PhiladelphiaUniversity
Faculty of Science
Department of Basic Sciences and Mathematics
FirstSemester, 2020 – 2021

Course Syllabus	
Course Title: Calculus III	**Course code: 250202**
Course Level: 2nd year	**Course prerequisite: 0250102**
Lecture Time: Sun, Tue, Thu (9:10-10:00)	**Credit hours:** 3
Location: 21009	**Contact hours:**

Academic Staff Specifics				
Name	**Rank**	**Office number and location**	**Office hours**	**E-mail address**
Dr. Rola Alseidi	**Assistant Professor**	**812**		**ralseidi@philadelphia.edu.jo**

Course description (According to the University Catalogue)

This course introduces advanced principles of calculus to form the foundation needed forstudent's advancement. The module deals with the following main topics: Multi-dimensional Analytic Geometry, Vector – ValuedFunctions, Functions of Several Variables, PartialDerivatives, Gradient, Maxima – MinimaProblems and Applications, Double and TripleIntegrals.

Course objectives:

Upon completion of the course, the student will be able to:

1. Extend the ideas of calculus to two and three dimensions.
2. Generalize the concepts of derivative and integral to vector-valued functions.
3. Describe the tangent plane in terms of ideas of calculus, and learn how the concepts of derivative and integral generalize to functions of several variables.
4. Understand the 2-dimensional version of the Fundamental Theorem of Calculus.

Text book

Howard Anton, Irl C. Bivens and Stephen Davis, **Calculus: Early Transcendentals, 10th Edition**, JohnWiley & Sons, Inc. 2013.

Teaching methods

Lectures, discussion and problem solving.

Learning outcomes:

- **Knowledge and understanding**

The student will have the knowledge and understanding of how to:

1. Evaluate double and triple integrals and apply them on some problems on area,volumeand in physics.
2. Find the derivative and the integral of vector functions and compute the curvature and the arc length.
3. Calculate the gradient and its derivative.
4. Apply the mean value theorem, intermediate value theorem and the chain rule on functions of several variables and to find their maximum and minimum values.
5. Define and state the fundamental theorem for line integrals.

- **Cognitive skills (thinking and analysis).**

1. Begin by developing the calculus of vector-valued functions and how to differentiate and integrate such functions. Develop some of the basic properties of these operations then apply these calculus tools to explain various physical phenomena.
2. Extend many of the basic concepts of calculus to functions of two or more variables; limits, continuity, and derivatives, and be able to solve optimizationproblems.
3. Extend the concept of a definite integral to functions of two and three variables using new techniques. Such integrals can be used to calculate surface areas, volumes of solids, and can be used to find masses and centers of gravity of flat plates and three-dimensional solids.
4. Students should understand the connections between limits, derivatives, and integrals and see how these relate to connections between tangents, rates of change, displacements, and areas.
5. Students should be able to determine appropriate techniques and knowledge necessary to solve mathematical or applied problems involving calculus.

- **Communication skills (personal and academic).**

1. Discussion of appropriate topics in calculus; solve problems individually, in groups, or as a class quizzes and exams.
2. Reading and studying the text; daily homework problems from the text; writing assignments on concepts covered in class.
3. The ability to clearly express an opinion, and accept the opinions of others.
4. The student should illustrate how to communicating with: Peers, Lecturers and Community.
5. The student should interpret how to Know the basic mathematical principles using the internet.
6. The student should appraise how to Use the computer skills and library.
7. The student should illustrate how to Search the internet and using software programs to deal with problems.

Assessment instruments

- Exams (First, Second and Final Exams)
- Quizzes.
- Homework assignments

Allocation of Marks		
Assessment Instruments	**Expected Time**	**Mark**
Mid term		**30%**
Final examination		**50%**
Quizzes and Homework	3 at least	**20%**
Total		**100%**

Course/ academic calendar

week	Basic and support material to be covered
(1)	**Three-Dimensional Spaces; Vectors:** Rectangular Coordinates in3-Space; Spheres; Cylindrical Surfaces.
(2)	Vectors.Dot Product; Projections.
(3)	Cross Product. Parametric Equations of Lines.
(4)	Planes in 3-Space. Quadric Surfaces.
(5)	Cylindrical and Spherical Coordinates.
(6) 1st examination	**Vector-Valued Functions:** Introduction to Vector-Valued Functions.
(7)	Calculus of Vector-Valued Functions.
(8)	Change of Parameter; Arc Length.Unit Tangent, Normal, and Binormal Vectors. Curvature.
(9)	**Partial Derivatives:** Functions of Two or More Variables. Limits and Continuity.
(10)	Partial Derivatives. Differentiability.
(11)	The Chain Rule. Directional Derivatives and Gradients.
(12)2nd examination	Tangent Planes and Normal Vectors.Maxima and Minima of Functions of TwoVariables.
(13)	Lagrange multipliers.
(14)	**Multiple Integrals:**Double Integrals. Double Integrals over Non-rectangular Regions.
(15)	Double Integrals in Polar Coordinates.Triple Integrals.
(16)Final examination	Triple Integrals in Cylindrical and Spherical Coordinates.

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Documentation and academic honesty

Any form of dishonest conduct will be strictly punished. A student who is caught cheating, orattempting to do so in an exam will be given a zero for the exam and a

report will be writtento the Dean for further action. A student who helps another student or is seen communicatingwith another student in an exam will be given the same penalty stated in the previous point.Students with different exam forms are not exempt from the above rules. Repeat offenders willbe expelled permanently and banned from future courses.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Other Education Resources

Books

- James Stewart, **Calculus: Early Transcendentals, 7th Edition**, Brooks/ Cole 2012.

- Saturnino L. Salas, Garret J. Etgen, Einar Hille, **Calculus: One and Several Variables, 10th Edition**, JohnWiley & Sons, Inc. 2007.