**Essex County College – Mathematics Department**

**MTH 121 Section 101 – Calculus with Analytic Geometry I**

**Summer I 2010 Syllabus**



**Instructor**: Dr. Susan Gaulden

**Office**: Room 2165 (Blue Area)

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**Office E-mail**: gaulden@essex.edu

**Office Hours**: Mondays, Tuesdays, Wednesdays & Thursdays from 10:00 am to

10:30 am

**Classroom**: Room 2113

**Class Meeting Times**: Mondays, Tuesdays, Wednesdays & Thursdays (plus one Friday,

 05/07/2010) from 10:40 am to 12:30 pm, from May 3 to

 June 21, 2010

**Required Textbook**: Calculus: Early Transcendentals*,* 6th edition, by James Stewart; published by Thomson Brooks/Cole, 2008; ISBN-13: 978-0-495-01166-8 or ISBN-10: 0-495-01166-5

Please note: This textbook is sold in the ECC bookstore. See me if you are unable to purchase the book during the first week of classes. Copies of the textbook are available on reserve in the Library and for use in the Learning Center.

**Other Suggested Supplies**: Students are expected and encouraged to use a graphing and/or scientific calculator to enhance understanding during class or while doing homework. Calculators are also permitted to be used but *not shared* on tests and exams.

**Course Prerequisite**: a grade of ‘C’ or better in MTH 120 or placement

**Course Co-requisite**: none

**Course Description**: This is the first course covering a rigorous sequence in early transcendental calculus. Topics covered include the theory and application of limits, continuity, differentiation, anti-differentiation and the Fundamental Theorem of Calculus. Methods and applications include related rates, implicit differentiation, indeterminate forms, Newton’s method, the Mean Value theorems, and volumes.

**General Education Goals**: The aggregate of the core courses required for any major at ECC have the following goals:

1. **Written and Oral Communication**: Students will communicate effectively in both speech and writing.
2. **Quantitative Knowledge and Skills**: Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
3. **Scientific Knowledge and Reasoning**: Students will use the scientific method of inquiry through the acquisition of scientific knowledge.
4. **Technological Competency/Information Literacy**: Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
5. **Society and Human Behavior**: Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
6. **Humanistic Perspective**: Students will analyze works in the field of art, music, or theater; literature; and philosophy and/or religious studies; and will gain competence in the use of a foreign language.
7. **Historical Perspective**: Students will understand historical events and movements in World, Western, non-Western, or American societies and assess their subsequent significance.
8. **Global and Cultural Awareness of Diversity**: Students will understand the importance of global perspective and culturally diverse peoples.
9. **Ethics**: Students will understand ethical issues and situations.

**Course Goals:** Upon successful completion of this course, students should be able to do the following:

1. demonstrate knowledge of the fundamental concepts and theories from calculus; (GEG 2)
2. utilize various pre-calculus and calculus problem-solving and critical-thinking techniques to set up and solve applied problems in engineering, sciences, business, and technology fields; (GEG 2)
3. use appropriate technology, such as graphing calculators and computer software, effectively as a tool to solve such problems as those described above; (GEG 2) and
4. communicate accurate mathematical terminology and notation in written and/or oral form in order to explain strategies to solve problems as well as to interpret found solutions. (GEG 1, GEG 2)

**Measurable Course**

**Performance Objectives**: Upon successful completion of this course, students should specifically be able to do the following:

1. Demonstrate knowledge of the fundamental concepts and theories from calculus:

1.1 *define limits, continuity and derivatives*;

1.2 e*valuate limits by using the limit laws*;

1.3 e*valuate derivatives by using various rules such as sum, product, quotient, chain, and l`Hospital's rules as well as implicit differentiation with applications in the tangent lines, extreme values and local linearity*;

1.4 a*pproximate definite integrals by calculating the limit of Riemann sums and exactly evaluate definite and indefinite integrals using the Fundamental Theorem in Calculus*;

1.5 a*pply the derivative of functions to find critical points and extreme values, and to graphs functions*; and

1.6 a*pply differentials to approximate the function values*

2. Utilize various pre-calculus and calculus problem-solving and critical-thinking techniques to set up and solve applied problems in engineering, sciences, business and technology fields:

2.1 a*pply integrals to calculate areas, work and volumes of revolution*; and

2.2 *apply derivatives to solve the relative rates and optimization problems in business and engineering*

3. Use appropriate technology, such as graphing calculators and computer software, effectively as a tool to solve such problems as those described above:

3.1 *use a graphing calculator and/or web-based application programs such as Applet to visualize graphs of functions. Identify limits, and calculate definite integrals*; and

3.2 *use mathematical software such as Mathematica and Maple to calculate derivatives and integrals*

4. Communicate accurate mathematical terminology and notation in written and/or oral form in order to explain strategies to solve problems as well as to interpret found solutions:

4.1 *write and explain solutions to related rates, optimization, and work and other application problems*

**Methods of Instruction**: Instruction will consist of a combination of lectures, presentation of sample problems, clarification of homework exercises and textbook material, general class discussion, and individual study.

**Outcomes Assessment:** All test and exam questions are blueprinted to course objectives.  Data is collected and analyzed to determine the level of student performance on these assessment instruments in regards to meeting course objectives.  The results of this data analysis are used to guide necessary pedagogical and/or curricular revisions.

**Course Requirements:** All students are required to:

1. Read the textbook and do the suggested homework problems in a timely manner.

2. Be an active participant in all classes.

3. Take tests/exams in class and adhere to the test/exam schedule.

**Grading**: 4 Class Tests (18 % each) = 72 %

These tests will show evidence of the extent to which

 students meet the course objectives, including but not

 limited to identifying and applying concepts, analyzing

 and solving problems, estimating and interpreting results,

 and stating appropriate conclusions using the correct

 mathematics terminology.

 1 Final Exam = 28 %

The comprehensive final exam will show evidence of the

 extent to which students have understood and synthesized

 all course content and achieved all course objectives.

 Total = 100 %

Please note the following items that pertain to grading in this course:

* Completing assigned reading and homework in a timely manner and contributing to class discussions will greatly enhance your chance of success in this course. Mathematics cannot be understood without doing a significant amount of outside study.
* There are NO MAKE-UP TESTS or EXAMS. You will be excused from a missed test or exam only if you contact me immediately to explain reasonable circumstances. If you are not excused, then you will receive a grade of ZERO for all missed tests or exams.
* In determining final course grades, consideration will be given to class attendance, punctuality, assignment completion and participation. Excessive absences or lateness usually negatively affects student understanding of the material and, therefore, performance in this course.
* Incomplete grades will only be given to students with a ‘C’ average or better who are unable to take the final exam. You must contact me immediately if you miss the exam and give a valid explanation of why you were unable to take the final.

**Academic Integrity:** Dishonesty disrupts the search for truth that is inherent in the learning process and so devalues the purpose and the mission of the College. Academic dishonesty includes, but is not limited to, the following:

* plagiarism – the failure to acknowledge another writer’s words or ideas or to give proper credit to sources of information;
* cheating – knowingly obtaining or giving unauthorized information on any test/exam or any other academic assignment;
* interference – any interruption of the academic process that prevents others from the proper engagement in learning or teaching; and
* fraud – any act or instance of willful deceit or trickery.

 Violations of academic integrity will be dealt with by imposing appropriate sanctions. Sanctions for acts of academic dishonesty could include the resubmission of an assignment, failure of the test/exam, failure in the course, probation, suspension from the College, and even expulsion from the College.

**Student Code of Conduct:** All students are expected to conduct themselves as responsible and considerate adults who respect the rights of others. Disruptive behavior will not be tolerated. All students are also expected to attend and be on time for all class meetings. No cell phones or similar electronic devices are permitted in class. Please refer to the Essex County College student handbook, *Lifeline*, for more specific information about the College’s Code of Conduct and attendance requirements.

**Class Expectations**: Some of the expectations that you, the students, may have of me, the

instructor, and some of the expectations that I, the instructor, will have of you, the students, in this class are given below.

You may expect me to:

* Arrive to class on time and be prepared.
* Provide clear instruction.
* Respect you as individuals and encourage you to work hard.
* Grade each test/exam fairly on the quality of your completed test/exam and not on the amount of time and effort you spent preparing for the test/exam.
* Return graded tests in a timely manner.

I will expect you to:

* Concentrate exclusively on this course during class hours.
* Do not receive or make phone calls or text messages. **TURN OFF all cell phones and other electronic devices** (iPods, MP3s, etc.) before entering the classroom. If you use a cell phone in class, you must leave for the remainder of the class session and see me during my office hours before attending the next class. If you repeatedly forget to turn off your cell phone and it rings and interrupts the class, you must leave for the remainder of the class session and see me during my office hours before attending the next class.
* Arrive to class on time. Late students are responsible for all missed material. If you are repeatedly late, you must see me during my office hours to discuss this matter.
	+ - * Come to class prepared. Reviewing notes from the previous class, reading appropriate sections of the textbook, and completing homework will enormously increase your understanding of the math topics covered in this course. It is especially *strongly* suggested that you do the homework in a timely manner!
* Ask questions. Questions should be asked in class or during my office hours. Please ask for help *before* you fall behind.
* Respect me and all of your classmates.
* Call if sick or unable to attend class, especially when a test or exam is scheduled.

**Students with Special Needs**: If you are a student with documented physical or learning disabilities, you are entitled to receive appropriate accommodations as recommended by the Office of Disability Support Services, which will occur once you provide the necessary documentation to this office. It is not enough for you to request such accommodations directly from me. You must contact Mr. Victor Stolberg, a counselor who coordinates disability support services, as soon as possible to receive valuable guidance and support. His office is Room 1124 and his phone number is 973-877-3129.

On the following pages is a TENTATIVE content distribution outline. This schedule is subject to change at any time. Please be aware of any changes that are announced in class by either contacting a classmate or else by contacting me via e-mail or by phone during my office hours.

Day / Date Class Material

# M 5/3 Introduction to the course; expectations will be discussed

**Chapter 2 Limits and Derivatives**

2.1 The Tangent and Velocity Problems (# 1,3,5,7)

T 5/4 2.2 The Limit of a Function (# 5,7,9,15,17,25,29)

2.3 Calculating Limits Using the Limit Laws (# 1a,1c,1e,5,7,9,13,17,21,35,47,61)

W 5/5 2.4 The Precise Definition of a Limit (no homework assigned)

 2.5 Continuity (# 3,5,19,35,39,41,47)

R 5/6 2.6 Limits at Infinity: Horizontal Asymptotes (# 3,7,15,19,33,39)

 2.7 Derivatives and Rates of Change (# 5,9,11,13,19)

F 5/7 2.7 Derivatives and Rates of Change (continued) (# 25,29,43,45)

 2.8 The Derivative as a Function (# 3,5,21,33a,35,37,41)

M 5/10 Questions on Chapter 2

**Chapter 3 Differentiation Rules**

 3.1 Derivatives of Polynomials and Exponential Functions (# 3,5,7,11,13,15,17,

23,25,35,49,51,63,65,73)

T 5/11 **Test #1** on Chapter 2

W 5/12 3.2 The Product and Quotient Rules (# 3,5,7,15,17,21,27,31)

R 5/13 3.3 Derivatives of Trigonometric Functions (# 1,3,5,9,23,33,35,37,39)

3.4 The Chain Rule (# 7,9,17,29,35,53)

M 5/17 3.4 The Chain Rule (continued) (# 73,77,81)

 3.5 Implicit Differentiation (# 5,7,11,13,19,25,33,47)

T 5/18 3.6 The Derivatives of Logarithmic Functions (#3,9,15,23,33,37,41,43)

 3.9 Related Rates (# 1,3,5,7,11,15)

W 5/19 3.9 Related Rates (continued) (# 23,27,31,33)

R 5/20 3.10 Linear Approximations and Differentials (# 1,3,11,13,15,23,33)

M 5/24 Questions on Chapter 3

**Chapter 4 Applications of Differentiation**

 4.1 Maximum and Minimum Values (3,7,15,17,23,29,31,41,47,53,57,69,75)

T 5/25 **Test #2** on Chapter 3

W 5/26 4.2 The Mean Value Theorem (# 1,11,17,21a)

R 5/27 4.3 How Derivatives Affect the Shape of a Graph (# 1,5,9,13,15,25,29,45,67)

 4.4 Indeterminate Forms and l`Hospital's Rule (# 1,5,9,11,19,29,31,73)

M 5/31 no class today – College is closed for Memorial Day

T 6/1 4.5 Summary of Curve Sketching (# 1,5,9,33,43,57,59)

 4.6 Graphing with Calculus and Calculators (# 3,7,11)

W 6/2 4.7 Optimization Problems (# 3,5,7,9,13,21,31,41,55)

R 6/3 4.9 Antiderivatives (# 1,5,11,13,15,27,29,33,39,57,59,77)

M 6/7 Questions on Chapter 4

 **Chapter 5 Integrals**

 5.1 Areas and Distances (# 3,5,11)

Day / Date Class Material

T 6/8 **Test #3** on Chapter 4

W 6/9 5.2 The Definite Integral (# 3,9,17,21,25,39)

 5.3 The Fundamental Theorem of Calculus (# 7,9,19,25,31,35,39,49)

R 6/10 5.4 Indefinite Integrals and the Total Change Theorem (# 7,11,17,21,23,27,35,

41,51,57,59,61)

 5.5 The Substitution Rule (# 1,3,5,7,9,11,19,21,23,25,29,31,51,59,69,79)

M 6/14 **Take-Home Test #4** on Chapter 5 distributed in class

**Chapter 6 Applications of Integration**

 6.1 Areas Between Curves (# 1,3,5,7,11,15,21)

 6.2 Volumes (# 1,7,9,11,15,49,51)

T 6/15 6.3 Volumes by Cylindrical Shells (# 3,9,17,21,41,43)

W 6/16 **Take-Home Test #4** on Chapter 5 due (Note: take-home tests ***will not*** be

accepted for ***any*** reason after today)

6.4 Work (# 1,7,13,19,23,29)

 6.5 Average Value of a Function (# 3,7,17,19)

R 6/17 Review for Final Exam

M 6/21 Comprehensive **Final Exam** on all course material covered