GEN1201/ECN1201 Mathematics for Business and Economics

Code
GEN1201/ECN1201

Title
Mathematics for Business and Economics

Prerequisites
None

Credits
3

Description
This course covers such important topics as limits, derivatives, graphing and optimization, anti-derivatives and integrals, basic operations with matrices. Many examples are used to introduce concepts and to demonstrate problem-solving techniques. Moreover, enough applications are included to convince that mathematics is really useful in business and social sciences. Most of the applications are simplified versions of actual real-world problems. There will be several tutorial sessions that will allow students to solve problems in a setting that will test their understanding and application of the materials presented in the lectures.

Objectives
The main objective of this course is to learn the basics of the calculus of single variable functions. Students will study derivatives, techniques of integration, matrices and determinants. Students will apply these ideas to a wide range of problems that include curve sketching and optimization, finding area between curves, solving matrix equations and system of linear equations using matrix inversion and determinants. More generally, students will improve their ability to think critically, to analyze a problem and solve it using a wide array of tools. Upon successful completion of the course, students should be able to investigate functions, describe behavior of a function in a precise way using concepts of limit and derivative.

Outcomes
1) The students should know the properties and graphs of basic elementary functions. 2) The students should be able to calculate limits. 3) The students should be able to calculate derivatives. 4) The students should be able to investigate functions using derivatives. 5) The students should be able to calculate integrals. 6) The students should know basic geometric and economic applications of integrals. 7) The students should be able to solve systems of linear equations using matrix inversion and determinants.

Assessment
60 % -first and second assessments
40 % -final assessment

Tentative course outline
Week1
Introduction. Functions. Domain. Graphs. Linear function. Straight line. Perpendicular and parallel lines. Intersection of two lines. Examples. Applications.

Week2
Quadratic function. Parabola. Applications. Polynomial function. Rational function. Examples. Exponential functions. Examples.

Week3
Logarithms. Examples. Limits. Continuity. Properties of limits. Infinite limits and limits at infinity.

Week4
Indeterminate forms. Fundamental limits. Asymptotes. Examples. The derivative. Slope of a tangent line. Elementary derivatives.

Week5
Rules of differentiation. Higher order derivatives. Calculation of derivatives. L,Hopital's rule. Examples. Applications.

Week6
First derivative and graphs. Finding intervals of monotonicity. Critical points. Local extrema. First derivative test. Examples. Midterm Preparation. Midterm Exam 1

Week7
Second derivative and graphs. Concavity. Inflection points. Second-derivative test for local maxima and minima. Analyzing graphs. Applications. Differential of a function.

Week8
Antiderivatives. Indefinite integrals. Indefinite integral formulas and properties. Integration by substitution. Examples.

Week9
Midterm break

Week10

Integration by parts. Technique of integration. Examples.

Week11

Geometric-numeric introduction to the definite integral. Fundamental theorem of Calculus. Examples. Area between two curves.

Week12

Algebra of matrices. Transpose of a matrix. Midterm Exam 2

Week13

Determinant. Inverse matrix.

Week14

Systems of linear equations. Matrix equations. Cramer's rule. Gaussian elimination.

Week15

Review. Preparation for final exam.