Essex County College
Division of Mathematics and Physics
Syllabus for MTH 121 — Calculus I
Fall 2008

Lecturer: Ron Bannon

Office: 2208
Phone: 973-877-1886
Email: ron.bannon@gmail.com
Course Blog: http://mth-121-2008-fall.blogspot.com/
Regular Hours: Tuesday & Thursday 8:30–10:55;
Appointment Hours: Monday & Wednesday 11:30–12:55;

• General Education Goals: The aggregate of the core courses will have the following goals:

  (Note: Each core course need not address all four goals.)

  – Cultural awareness – To enable students to become more aware of the different perspectives emanating from a culturally diverse population;

  – Critical thinking and problem solving – To emphasize critical thinking and problem solving; to the extent possible, to include quantitative reasoning and research skills, including accessing information from a variety of sources and media;

  – Communication – To enable students to increase proficiency in writing, reading, speaking, and listening skills;

  – Computers – To require students to prepare and present information with the use of computers.

• Journal: A Math Journal is required of each student. The Journal entries should be comprised of the following four items:

  – Class notes dated and kept in consecutive order.
  – Summary of each set of class notes taken.
  – Summary of each reading assignment.
  – Running vocabulary list kept in the rear of the Journal. The list should not only contain definitions, but specific examples to help clarify the definitions.

The Journal is due at the end of the semester.

• Honor Code: The Honor Code is a statement on academic integrity, it articulates reasonable expectations of students and teachers in establishing and maintaining the highest standards in academic work:¹

  1. that they will not give or receive aid in examinations; that they will not give or receive unpermitted aid in class work, in the preparation of projects, or in any other work that is to be used by the instructor as the basis of grading;

¹Adapted from Stanford University’s Honor Code guidelines.
2. that they will do their share and take an active part in seeing to it that others as well as themselves uphold the spirit and letter of the Honor Code.

- **Working Together:** It is okay to work together on Review Problems. However, when it comes time for you to write up the solutions on the Projects, I expect you to do this on your own, and it would be best for your own understanding if you put aside your notes from the discussions with your classmates and wrote up the solutions entirely from scratch. Working together on exams, of course, is expressly forbidden.

- **Prerequisites:** MTH 120 with a final grade of “C” or better, or by placement test. I expect a good working knowledge of algebra and arithmetic, including the ability to deal with a variety mathematical problems as presented in MTH 119 and MTH 120.


- **Material to be Covered:** This is a first course in calculus. In the first semester we will learn about derivatives, integrals and the fundamental theorems of calculus, which precisely define the connections between integrals and derivatives. We will begin with a brief review of pre-calculus mathematics, and will continue forward by introducing the notion of a limit, which is essential to defining both derivatives and integrals. By the end of the semester students should have an intuitive idea of these concepts. We will also give an indication of the sorts of problems that can be solved using calculs and discuss the interpretations of the derivative as a measure of *instantaneous rate of change*, velocity or slope of a tangent line to a curve and the integral as an accumulation function, area under a curve or distance traveled. The first six chapters of Stewart’s book will be covered in varying detail, and you should attend all classes to more fully appreciate the required detail.

- **Suggested Review Problems:** Do these problems in the order they are covered in class, but also read the text in each section before doing these problems. Failure to understand the principles embodied in the great bulk of these problems will severely hinder success in the course.

  **2.1 The Tangent and Velocity Problems:** 1, 2, 4, 5, 7, 9.
  **2.2 The Limit of a Function:** 3, 4, 7, 8, 10, 15, 17, 22, 27, 34, 36, 37, 40.
  **2.3 Calculating Limits Using the Limit Laws:** 1, 6, 10, 15, 18, 31, 34, 35, 37, 42, 46, 49, 52, 58, 61.
  **2.4 The Precise Definition of a Limit:** 2, 5, 8, 9, 11, 12, 17, 20, 29, 34, 36, 39, 42.
  **2.5 Continuity:** 3, 6, 7, 9, 10, 16, 21, 29, 32, 35, 38, 40, 43, 44, 47, 53, 57, 60, 61, 65.
  **2.6 Limits at Infinity: Horizontal Asymptotes:** 2, 3, 6, 11, 12, 19, 28, 33, 37, 40, 46, 51, 54, 58, 60, 63, 68, 71.
  **2.7 Derivatives and Rates of Change:** 1, 4, 5, 9, 12, 14, 16, 20, 23, 26, 33, 40, 41, 42, 46, 49, 51.
  **2.8 The Derivative as a Function:** 1, 3, 12, 14, 17, 22, 25, 30, 33, 34, 35, 42, 44, 45, 50, 55, 56.
  **3.1 Derivatives of Polynomials and Exponential Functions:** 2, 5, 7, 10, 24, 28, 35, 41, 44, 45, 50, 51, 54, 58, 62, 63, 69, 73, 78.

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This is optional material.
3.2 The Product and Quotient Rules: 1, 5, 10, 15, 26, 27, 30, 33, 36, 40, 43, 46, 47, 49, 51, 53, 54, 57.

3.3 Derivatives of Trigonometric Functions: 3, 10, 12, 17, 20, 24, 25, 28, 31, 35, 36, 41, 42, 45, 49, 50.

3.4 The Chain Rule: 1, 4, 7, 14, 19, 34, 40, 47, 55, 58, 59, 61, 63, 65, 72, 75, 79, 82, 86, 89.

3.5 Implicit Differentiation: 2, 7, 14, 20, 21, 23, 27, 32, 35, 40, 46, 52, 56, 59, 64, 69.

3.6 The Derivatives of Logarithmic Functions: 2, 9, 16, 24, 27, 31, 34, 35, 41, 42, 50, 53.

3.9 Related Rates: 2, 5, 8, 11, 13, 18, 24, 26, 27, 31, 36, 38, 42, 44.

3.10 Linear Approximations and Differentials: 3, 6, 9, 12, 15, 20, 25, 30, 33, 34, 41, 43.

4.1 Maximum and Minimum Values: 2, 5, 8, 13, 16, 21, 29, 34, 41, 48, 52, 61, 65, 70, 72, 74, 76.

4.2 The Mean Value Theorem: 1, 5, 8, 10, 11, 18, 21, 23, 28, 29, 34, 35.

4.3 How Derivatives Affect the Shape of a Graph: 2, 4, 7, 8, 11, 12, 19, 23, 25, 31, 36, 46, 53, 56, 64, 72, 78, 81.

4.4 Indeterminate Forms and l'Hôpital’s Rule: 3, 1, 6, 11, 24, 31, 46, 51, 59, 66, 67, 71, 73, 76, 78, 82.

4.5 Summary of Curve Sketching: 2, 5, 11, 18, 28, 31, 38, 48, 54, 57, 64, 72.

4.6 Graphing with Calculus and Calculators: 3, 6, 9, 12, 13, 20, 23, 26, 31, 34, 38.

4.7 Optimization Problems: 1, 5, 8, 9, 13, 16, 25, 28, 32, 37, 42, 44, 46, 53, 55, 62, 64, 65, 73.

4.9 Antiderivatives: 3, 8, 15, 20, 21, 25, 30, 35, 38, 42, 48, 49, 52, 55, 60, 67, 69, 72, 75, 76.

5.1 Areas and Distances: 2, 5, 8, 11, 12, 13, 15, 18, 19, 20, 26.

5.2 The Definite Integral: 1, 6, 8, 9, 15, 18, 23, 26, 33, 36, 47, 48, 52, 57, 63.

5.3 The Fundamental Theorem of Calculus: 6, 9, 14, 17, 20, 25, 30, 32, 40, 43, 49, 51, 58, 63, 69, 74.

5.4 Indefinite Integrals and the Total Change Theorem: 2, 7, 10, 12, 18, 19, 21, 24, 29, 37, 42, 47, 52, 59, 63, 65, 68.

5.5 The Substitution Rule: 2, 5, 10, 16, 23, 28, 42, 47, 53, 58, 66, 69, 73, 78, 82, 85.

6.1 Areas Between Curves: 2, 5, 7, 12, 20, 23, 29, 34, 36, 41, 42, 45, 50.

6.2 Volume: 3, 6, 7, 14, 21, 28, 31, 34, 37, 42, 46, 49, 53, 63, 68, 72.

6.3 Volumes by Cylindrical Shells: 2, 4, 5, 11, 15, 20, 21, 26, 30, 33, 38, 43.

6.4 Work: 2, 3, 6, 11, 16, 22.

6.5 Average Value of a Function: 1, 4, 7, 10, 13, 15, 16, 19, 20, 22.

• WebAssign, Projects and Quizzes: The general format of the quiz will be a problem similar to the material covered in the previous week(s). I expect you to do the suggested Review Problems first, and if you don’t understand something you should ask questions. Once you feel comfortable with the material, you should do the WebAssign and posted Project assignments. The quizzes will be an effective way of monitoring your performance.

• **Exams:** Three exams will be given (see schedule)—each of these three exams is weighed equally. The material on these exams will be similar to the material covered in class.

• **Grading Policy:** 20% is based on quizzes, 60% is based on three full-period exams, and 20% on assignments which includes posted Project questions and WebAssign. The letter grade will be based on the following scale:

  - 94% and above  A
  - 88% < 94%  B+
  - 82% < 88%  B
  - 76% < 82%  C+
  - 70% < 76%  C
  - 64% < 70%  D
  - below 64%  F

• **Tentative Exam/Quiz Schedule:**

  - Quiz 1  09/19/08  Friday
  - Quiz 2  9/26/08  Friday
  - Quiz 3  10/3/08  Friday
  - Quiz 4  10/10/08  Friday
  - Quiz 5  10/17/08  Friday
  - Test 1  10/24/08  Friday
  - Quiz 6  10/31/08  Friday
  - Quiz 7  11/7/08  Friday
  - Quiz 8  11/14/08  Friday
  - Test 2  11/21/08  Friday
  - Quiz 9  12/5/08  Friday
  - Quiz 10  12/12/08  Friday
  - Final  12/19/08  Friday

• **Calculators:** I encourage the use of calculators when appropriate. However, calculators are not allowed on exams or quizzes unless specifically requested in advance. Please see the me if you have any questions.

• ** Civility:** You are expected to act in an adult manner at all times. Here’s a partial list of things that I don’t want to see:

  - **Sleeping:** It is the single most offensive behavior.
  - **Slouching:** Pay attention and look alert.
  - **Being Late:** You’re expected to be on time and stay the full period.
  - **Interruptions:** Personal business does not belong in any classroom.