SCHOOL OF MATHEMATICAL SCIENCES
Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: MSMT 151   *Full Mark*: 75

Paper: **Calculus with Analytic Geometry II**   *Pass Mark*: 30

Nature: Theory and Lab. work   *Credit*: 3

Course Description:

This course begins with Applications of integration, Techniques of integration, Parametric Equations and Polar Coordinates, and is followed by a comprehensive treatment of Infinite sequence and series.

Learning Objectives:

After successful completion of this course the student will be able to

- Find Areas Between Curves, Volumes, Volumes by Cylindrical Shells, Work, Average Value of a Function
- Integrate by Parts,
- Find trigonometric Integrals,
- Do Trigonometric Substitution,
- Integrate Rational Functions by Partial Fractions,
- Strategy for Integration,
- Integration Using Tables and Computer Algebra Systems,
- Approximate Integration,
- find Improper Integrals
- Use integration to find Arc Length, Area of a Surface of Revolution,
- Apply integration to Physics and Engineering, Economics and Biology, Probability.
- Define Curves in Parametric form,
- Use Calculus with Parametric Curves,
- Acquire knowledge of Polar Coordinates,
- Find Areas and Lengths in Polar Coordinates,
- Acquire knowledge of Conic Sections,
- Express in Conic Sections in Polar Coordinates
- Acquire knowledge of Sequences and Series,
- Use The Integral Test to Estimate of Sums,
- Do The Comparison Tests,
- Acquire knowledge of Alternating Series, Absolute Convergence
- Do the Ratio and Root Tests,

- Acquire knowledge of Power Series,
- Represente Functions as Power Series,
- Acquire knowledge of Taylor and Maclaurin Series,
- Apply Taylor Polynomials.

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). In some topics the use of software MATLAB for problem solving will be encouraged. Students will be encouraged to utilize the computer whenever possible and wherever applicable.

Contents:

Unit 1 Applications of integration   8 hrs

Areas Between Curves, Volumes, Volumes by Cylindrical Shells, Work, Average Value of a Function.

Unit 2 Techniques of integration   9 hrs

Integration by Parts, Trigonometric Integrals, Trigonometric Substitution, Integration of Rational Functions by Partial Fractions, Strategy for Integration, Integration Using Tables and Computer Algebra Systems, Approximate Integration, Improper Integrals.

Unit 3 Further Applications of integration   8 hrs

Arc Length, Area of a Surface of Revolution, Applications to Physics and Engineering, Applications to Economics and Biology, Probability

Unit 4 Parametric Equations and Polar Coordinates   10 hrs

Curves Defined by Parametric Equations, Calculus with Parametric Curves, Polar Coordinates, Areas and Lengths in Polar Coordinates, Conic Sections, Conic Sections in Polar Coordinates.

Unit 5 Infinite sequence and series   13 hr

Sequences, Series, The Integral Test and Estimates of Sums, The Comparison Tests, Alternating Series, Absolute Convergence and the Ratio and Root Tests, Strategy for Testing Series, Power Series, Representations of Functions as Power Series, Taylor and Maclaurin Series, Applications of Taylor Polynomials

Text Book:

1. *Calculus – Early Transcendental Functions,* 7th edition, J. Stewart, Thomson Brooks/Cole

Reference Books:

1. *Calculus: Early Transcendental Functions*, Larson, et al, Houghton Mifflin, 2011
2. *Calculus* : *A complete course*, Robert A. Adams, Christopher Essex. Pearson, 2010

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