Math 205 (Series and Vector Calculus)

Math 205	Series and Vector Calculus	Credits	Lec.	Tut.
		3	3	1
Course Summary	This course deals with calculus topics important to students in mathematics, the sciences, and engineering. We will study in detail Infinite Sequences and Series, Multiple Integrals, and Vector Calculus.			
Prerequisites	Math 202 Math 203	Calculus II & Calculus III		
Textbook	J.Stewart	Calculus, Early Transcendentals Seventh Edition.	International Metric Version, Al-Shegrey Bookstore	2012

Objectives:

On completion of the course, the students should be able to

- grasp the concepts of infinite sequences and series, idea of convergence and divergence of the infinite series, representation of functions as power series, Taylor series, Maclaurin series and Fourier series;
- evaluate double and triple integrals, and learn their use to compute volume, surface area, centroids, etc., and change of variables in multiple integrals;
- understand calculus of vector fields, line integrals and surface integrals with applications, connection between line integral, double integral, and triple integral (Green's Theorem, Stokes' Theorem, The Divergence Theorem).

Course description:

1. Infinite Sequences and Series

- **a.** Sequences
- **b.** Series
- **c.** The Integral Test and Estimates of Sums
- **d.** The Comparison Tests
- **e.** Alternating Series
- **f.** Absolute Convergence and the Ratio and Root Tests
- **g.** Strategy for Testing Series
- **h.** Power Series
- **i.** Representations of Functions as Power Series
- **j.** Taylor and Maclaurin Series
- **k.** Applications of Taylor Polynomials

2. Multiple Integrals

- **a.** Double Integrals over Rectangles
- **b.** Iterated Integrals
- **c.** Double Integrals over General Regions
- **d.** Double Integrals in Polar Coordinates
- **e.** Applications of Double Integrals
- **f.** Triple Integrals
- **g.** Triple Integrals in Cylindrical Coordinates
- **h.** Triple Integrals in Spherical Coordinates
- **i.** Change of Variables in Multiple Integrals

3. Vector Calculus

- **a.** Vector Fields
- **b.** Line Integrals
- **c.** The Fundamental Theorem for Line Integrals
- **d.** Green's Theorem
- **e.** Curl and Divergence
- **f.** Parametric Surfaces and Their Areas
- **g.** Surface Integrals
- **h.** Stokes' Theorem
- **i.** The Divergence Theorem
- **j.** Summary of Fundamental Theorems

Teaching Schedule:

Delivery Type	Number	Lecture Length (hours)	Student Hours
Lecture	39	1	39
Tutorial	13	1	13
Private Study Hours			117
Total Contact Hours			52
Total Hours			169

Methods of Assessment:

1- Coursework

Assessment Type	Notes (paper HW/Online)	% of Formal Assessment
In-course Assessment	Weekly Online HW	10
Total Percentage		10

2- Exams

Assessment Type	Notes (MCQ, etc …)	% of Formal Assessment
First Exam	MCQ & Written	25
Second Exam	MCQ & Written	25
Final Exam	MCQ & Written	40
Total Percentage		90