

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Dr. Manal Ghanim

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

Three dimensional space and vectors rectangular coordinates in 3-space; spheres, cylindrical surfaces; quadric surfaces; vectors: dot product, projections, cross product, parametric equations of lines. planes in 3-spaces; vector -valued functions: calculus of vector valued functions, change of parameters, arc length, unit tangent and normal vectors, curvature, functions of two or more variable: domain, limits, and continuity; partial derivatives; differentiability; total differentials; the chain rule; the gradient; directional derivatives; tangent planes; normal lines; maxima and minima of functions of two variables; Lagrange multipliers; 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 .

19. Course aims and outcomes:**A- Aims:**

1. Write equations of planes and lines in 3-space.
2. Distinguish equations planes from any other equations.
3. Distinguish between vectors and scalars.
4. Use partial differential when dealing with functions of several variables.
5. Measure the curvature at any point on two or three space curves.
6. Use a suitable coordinate system to evaluate double or triple integrals.

B- Intended Learning Outcomes (ILOs):

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

A. Knowledge and Understanding Skills: Student is expected to

- A1. Recognize the three dimensional space.
- A2. Know vectors which are quantities with magnitude and direction.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

- B1. Imagine the three dimensional space, and solids.
- B2. Represent problems using three dimensional space and several variable functions.

C. Subject- Specific Skills: Student is expected to

- C1. Write equations of lines and planes with a vector help.
- C2. Find the curvature of a curve and the three unit vectors.
- C3. Name and sketch cylinders and quadric surfaces.
- C4. Calculate limits of several variable functions.
- C5. Differentiate functions of several variables, and use the chain rule.
- C6. Calculate the directional derivatives, and find the maximum and minimum values of functions in two variables.
- C7. Evaluate double and triple integrals.

D. Creativity /Transferable Key Skills/Evaluation: Student is expected to

- D1. Use the concepts of partial derivatives' in deferent branches of mathematics physics and engineering.

20. Topic Outline and Schedule:

| Topic | Week | Instructor | Achieved ILOs | Evaluation Methods | Reference |
|---|-------|------------|--------------------|--------------------|-----------|
| Chapter 12: Vectors and the Geometry of Space 12.1 Three-dimensional coordinate systems Exercises: 3, 5, 8, 9, 10, 11, 12, 16, 17, 19, 20, 21, 22, 27, 28, 31, 34, 40, 41 12.2 Vectors Exercises: 4, 6, 15, 18, 21, 25, 26, 29,41 12.3 The dot product Exercises: 1,2,5,8,10,15,19,22,24,25,26,27, 28,32,34,36,37,38,40,43,46,53,55,56 12.4 The cross product Exercises: 1,4,13,14,19,20,27,29,34,35,37,38,45 12.5 Equations of lines and planes Exercises: 1,2,3,4,5,7,10,11,12,14,16,17,19,20,21,22,24, 26,27,30,31,34,37,38,44,46,48,49,52, 56,59,61,62,63,64,68,70,72,73,75,76,78,79 12.6 Cylinders and quadric surfaces Exercises: 3,5, 11– 36, 41, 42,43,44 | 1-5 | | A1, A2, C1, C3 | Exam | |
| Chapter 13: Vector Functions 13.1 Vector functions and space curves Exercises: 1,2,4,7,11,14,16,17,26,27 13.2 Derivatives and integrals of vector functions Exercises: 3,6,9,12,17,19,24,25,27,33,36,41 13.3 Arc length and curvature Exercises: 1,3,4,13,14,17,19,22,25,28,31,44,48,49 | 6-7 | | B1, C2 | Exam | |
| Chapter 14: Partial Derivatives 14.1 Functions of several variables Exercises: 9,10,12,14,15,17,19,20,21,22,29,31, 44,48,49 14.2 Limits and continuity Exercises: 5,7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 21, 29, 33, 37, 38,40,41 14.3 Partial derivatives Exercises: 15,21,26,28,29,31,36,39,41, 43,46,51,57,63,72,76 14.4 Tangent planes and linear approximation Exercises: 1,4,6,11,12,14,17,19,31,46 14.5 The chain rule Exercises: 2,4,8,11,13,15,21,24,29,32,45,48,54 14.6 Directional derivatives and the gradient vector Exercises: 4, 8, 10, 11, 15, 20, 21, 24, 28, 39, 43, 54, 55 14.7 Maximum and minimum values Exercises: 1,5,8,12,13,16,29,33,35,39,40,43,46 14.8 Lagrange multipliers Exercises: 3,6,8,11,19,27,28,31,34,40 | 8-13 | | B2, C4, C5, C6, D1 | Exam | |
| Chapter 15: Multiple Integrals 15.2 Iterated integrals Exercises: 4,7,9,12,16,19,23,26,27,28,31 15.3 Double integrals over general regions Exercises: 5,6,11,12,19,21,24,26,28,31, 34,41,43,44,45,46,49,51 | 14-15 | | C7 | Exam | |

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|---|--|--|--|--|--|
| 15.4 Double integrals in polar coordinates Exercises: 5,7,8,10,11,15,17,19,21, 25,26,29,31,32 | | | | | |
| 15.7 Triple integrals Exercises: 4,9,11,12,16,17,19,20,22,30 | | | | | |
| 15.8 Triple integrals in cylindrical coordinates Exercises: 3,8,9,17,18,21,22,23,29,30 | | | | | |
| 15.9 Triple integrals in spherical coordinates Exercises: 4,7,8,10,21,22,24,26,30,39,40,41 | | | | | |

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

In order to succeed in this course, each student needs to be an active participant in learning – both in class and out of class.

- The instructor will spend most of the class time on presenting the new material as well as on discussing homework problems.
- Group work in this class is encouraged.
- To actively participate in class, you need to prepare by reading the textbook and to do all assigned problems before class. (Problems will be assigned each class period, then to be discussed the following period).
- You should be prepared to discuss your homework at each class meeting.
- You are encouraged to work together with other students and to ask questions and seek help from your professor, both in and out of class.
- Students are also encouraged to use graphing calculators extensively and to use computer software supplements.

22. Evaluation Methods and Course Requirements:

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

| ILO/s | Learning Methods | Evaluation Methods | Related ILO/s to the program |
|-------|------------------|--------------------|------------------------------|
| | Lectures | Exam | A1, A4, B1, D1 |

23. 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 homeworks.

24. Required equipment:

Data Shows

25. References:

A- Required book (s), assigned reading and audio-visuals:

James Stewart (2012) Calculus (Early Transcendentals), 8th Edition, Thomson, Metric international version, Canada.

B- Recommended books, materials, and media:

- (1) G. Thomas (2005) Calculus, 11th edition, Addison Wesley (Person Education).
- (2) R. Smith and R. Minton (2007) Calculus, 3rd edition, McGraw Hill.
- (3) Howard Anton, Irl Bivens and Stephen Davis (2005) Calculus, 8th edition, John Wiley and sons Inc., New York.

26. Additional information:

Name of Course Coordinator: Dr. Manal Ghanim Signature: ----- Date: 1/11/2016

Head of curriculum committee/Department: Dr. Emad Abu Osha Signature: -----

Head of Department: Dr. Baha Alzalg Signature: -----

Head of curriculum committee/Faculty: Dr. Amal Al-Aboudi Signature: -----

Dean: Dr. Sami Mahmood Signature: -----

Copy to:

Head of Department
Assistant Dean for Quality Assurance
Course File