

## COURSE SYLLABUS

Catalogue No. : **Ma 19/20**  
 Department: **Mathematics**  
 Semester: **2<sup>nd</sup>**  
 Credit : **6 units**

Course Title: **Calculus for Economists**  
 School: **Science and Engineering**  
 School Year: **2007 – 2008**  
 Prerequisites : **Ma 11**

### A. Course Description

**Ma 20** is a 6-unit course taken primarily by Eco, MEco, and MIS majors to introduce them to differential and integral calculus in preparation for Ec 115 (Introduction to Mathematical Economics). Topics include: limits and continuity; derivatives and differentials, some applications of derivatives, antidifferentiation, the definite integral, partial derivatives and the total differential of functions of more than one variable.

### B. Course Objectives

At the end of the course, the student is expected to be able to:

1. Have an intuitive notion of the concepts of limit and continuity of a function; apply the limit theorems and obtain the asymptotes of the graph of a function.
2. Find the derivative of algebraic, exponential and logarithmic functions; interpret the derivative as a measure of slope and as a rate of change; use derivatives as an aid in sketching the graph of a function and to solve optimization problems.
3. Determine both the definite and the indefinite integrals of functions; interpret the integral as a measure of an area of a region; apply different techniques of integration; solve differential equations.
4. Find the partial derivatives and the higher order partial derivatives of functions of more than one variable; determine the maximum and minimum values of multivariate functions and use the method of Lagrange multipliers to solve constrained optimization problems.

### C. Course Outline and Timeframe (based on the textbook, *Calculus for Business, Economics, Life Sciences, and Social Sciences* (9<sup>th</sup> ed), by Barnett and others)

Topics (# of hours does not include exam day)	Chapter/Section
<b>1. The Derivative (14.5 hours)</b> Rate of Change and Slope Limits The Derivative Derivatives of Constants, Power Forms, and Sums Derivatives of Products and Quotients Chain Rule: Power Form Marginal Analysis in Business and Economics  Long Exam #1                      Tentative Schedule: Nov. 29, 2007 (Thu.)	3.1 3.2 3.3 3.4 3.5 3.6 3.7
<b>2. Graphing and Optimization (13 hours)</b> Continuity and Graphs First Derivative and Graphs Second Derivative and Graphs Curve Sketching Techniques: Unified and Extended Optimization; Absolute Maxima and Minima  Long Exam #2                      Tentative Schedule: Dec. 18, 2007 (Tue.)	4.1 4.2 4.3 4.4 4.5

<p><b>3. Additional Derivative Topics (13 hours)</b>  The Constant <math>e</math> and Continuous Compound Interest  Derivatives of Logarithmic and Exponential Functions  Chain Rule: General Form  Implicit Differentiation  Related Rates</p> <p>Long Exam #3      Tentative Schedule: Jan.22, 2008 (Tue.)</p>	<p>5.1 5.2 5.3 5.4 5.5</p>
<p>Midterm Exam      Tentative Schedule: Jan. 24 or 25, 2008 (Thu. Or Fri.)</p>	
<p><b>4. Integration (14.5 hours)</b>  Antiderivatives and Indefinite Integrals  Integration by Substitution  Differential Equations – Growth and Decay (no slope fields)  A Geometric-Numeric Introduction to the Definite Integral  Definite Integral as a Limit of a Sum; Fundamental Theorem of Calculus  (no error bounds)</p> <p>Long Exam #4      Tentative Schedule: Feb. 14, 2008 (Thu.)</p>	<p>6.1 6.2 6.3 6.4* 6.5*</p> <p>*Corresponding sections in Goldstein may be used instead.</p>
<p><b>5. Additional Integration Topics (10.5 hours)</b>  Area between Curves  Applications in Business and Economics (no probability density functions)  Integration by Parts</p> <p>Long Exam #5      Tentative Schedule: Feb. 28, 2008 (Thu.)</p>	<p>7.1 7.2 7.3</p>
<p><b>6. Multivariable Calculus (14 hours)</b>  Functions of Several Variables  Partial Derivatives  Maxima and Minima  Maxima and Minima Using Lagrange Multipliers  Double Integrals Over Rectangular Regions</p> <p>Long Exam #6      Tentative Schedule: Mar. 18, 2008 (Tue.)</p>	<p>8.1 8.2 8.3 8.4 8.6</p>
<p>Final Exam      Schedule: c/o Registrar's Office      <b>March 24 – 29</b></p>	

**D. Required Reading (Textbook):**

*Calculus for Business, Economics, Life Sciences, and Social Sciences* 9<sup>th</sup> ed), by R.A. Barnett, M.R. Ziegler and K.E. Byleen.

**E. Suggested Readings (References):**

Bittinger, M.L., *Calculus*, 5<sup>th</sup> edition, Addison-Wesley, 1992  
 Edwards, C.H. and E. Penney, *Calculus with Analytic Geometry*, 4<sup>th</sup> edition, Prentice-Hall, 1994.  
 Goldstein, L.J., D.C. Lay and D.I. Schneider, *Calculus and its Applications*, 7<sup>th</sup> edition, Prentice-Hall, 1996.  
 Harshbarger, R.J. and J.J. Reynolds, *Calculus with Applications*, D.C. Heath and Company, 1990.  
 Thomas, G.B. and R.L. Finney, *Calculus and Analytic Geometry*, 8<sup>th</sup> edition, Addison-Wesley, 1993.

**F. Course Requirements and Grading System:**

The final mark of the student will be based principally on the following: 6 long exams (100 pts. each), the departmental midterm exam (200 pts.), the departmental final exam (200 pts.) and (*optional*) quizzes/assignments (100 pts.).

<i>Percentage of the total score</i>	<i>Equivalent letter grade</i>
92% - 100%	A
86% - 91%	B+
77% - 85%	B
69% - 76%	C+
60% - 68%	C
50% - 59%	D
49% - and below	F

Students whose class standing before the final exam is 90% or above (prior to cancellation of one (1) lowest long exam score) may be exempted from taking the final exam subject to the discretion of the teacher.

**G. Important Dates to Remember:**

<i>Date</i>	<i>Day</i>	<i>Event</i>
November 16, 2007	Friday	2 <sup>nd</sup> Sem Faculty Day
November 30, 2007	Friday	Bonifacio Day (National Holiday)
December 7, 2007, 3:00pm	Friday	Mass in honor of Our Lady of the Immaculate Conception
December 20, 2007	Thursday	Last day of classes for 2007
December 21-January 6, 2008		CHRISTMAS BREAK
January 7, 2008	Monday	Start of Classes
January 26, 2008	Saturday	Deadline of Advisory Grades (on-line)
January 30, 2008	Wednesday	Distribution of Advisory Grades to the Freshmen by the Registrar's Office
February 4, 2008	Monday	President's Day (School Holiday)
February 6, 2008, 9:30am	Wednesday	Ash Wednesday Mass
March 20-23, 2008	Thu.-Sun.	Holy Week (Non-working days)
April 2, 2008	Wednesday	Deadline for on-line submission of Final marks

**H. General Classroom Policies:**

1. Make-up long exams, midterms, and finals may be given depending on the student's reason(s), and upon the Department Chairperson's approval. Make-up exams are more difficult than the regular exam.
2. As a departmental policy, there will be no take home long exams and no bonuses.

**I. Consultation Hours: (per faculty)**