Notes for Instructors
2006-2007

The text is sold in a full version and a shortened version -- the “Single Variable” version. Either may be used
for Calculus I and II. Students who will go on to Calculus III will need the full version. Please announce this to
your students.

The Nature of the Course: This textbook enables the instructor to use technology and the rule of four (topics
are presented geometrically, numerically, algebraically, and verbally) to focus on conceptual understanding. At
the same time, it retains the strength of the traditional calculus by exposing the students to the rigor of proofs
and the full variety of traditional topics. We strongly recommend that you read the author's preface in the
textbook.

Calendar: The calendar listed on the "Information for Students" sheet does not take holidays into account; you
will have to adjust it as needed. You will also need to adjust it somewhat based on which of the optional sections
you elect to cover. Finally, note that we have put no test dates on the calendar, leaving the testing scheme up to
the individual instructor. Several possible testing schemes are given below. You should resist the temptation to
slow down too much in Chapter 4 (Applications of Differentiation); you need to allow sufficient time at the end
of the course for a thorough treatment of sections 5.1 - 5.4 and a decent introduction to integration by
substitution in section 5.5. Do not shortchange the students on chapter 5; they will need it for Calculus II.
Please note that section 2.9 (2nd edition) on linear approximations has been removed, and the material in it is
now incorporated into section 3.8. Section 2.10 in the old edition is section 2.9 in the new edition.

Prerequisite: We are concerned about students entering the calculus course without adequate prerequisites.
We have agreed this year that we will provide all students in Intermediate Algebra, College Algebra,
Trigonometry, Precalculus, and Calculus I with the same one-page handout describing the prerequisites for
Calculus I. It is included in this section of the Manual for you to hand out.

Graphing Technology: You and your students will need access to a graphing calculator or computer program
that will graph a function over any desired domain and find the zeroes of a function. The ability to perform
numerical integration by computing left and right Riemann sums may also be useful, depending on your
emphasis in chapter 5. You need to plan for this in advance, so that you can be clear with the students
about the requirements in your first day handout. If you are uncertain what resources are available, ask one
of the members of the course committee (listed at the beginning of this document).

Homework: It is our feeling that a good Calculus course must be problem-oriented. This text has some great
exercises; try to assign some that require more than just routine computation. No list of suggested problems is
given, because the text is flexible enough that different instructors may teach with different emphases; your
particular emphasis will dictate which problems you choose to assign. As in most texts, answers to odd-
numbered problems are given in the back.
Testing: You may give a test per chapter plus a comprehensive final. Three other possible testing schemes are given:

**Testing Scheme 1**
- Test 1: Sections 1.1 through 2.5;
- Test 2: Sections 2.6 through 3.3;
- Test 3: Sections 3.4 through 4.4;
- Midterm Exam: Comprehensive of the differentiation portion of the course, through section 4.8.
- Test 4: Sections 4.9 through 5.5

**Testing Scheme 2**
- Test 1: Sections 1.1 through 1.7;
- Test 2: Sections 2.1 through 3.2;
- Test 3: Sections 3.3 through 4.1;
- Midterm Exam: Sections 4.2 through 4.8 or comprehensive midterm exam through 4.8;
- Test 4: Sections 4.9 through 5.5 or comprehensive final exam. (Only one comprehensive exam should be chosen.)

**Testing Scheme 3**
- Test 1: Sections 1.1 through 2.5;
- Test 2: Sections 2.6-2.9 and chapter 3;
- Test 3: Chapter 4;
- Test 4: Chapter 5;
- Final Exam: Cumulative final exam

Use one of these testing schemes or come up with one of your own. In any case, be sure to tell your students on the first day handout when their tests will be, and what each will cover.

While you should compose exams that are consistent with the syllabus and your style of teaching, exams composed solely or primarily of multiple choice questions are generally not considered acceptable. Also, a word about group testing schemes. You will need to document carefully how the tests were administered, how the groups were composed, and how the exams were graded. It is uncommon for all or even most exams to be given this way. If you have questions, you are encouraged to consult with a committee member.

**Comments on the Syllabus:**

**A Preview of Calculus.** We suggest you assign this for reading.

**Chapter 1.** You should be able to cover this rather quickly, as it is a review of precalculus topics from a slightly more advanced and multi-dimensional perspective. Section 1.7 on parametric curves will be covered in a later course, so we aren't including it here.

**Chapter 2.** This chapter introduces limits, continuity, and the derivative. The section on limits and continuity are fairly standard, although delta-epsilon arguments are not given. Sections 2.6-2.10 do a good job of helping the students understand what the derivative represents without getting into the differentiation formulas. Cover the entire chapter.

**Chapter 3.** Here the standard differentiation formulas are given, with geometric, numerical, and analytic justifications. Section 3.3 is optional; cover the rest of the chapter. Section 3.8 closes the chapter with a look at linearization and the differential.

**Chapter 4.** This chapter looks at applications of the derivative. The intent is not to be encyclopedic, but rather to illustrate some of the ways that the derivative can be used to analyze functions and solve interesting
problems. Section 4.1 and 4.8 are optional, but you should cover at least one of them. Section 4.7 is omitted from the syllabus. Cover the rest of the chapter.

Chapter 5. Here, the students are introduced to the definite integral. We will cover through section 5.5. Section 5.5 should be covered lightly, looking at only the more straightforward substitutions. It will also be covered in Calculus II. In sections 5.1 and 5.2, you may wish to de-emphasize finding exact values of the definite integral by using equations 4 - 6 on page 364 and instead do more with approximating them by Riemann Sums. Either way, you must work with them enough that the students understand definite integrals before they encounter the Fundamental Theorem, so that they do not think that a definite integral means "$F(b) - F(a)$."
Prerequisites for Calculus

There are two calculus sequences at ACC (and at most colleges) -- Business Calculus and Calculus. The prerequisite sequence is different for these. Depending on background, students may start the prerequisite sequence at different places

<table>
<thead>
<tr>
<th>Intermediate Algebra (MATD 0390)</th>
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<tbody>
<tr>
<td>College Algebra** (MATH 1314)</td>
<td>Math for Bus &amp; Eco</td>
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<td>College Algebra (MATH 1314)</td>
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<td>*Trigonometry (MATH 1316)</td>
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<tr>
<td>Precalculus (MATH 2412)</td>
<td>Business Calculus I (MATH 1425)</td>
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<td>Calculus I (MATH 2413)</td>
<td>Business Calculus II (MATH 1426)</td>
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<td>Calculus II (MATH 2414)</td>
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<tr>
<td>Calculus III (MATH 2415)</td>
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Where to start: The only way that students may skip courses in a sequence is to begin higher in the sequence, based on current knowledge of material from high school courses.
1. A student who needs a review of high school Algebra II will start in Intermediate Algebra (or below.)
2. A student who completed high school Algebra II, but no higher, and whose assessment test score indicates that he/she remembers that algebra, will start in College Algebra or Math for Business & Economics. A substantially higher assessment test score enables the student to start in Trigonometry.
3. A student who completed some precalculus, elementary analysis, or trigonometry in high school, and whose assessment test score indicates that he/she remembers algebra, is eligible to start higher in the sequence than College Algebra. Check the catalog or the math web page.***

* The material in the Trigonometry course requires that students are quite adept with the skills from high school Algebra II (Intermediate Algebra). Some students will achieve that level of skill in the College Algebra course if their placement score is high enough, while others need an additional semester of work on algebra that is done in two courses, Intermediate Algebra and College Algebra.

** Some students who are very successful in College Algebra are tempted to skip either Trigonometry or Precalculus and enroll in Calculus I. That is not acceptable. Trigonometry topics are essential to success in Calculus, and while it is true that the topic list for Precalculus has only a few additions from the topic list for College Algebra, the level of sophistication of the presentation and the problems on all topics is greater in Precalculus. That increased sophistication is necessary for an adequate background for the Calculus sequence. ***

Notes about the Business sequence: Texas State University requires Math for Business and Economics and Business Calculus I. Students who will attend the UT College of Business must complete the entire Business Calculus sequence before transferring. For more information, including requirements for UT economics students, see http://www.austincc.edu/mthdept2/notes/1425.html

*** For additional information, including prerequisite review sheets for most courses, see http://www.austincc.edu/math/
First Day Handout for Students

MATH 2413     CALCULUS I       Session (Fall/Spr/Sum 2006/7)

Synonym & Section: Time: Room :

Instructor: Office: Office Hours:
Office Phone: Other times by appointment
E-mail:
Web Page: (if any)

COURSE DESCRIPTION
MATH 2413 CALCULUS I (4-4-0). A standard first course in calculus. Topics include inequalities; functions; limits; continuity; the derivative; differentiation of algebraic functions and trigonometric functions; Newton's method; applications of the derivative; the integral; integration of algebraic functions and the sine and cosine functions; numerical integration; and applications of the integral. Prerequisites: MATH 2412 with C or better or equivalent. Another option is an appropriate secondary school course (one year of precalculus or the equivalent, including trigonometry, with a B or better) and a satisfactory entrance score on the ACC Mathematics Assessment Test.

REQUIRED TEXTS/MATERIALS
The required textbook for this course is:


Technology required: You must have access to technology which enables you to (1) Graph a function, (2) Find the zeroes of a function. Most ACC faculty are familiar with the TI family of graphing calculators. Hence, TI calculators are highly recommended for student use. Other calculator brands can also be used. Your instructor will determine the extent of calculator use in your class section.

INSTRUCTIONAL METHODOLOGY: This course is taught in the classroom primarily as a lecture/discussion course.

COURSE RATIONALE
This course is the first course in the traditional calculus sequence for mathematics, science and engineering students. It is part of what could be a four-semester sequence in calculus courses. The approach allows the use of technology and the rule of four (topics are presented geometrically, numerically, algebraically, and verbally) to focus on conceptual understanding. At the same time, it retains the strength of the traditional calculus by exposing the students to the rigor of proofs and the full variety of traditional topics: limits, continuity, derivative, applications of the derivative, and an introduction to the definite integral.

COURSE EVALUATION/GRADING SCHEME
Grading criteria must be clearly explained in the syllabus. The criteria should specify the number of exams and other graded material (homework, assignments, projects, etc.) Instructors should discuss the format and administration of exams. Guidelines for other graded materials, such as homework or projects, should also be included in the syllabus.
COURSE POLICIES
The syllabus should contain the following policies of the instructor:
Missed exam policy
Late work policy (if applicable)
Class participation expectations
Reinstatement policy (if applicable)
Student discipline

Attendance Policy: Include YOUR attendance policy, even if it is that attendance is not required. (If you make attendance required, the Math Department recommends the following statement: Attendance is required in this course. Students who miss more than 5 classes may be withdrawn although the instructor makes no commitment to do so.)

Withdrawal Policy: It is the student's responsibility to initiate all withdrawals in this course. The instructor may withdraw students for excessive absences (4) but makes no commitment to do this for the student. After the last day to withdraw, (insert date), neither the student nor the instructor may initiate a withdrawal.

Incomplete Grade Policy: Incomplete grades (I) will be given only in very rare circumstances. Generally, to receive a grade of "I", a student must have taken all examinations, be passing, and after the last date to withdraw, have a personal tragedy occur which prevents course completion.

COMMON COURSE OBJECTIVES: Common course objectives should be included. They can be found at: http://www2.austin.cc.tx.us/mthdept2/tfcourses/obj2413.htm

Course-Specific Support Services: Sometimes sections of MATH 0187 (1-0-2) are offered. This lab is designed for students currently registered in Calculus I MATH 2413. It offers individualized and group setting to provide additional practice and explanation. This course is not for college-level credit. Repeatable up to two credit hours.
ACC main campuses have Learning Labs which offer free first-come first-serve tutoring in mathematics courses. The locations, contact information and hours of availability of the Learning Labs are posted at: http://www.austincc.edu/tutor (Give Learning Lab Room # at your campus.)

Include the following policies that are listed at beginning of Math Manual. Go to www.austincc.edu/mthdept5/mman06/statements.html Insert full statement for each of the following in your syllabus.

Statement on Scholastic Dishonesty

Statement on Scholastic Dishonesty Penalty.

Statement on Student Discipline.

Statement on Students with Disabilities
Instructors are encouraged to add a statement about the letter of accommodation such as: "Students who are requesting accommodation must provide the instructor with a letter of accommodation from the Office of Students with Disabilities (OSD) at the beginning of the semester. Accommodations can only be made after the instructor receives the letter of accommodation from OSD."

Statement on Academic Freedom

TESTING CENTER POLICY: ACC Testing Center policies can be found at: http://www.austincc.edu/testctr/
STUDENT SERVICES: The web address for student services is: http://www.austincc.edu/rss/index.htm
The ACC student handbook can be found at: http://www.austincc.edu/handbook

INSTRUCTIONAL SERVICES: The web address is:
http://www.austincc.edu/faculty/newsemester/ . then click on “Campus Based Student Support Overview”.

Calendar/Syllabus/Suggested Testing Schedule:

<table>
<thead>
<tr>
<th>16-Week Semester</th>
<th>11-Week Semester</th>
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<tbody>
<tr>
<td>Week 1</td>
<td>1.1, 1.2, 1.3, 1.4</td>
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<tr>
<td>Week 2</td>
<td>1.5, 1.6, 2.1</td>
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<tr>
<td>Week 3</td>
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<td>Week 4</td>
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<td>Week 5</td>
<td>2.6, 2.7, 2.8</td>
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<td>Week 6</td>
<td>2.9, 3.1</td>
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<td>Week 7</td>
<td>3.2, 3.3*, 3.4</td>
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<td>Week 8</td>
<td>3.5, 3.6</td>
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<td>4.1*, 4.2</td>
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<td>Week 11</td>
<td>4.3, 4.4</td>
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<td>Week 12</td>
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<td>Week 13</td>
<td>4.8*, 4.9</td>
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<td>Week 14</td>
<td>5.1, 5.2</td>
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<td>Week 15</td>
<td>5.3, 5.4</td>
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<tr>
<td>Week 16</td>
<td>5.5, Review</td>
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Please note: schedule changes may occur during the semester. Any changes will be announced in class.