

COURSE OUTLINE & INFORMATION SHEET

| PROGRAM | COURSE NO. | COURSE TITLE | CREDIT HOURS |
|---------|------------|-------------------|--------------|
| Math | MT205-ZZ | <i>Calculus I</i> | 4 |

INSTRUCTOR: Stanton Lockwood; phone: 603-455-0378 ; E-MAIL: slockwood@ccsnh.edu

COURSE DESCRIPTION:

This course in the calculus of one variable will include: limits; derivatives of algebraic, trigonometric, exponential and logarithmic functions; anti-derivatives; and an introduction to integration. Applications will be stressed throughout the course including: velocity, acceleration, curve sketching, optimization and related rates.

PREREQUISITES:

Any student taking this course is expected to have had success working with topics covered in NHTI's Precalculus (MT134) course. In general, the less exposure you've had to the prerequisite topics, the more challenging you'll find *Calculus I*. (These topics are listed on the end pages of this syllabus. Read *thoroughly* to determine what prerequisite "gaps", if any, you may have).

GENERAL COURSE OBJECTIVES:

- 1) Determine the derivatives of explicit and implicit rational functions.
- 2) Determine the derivatives of explicit and implicit transcendental functions.
- 3) Solve applications involving velocity, acceleration, curve sketching, related rates, optimization, growth & decay.
- 4) Apply the Fundamental Theorem of Calculus through area and other applications

MATERIALS REQUIRED:

- One of the following two ISBN's:
 - ISBN-032119991X (or 9780321199911): **My MathLab Student Version** student access code; NO printed textbook
 - ISBN-0321511832 (or 9780321511836): **My MathLab Student Version** bundled with printed textbook: Calculus, 11th Ed. by Thomas, Addison Wesley (2008) (032148987X is textbook only)
- Graphing Calculator: TI-83+

You will be using on-line materials for this course that are available by accessing the Web site www.coursecompass.com. You will receive from the instructor a [Getting Started](#) guide that details how to gain access to this course.

NOTE: It is *highly* recommended that the PC you use have a "broadband" connection of some type. It can be frustrating at times, waiting long periods of time for programs, graphics, sound files, etc. to load, if you don't use high-speed communication links.

GRADING POLICY:

A. I do NOT use the Course Compass percentage scheme in calculating your grades. Instead, I keep my

own records whereby all homework and tests are assigned *quality points* according to the following scheme. The percentage and quality point numbers shown under the letter grades are the minimums for earning that letter grade. For example, if your overall grade at the end of the semester was, say, 3.25 quality points, then your NHTI transcript would show a letter grade of “B” (not “B+”).

| Letter: | A | | | | | A- |
|---------|-----|-----|-----|-----|-----|-----|
| % score | >94 | 94 | 93 | 92 | 91 | 90 |
| QltyPts | 4.0 | 3.9 | 3.9 | 3.8 | 3.8 | 3.7 |

| Letter: | B+ | | | | | B | B- | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| % score | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 |
| QltyPts | 3.5 | 3.3 | 3.2 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 | 2.8 | 2.7 |

| Letter: | C+ | | | | | C | C- | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| % score | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 |
| QltyPts | 2.5 | 2.3 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 |

| Letter: | D+ | | | | | D | D- | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| % score | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 |
| QltyPts | 1.5 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 |

| Letter: | F | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|
| % score | 59 | 58 | 57 | 56 | 55 | 54 | <54 |
| QltyPts | 0.6 | 0.5 | 0.4 | 0.3 | 0.2 | 0.1 | 0.0 |

The following definitions describe the significance of the above grade levels:

- A or A-** represents achievement of a level of understanding and ability which is excellent and distinctive.
- B+, B, or B-** represents achievement of a level of understanding and ability of consistent high quality.
- C+, C, or C-** represents achievement of a level of understanding consistent with those required for successful entry into the student’s chosen field.
- D+, D, or D-** represents some evidence of achievement, but substantially below the level required for successful entry into the student’s chosen career field.
- F** represents negligible academic achievement.

It is the instructor’s position that grades are EARNED, NOT GIVEN (Please let the instructor know if you want to be *given* a grade that’s *not earned!*). The grade you earn must represent, as closely as possible, the same level of achievement as any other student earning that same grade. Your grade is based on the *same work* everybody else in the class is expected to complete*. Consequently, “extra credit” assignments are *not* offered; the instructor *does* recognize, however, *extra effort*, e.g. in preparing for exams, doing more homework than required, etc.

*(Note, however, the discussion in the DISABILITIES SERVICES section further on.)

B. Your semester grade for the course will be determined based on the following:

Tests - 70% of semester grade
(12 tests of equal weight taken; the *two* lowest of these grades dropped)

Final exam - 15% of semester grade

Homework - 15% of semester grade

- C. When *any* course work is not completed by its due date, grade credit is reduced for whatever work remains undone—*this includes exams not taken at their scheduled times*. In any case, *no work will be accepted after **Friday, May 7, 2010***.

NOTE: A grade of “Incomplete” will only be considered by the instructor if the student has been missing consecutive assignments or tests for an extended time period, due to, for example, an extended illness or other unusual circumstance.

HOMEWORK ASSIGNMENTS:

Homework assignments are given on a weekly basis, i.e. assignments are given on a Monday and are due to be submitted no later than midnight of the following Saturday – 6 days later. These are the so-called “Tracked” homework exercises. The credit given for these exercises counts 15% of the semester grade – as noted in section **B** above.

A second homework component, referred to as “Tutorial” exercises, are *optional* but may be completed by a student in one of these situations: 1) If a student, for whatever reason, is unable to complete the *Tracked* exercises by midnight Saturday but seeks some credit (probably *not* full credit) for the week’s homework; or 2) A student seeks extra credit *beyond* the credit earned from completion of the *Tracked* exercises. In either case 1) or 2), the instructor will determine, on an individual basis, how much credit is assigned for these optional exercises; but there is a limit of 1.0 additional Quality Points (per week) that can be earned.

EXAMS/TESTS:

A total of 13 exams are given, including the final exam. Topics covered on any particular weekly exam are those you worked on for homework in the Monday-through-Saturday timeframe mentioned above. You may start the exam *anytime* on Sunday or Monday following the homework timeframe. **Once you start the exam, however, you have only 90 minutes to complete the exam.** If you do not finish within that time period, your grade will reflect any items you don’t complete. Your exam grade is automatically calculated by the computer *immediately* after the 90-minute period is up. **YOU HAVE NO OPPORTUNITY TO RETAKE -- OR GET EXTENDED TIME.** (A strategy some students adopt is to take weekly exams on Mondays and start the new week’s homework that same day; but, of course, you’re free to take exams on Sundays instead of Mondays.)

Your lowest *two* of the 12 weekly exam grades are dropped, i.e. are not used in calculating your course grade. Should you miss taking an exam, that exam will be considered one of the 12 not used in the course grade calculation. The final exam grade is NOT dropped; If you miss taking the final exam, the grade will be “F” for the exam. **NOTE: You can NOT pass the course if you miss taking more than three exams**

MAKE-UP WORK POLICY:

A missed test/exam can be considered for make-up only if the instructor has been notified—*prior to the scheduled exam time*—that the student can not take the exam as scheduled. You are NOT *guaranteed* makeup of tests/exam; individual circumstances will dictate whether or not you are allowed makeup. If you expect to get *some* credit for work completed after the time indicated in the assignment schedule, then you need to discuss with the instructor your extenuating circumstances.

GRADE REPORTING:

Faculty submit grades electronically to the Registrar's Office within a few days following the end of each final exam period. FINAL GRADES ARE NOT MAILED to students. It is the student's responsibility to review his/her final grades via the Student Information System as soon as grades are available. Students who receive an "I" (Incomplete) grade should coordinate with the instructor to complete the remaining coursework as soon as possible. Unresolved "I" grades will convert to an "F" (Failing) grade automatically at the end of the third week of the following semester. A grade of Incomplete will place a student's financial aid status on hold for the subsequent semester. Consult the NHTI catalog for the full "Incomplete Grade Policy."

COURSE DROP/WITHDRAWAL AND REFUND:

A course must be dropped by notifying the Registrar's Office (for day classes) or the Division of Continuing Education (for evening classes) prior to the end of the eighth calendar day of the semester in order to receive a 100% refund of tuition, less non-refundable fees. After that time, the student may submit a DROP form to the Registrar's Office but no refund will be granted. Ceasing to attend a class does not constitute an official drop or withdrawal and may result in a grade of "F". Officially dropping a course prior to the completion of 60% of the scheduled duration of a course will result in a grade of "W". After that time, a grade of "WP" or "WF" will be issued depending on the student's standing at the time of the drop. Note: Dates are prorated for courses offered in an alternative format; contact the Registrar or Division of Community Education for details. Dates for the 2009-2010 Academic Year are as follows:

| | |
|------------------------------------------|--------------------|
| | <u>Spring 2009</u> |
| Last day to drop with a full refund | <i>January 26</i> |
| Last day to withdraw with a grade of "W" | <i>March 29</i> |

PLAGIARISM/CHEATING POLICY:

As stated in the Student Handbook: Honesty is expected of all NHTI students. In academic matters this includes the submission of work that clearly indicates its source. Dishonest acts include cheating and plagiarism. **Cheating** includes, but is not limited to: (1) use of any unauthorized assistance from other persons or technologies in taking quizzes, tests, or examinations or in the preparation and completion of class assignments; (2) dependence upon the aid of resources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) the acquisition, without permission, of tests or other academic material belonging to a member of the CCSNH colleges faculty, staff, or students; or (4) knowingly providing unauthorized assistance of any kind to another for the purpose of providing unfair advantage to the recipient in the completion of course assessments/assignments (sometimes known as **facilitation**). **Plagiarism** includes, but is not limited to, the use (intentional or unintentional), by paraphrase or direct quotation, of the published or unpublished work of another person without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in providing term papers or other academic materials via direct sale, barter, or other means.

Cheating and plagiarism are considered serious disciplinary matters and are subject to the same penalties and procedures as other NHTI disciplinary matters. Students should be aware that penalties levied in proven cases of cheating or plagiarism may include the issuance of a grade of AF (which may in turn lead to delay of graduation), suspension or dismissal from a program or from the college, or other sanctions as deemed appropriate.

The instructor assumes that any work you submit (tests, assignments, etc.) was NOT completed by someone else. However, if *integrity* is *not* important to you, then, by all means, submit work that is not your own—and notify the instructor of your lack of commitment to the course!.

CIVIL RIGHTS/EQUITY ISSUES (discrimination and harassment):

NHTI – Concord's Community College does not discriminate in the administration of its admissions, educational programs, activities, or employment practices on the basis of race, color, religion, national origin, age, sex, handicap, veteran status, sexual orientation, or marital status. The college is sensitive to the fear and/or embarrassment an individual may experience in coming forward with a complaint regarding discrimination. The grievance reporting procedures outlined in the Student and Employee Handbooks are

designed to provide a safe, confidential, and supportive environment in which an individual may discuss his/her concerns. Any NHTI student, employee, or visitor who has observed, is aware of, or has been a victim of discriminatory or harassing behavior while engaged in an NHTI-sponsored activity should report such behavior to the Civil Rights/Equity Coordinator (Eileen Fitzsimmons, North Hall Room N108, efitzsimmons@ccsnh.edu, 271-2583) or other Institute representative.

CROSS-CULTURAL EDUCATION and ENGLISH-as-a-SECOND-LANGUAGE (ESL) SERVICES:

The Director of Cross-Cultural Education and the ESOL Coordinator, located in Sweeney Hall, Room S301, work together to provide the tools necessary for successful integration of cultures, whether for academic or business purposes. Students may arrange to take the TOEFL exam or the institutional ESOL assessment test at NHTI to allow for appropriate course registration and ESOL course placement. ESOL courses are offered for college credit throughout the year. A gradual merging process allows students to take ESOL courses and courses required in the chosen program simultaneously. Individual tutoring in ESOL and other test-taking accommodations can be arranged through the ESOL Coordinator. Programs are also offered that assist members of the international and immigrant communities to better understand American culture and that help the community develop awareness and understanding. Call 271-8928 for more information.

THE LEARNING CENTER:

The Learning Center, located in the library, provides free academic assistance to all NHTI students who would like to improve their grades. The LC offers peer tutoring in most subjects; professional drop-in tutoring in writing, math, study skills & critical reading, and A&P/biological sciences; Disabilities Services; and a computer learning lab. For more information, call 271-7725 or check the LC web site.

DISABILITIES SERVICES:

Students with documented disabilities are eligible to receive reasonable accommodations that address individual learning needs. To receive services, students must contact the Coordinator of Disabilities Services, whose office is in the Learning Center. For details, please refer to the *Policies and Procedures Manual for Services Available for Students with Disabilities*, which is available in print and on the NHTI Web site (www.nhti.edu).

Students with documented disabilities should be aware that simply noting in writing or in discussions with faculty that one's disability affects academic skills does NOT constitute formal disclosure of a disability. Once a student develops a Reasonable Accommodation Plan (RAP) with the Coordinator of Disabilities Services, that student is responsible for discussing the RAP with the instructor. Students should make requests for specific accommodations at least one week prior to when the accommodations are needed. Call Beverly Boggess at 271-7723 or e-mail her at bboggess@ccsnh.edu for more information

STUDENT EMAIL:

Official Community College System of New Hampshire (CCSNH) email accounts will be created automatically for all enrolled students at the time of course registration. This is the only email address that will be recognized by NHTI for any required correspondence in NHTI-controlled courses and will serve as the official account for ALL of your electronic communication with the college. This practice will ensure that all students are able to comply with the email-based requirements specified by faculty. Students are responsible for checking their official student email regularly and reading college-related communications. The electronic mail system is college property. Additionally, all messages composed, sent, or received on the electronic mail system are and remain the property of the CCSNH or NHTI. The CCSNH electronic mail system is not to be used to create or forward any offensive messages. CCSNH is not responsible for the handling of email by outside vendors.

PERFORMANCE OBJECTIVES:

Upon successful completion of this course the student will be able to:

I. Derivatives of polynomial functions

1. Find the derivative of a function using the definition and four-step method
2. Find derivatives using the power, chain, product and quotient rules
3. Evaluate a derivative at a given point manually and with a graphing calculator
4. Find the derivative of an implicit function
5. Find higher order derivatives
6. Employ proper notations for the derivative
7. Solve applied problems involving slope of a line tangent to a curve, velocity and acceleration

II. Applications of Limits and Derivatives of polynomial functions

1. Derive the equations of tangent and normal lines to a point on a curve
2. Employ the first and second derivative tests to sketch curves
3. Solve applied optimization problems
4. Solve applied related rate problems

III. Derivatives of transcendental functions

1. Find the derivatives of the six trigonometric functions, explicit and implicit
2. Find the derivatives of the six inverse trigonometric functions, explicit and implicit
3. Find the derivatives of exponential and logarithmic functions, explicit and implicit

IV. Applications of derivatives of transcendental functions

1. Employ the first and second derivative tests to assist in curve sketching
2. Derive the equations of tangent and normal lines to a point on a curve
3. Solve applied optimization problems
4. Solve applied related rate problems
5. Solve applied growth and decay problems
6. Solve applied growth and decay problems

IV. The Fundamental Theorem of Calculus

1. Determine anti-derivatives of functions.
2. Determine definite integrals using the Fundamental Theorem of Calculus.
3. Use a Table of Integrals to evaluate indefinite integrals.
4. Determine bounded areas with integration techniques.

CALCULUS I, MT205-ES
COURSE SCHEDULE, Spring 2009

| WEEK OF*: | TOPIC | SEC. | PAGES | EXERCISES |
|------------------------|------------------------------------------------------------------------------|-------------|--------------------|--------------------------------------------------------------------------|
| <i>WK1</i> 1/18/10 | RATE OF CHANGE & LIMITS LIMITS USING LIMIT LAWS | 2.1 2.2 | 73–81 84–89 | <u>81</u> : 1–4, 11–19, 29–37 <u>89</u> : 1–47 |
| <i>WK2</i> 1/25/10 | ONE-SIDED LIMITS & LIMITS-AT-INFINITY VERTICAL ASYMPTOTES | 2.4 2.5 | 102–111 115–121 | <u>111</u> : 1–3, 11–17, 21–27, 37–51 <u>122</u> : 1–11, 17–21, 27–37 |
| <i>WK3</i> 2/1/10 | CONTINUITY TANGENTS & DERIVATIVES | 2.6 2.7 | 124–130 134–139 | <u>132</u> : 1–27 <u>140</u> : 1–33 |
| <i>WK4</i> 2/8/10 | THE DERIVATIVE AS A FUNCTION RULES FOR DIFFERENTIATION | 3.1 3.2 | 147–155 159–168 | <u>155</u> : 1–21, 27–30, 35–43 <u>169</u> : 1–35 |
| <i>WK5</i> 2/15/10 | DERIVATIVE AS RATE OF CHANGE DERIVATIVES OF TRIG FUNCTIONS | 3.3 3.4 | 171–178 183–187 | <u>180</u> : 7–13, 17–29 <u>188</u> : 1–29, 39 |
| <i>WK6</i> 2/22/10 | THE CHAIN RULE FOR COMPOSITE FUNCTIONS IMPLICIT DERIVATIVES | 3.5 3.6 | 190–195 205–210 | <u>201</u> : 1–13, 19–31, 39–43, 49–55 <u>211</u> : 1–41, 47–51 |
| <i>WK7</i> 3/1/10 | NATURAL LOG FUNCTION DERIVATIVES EXPONENTIAL FUNCTION DERIVATIVES | 7.2 7.3 | 476–483 486–492 | <u>484</u> : 5–29, 55–61 <u>493</u> : 17–33, 67–69 |
| <i>WK8</i> 3/8/09 | RELATED RATES | 3.7 | 213–217 | <u>218</u> : 1–35 |
| <i>WK9</i> 3/15/10 | EXTREME VALUES OF FUNCTIONS FIRST DERIVATIVE TEST | 4.1 4.3 | 244–251 262–265 | <u>252</u> : 1–25, 35–49 <u>266</u> : 1–31 |
| <i>WK10</i> 3/22/10 | CONCAVITY & CURVE SKETCHING OPTIMIZATION TOOLS | 4.4 4.5 | 267–274 278–284 | <u>274</u> : 1–13, 23–35, <u>285</u> : 1–37 |
| <i>WK11</i> 3/29/10 | ANITDERIVATIVES & INDEFINITE INTEGRAL FINITE SUMS | 4.8 5.1 | 307–313 325–333 | <u>314</u> : 1–41 <u>333</u> : 1–12 |
| <i>WK12</i> 4/5/10 | SIGMA NOTATION & FINITE SUM LIMITS THE DEFINITE INTEGRAL | 5.2 5.3 | 336–342 343–352 | <u>342</u> : 1–6, 19–23 <u>352</u> : 9, 15–21, 27–49 |
| <i>WK13</i> 4/12/10 | THE FUNDAMENTAL THEOREM OF CALCULUS INTEGRATION BY SUBSTITUTION | 5.4 5.5 | 356–364 386–374 | <u>365</u> : 1–45 <u>374</u> : 1–29 |
| <i>WK14</i> 4/19/10 | AREA BETWEEN CURVES NATURAL LOGARITHMS | 5.6 7.2 | 376–383 476–483 | <u>383</u> : 1–11, 25–33, 43–55, 61–65 <u>484</u> : 5–23, 37–45, 71 |
| <i>WK15</i> 4/26/10 | EXPONENTIAL FUNCTIONS | 7.3 | 486–492 | <u>493</u> : 17–29, 41–53 |

*(Dates are Mondays)

FINAL EXAM is week of 5/3/2010

(This schedule is subject to reasonable modification by the instructor in response to the needs of the class. Changes will be communicated in a timely manner.)

PREREQUISITE TOPICS FOR TAKING CALCULUS I

Course #: MT134

Course Name: PreCalculus

Course Description: Topics will include: complex numbers, trigonometric identities and equations, polynomial and rational functions, conic sections, non-linear systems, non-linear inequalities, sequences and series, limits and continuity. A graphing calculator will be required.

Course Content:

1. Complex numbers
2. Trigonometric formulas, identities and equations
3. Polynomial functions, rational functions
4. Analytic geometry and conic sections
5. Nonlinear systems
6. Inequalities with one and two variables
7. Sequences and series
8. Limits and continuity

Major Objectives:

1. Perform operations involving complex numbers
2. Solve, graph and apply polynomial and rational functions
3. Analyze, graph and apply conic sections
4. Solve and graph systems of bivariate equations and inequalities
5. Prove and employ trigonometric identities and solve and apply trigonometric equations
6. Recognize, formulate and apply sequences and series
7. Determine a limit and whether a function is continuous

Performance Objectives:

I. Complex numbers

Upon successful completion of this course the student will be able to:

1. Construct the cycle of values created by the integral powers of j
2. Express the square root of a negative number in terms of j
3. Express complex numbers in rectangular, polar and exponential form and convert among those forms
4. Graph complex numbers and their conjugates in the complex plane
5. Add, subtract, multiply, divide, find powers and roots of complex numbers

II. Polynomial functions, rational functions

Upon successful completion of this course the student will be able to:

1. Use the remainder theorem to find the remainder when $f(x)/(x-a)$
2. Use the factor theorem to determine whether $x-a$ is a factor of $f(x)$
3. Find the roots of polynomial functions using a graphics calculator
5. Given the degree, nature of roots and y - intercept write the equation of a polynomial function
6. Find asymptotes and graph a rational function using a graphing calculator
7. Find the roots of rational functions using a graphing calculator

III. Analytic geometry and conic sections

Upon successful completion of this course the student will be able to:

1. Apply the slope, midpoint and distance formulas.
2. Use point-slope form or slope-intercept form to write the equation of a line.
3. Given the general equation of a circle, ellipse, parabola, or hyperbola write the standard equation.
4. Given the general equation of a circle, ellipse, parabola, or hyperbola determine all the features of interest
5. Given the general equation of a circle, ellipse, parabola, or hyperbola sketch the graph with and without a graphing calculator
6. Given the graph of a conic section with sufficient information, write the equation.
7. Solve applied problems using conic sections.
8. Use translation of axes to graph conic sections which are not centered at the origin.

IV. Non-linear systems

Upon successful completion of this course the student will be able to:

1. Solve and graph a nonlinear system of equations.
2. Solve and graph a nonlinear inequality.
3. Solve applied problems

V. Inequalities with one and two variables

Upon successful completion of this course the student will be able to:

1. Use properties of inequalities to solve a linear inequality.
2. Graph the solution set of a linear inequality.
3. Solve an absolute value inequality.
4. Solve a system of linear inequalities graphically.
5. Solve applied problems.

VI. Sequences and series

Upon successful completion of this course the student will be able to:

1. Determine whether a sequence is arithmetic or geometric and find the common difference or ratio
2. Use the formulas for the n^{th} term and sum of the first n terms of an arithmetic and geometric sequence to solve problems
3. Determine whether an infinite series converges and, if so, find its sum
4. Determine the coefficients and powers for the terms in a binomial expansion
5. Find any term in a binomial expansion
6. Solve applied problems using series

VII. Limits and continuity

Upon successful completion of this course the student will be able to:

1. Find average slope of a polynomial over a given range.
2. Evaluate the limit of a function graphically by using a graphing calculator.
3. Evaluate the limit of a function numerically by using a graphing calculator.
4. Evaluate the limit of a function algebraically.
5. Evaluate limits at infinity, algebraically, graphically, and numerically.
6. Determine if a given function is continuous.