



Level Four

Calculus (3)

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	203	Calculus (3)	4	3	0	2	MAT 102

Objectives:

The main objective of Calculus (3) is for students to learn the basics of the calculus of functions of several variables. They will study partial derivatives, the gradient vector, Lagrange multipliers, double and triple integrals and line integrals, culminating with Green's Theorem.

Upon successful completion of the course, students should be able to:

- Differentiate functions of two and three variables.
- Evaluate double and triple integrals and line integrals.
- Apply derivatives and integrals to problems of arc length, and curvature.
- Apply Green's Theorem to evaluate line integrals.

The student will be familiar with calculus of several variables functions and will be able to use its methods and tools in applied mathematics and sciences .

Syllabus :

- Polar, cylindrical, and spherical coordinates; scalar and vector functions.
- Functions of several variables; limits and continuity; Partial derivatives, directional derivatives; the total derivative; the gradient of a scalar function.
- Chain rule; implicit differentiation; implicit and inverse function theorems; extrema; maxima and minima and their tests; constraints and Lagrange's multipliers;
- Taylor's series for functions of several variables;
- Double and triple integration; areas and volumes; change of variables in multiple integrals; improper multiple integrals.
- Line and surface integrals; Curl and divergence, Green's Theorem, Divergence theorem, and Stoke's Theorem; Applications.

The instructor should stress on using mathematical software through out the course .

References:

- **Advanced Engineering Mathematics**, E. Kreyszig, John Wiley & Sons , INC 8th ed (1998).
- **Calculus**, L. Hostetler & Edwards, Houghton Mifflin Publisher, 8th (2005).
- **Calculus**, F. Ayres & E. Mendelson, Schaum's Outline McGraw-Hill, 1st ed. (1999).

