

INSTITUTE OF MATHEMATICS  
College of Science  
University of the Philippines Diliman

**Math 22 Course Syllabus**

**A. Course Catalogue Description**

Course Number	Math 22
Course Title	Elementary Analysis II
Course Description	Techniques of integration; improper integrals; parametric equations and polar coordinates; lines in space, planes, cylindrical surfaces, surfaces of revolution, and quadric surfaces; vectors and vector-valued functions; sequences and series
Prerequisite	Math 21/equiv.
Course Credit	4 units
Number of Hours	4 hours/week

**B. Course Content**

- I. Course Introduction
- II. Techniques of integration and improper integrals
  1. Review of formulas of integration and integration by substitution
  2. Integration by parts
  3. Trigonometric integrals and integration by trigonometric substitution
  4. Integration of rational functions by partial fractions
  5. Improper integrals
- III. Sequences and series
  1. Sequences
  2. Series of constant terms and the Divergence test
  3. The Integral, Comparison and Limit Comparison tests
  4. Alternating series and the Alternating Series test
  5. Ratio Test and Root Test
  6. Power series; radius and interval of convergence of a power series
  7. Differentiation and integration of power series
  8. Taylor, Maclaurin and binomial series
  9. Approximation using Taylor polynomials
- IV. Parametric curves, polar coordinates, and surfaces
  1. Parametric curves and the calculus of parametric curves
  2. Polar coordinates and graphs of equations in polar coordinates
  3. Tangent lines to, areas enclosed by, and arclength of polar curves
  4. The three-dimensional Cartesian coordinate system
  5. Cylindrical surfaces
  6. Surfaces of revolution
  7. Review of conic sections and quadric surfaces
- V. Vectors, lines and planes in space, vector-valued functions
  1. Vectors in plane and in space
  2. Magnitude and direction angles of vectors
  3. Vector operations; dot and cross product of vectors
  4. Scalar and vector projections
  5. Lines and planes in space
  6. Vector-valued functions

7. Calculus of vector-valued functions
8. Moving trihedral, arc length, and parametrization using arc length
9. Curvature
10. Motion in space; normal and tangential components of acceleration

For a more detailed syllabus, send an email request to [ddapr@math.upd.edu.ph](mailto:ddapr@math.upd.edu.ph).