

Mathematics 110A
Fall, 2005

Textbook: Taalman, Integrated Calculus: Calculus with Precalculus and Algebra, Houghton Mifflin

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Course Content: A two-semester course, Mathematics 110A, B provides students with an integrative approach to calculus that includes the necessary precalculus topics. Course content includes limits; continuity; the derivative; differentiation of algebraic, trigonometric, and the natural logarithmic and exponential functions; applications of derivatives; anti-derivatives; the definite integral; integration by substitution; and applications of the definite integral. Algebraic and transcendental functions are included. Math 110A does not count for a GER mathematics course. Math 110B does count for a GER mathematics course.

Content for Math 110A

Review of algebra, functions, trigonometric functions, logarithms and exponents. Calculus topics include limits, continuity, definition of derivative, differentiation, extrema, Intermediate Value Theorem, Mean Value Theorem, graphing polynomial and rational functions, optimization problems.

Content for Math 110B

Review of inverse trigonometric functions and differentiation, and graphing. New topics include implicit differentiation, logarithmic differentiation, related rates, graphing vertical tangents, logarithmic and exponential graphs, sums and sigma notation, induction, antiderivatives, Fundamental Theorem of Calculus, definite integral, area, volume, separable differential equations, substitution method of integration.

Goals: By the completion of the sequence Math110A and 110B, the student should have a basic conceptual understanding of the following: (1) limits and their relationship to the graph of a function, (2) the derivative and its relationship to the graph of a function and to the concept of “rate of change,” and (3) the definite integral and its relationship to area and volume. The student should be able to calculate derivatives and to evaluate limits and integrals (both definite and indefinite). The sequential course for Math 110B is Math 112, Calculus II.

Class Attendance: The student is responsible for the course material discussed in class, therefore the student is expected to attend all classes. An inordinate number of absences will be handled in accordance with the College’s policies. In addition, after two absences (excused or unexcused), any unexcused absence will result in a deduction of 5 points from your grade total. Entering class late by ten or more minutes is considered an absence.

Homework: Homework assignments will be posted on the class conference regularly. They are for the student’s benefit and will not be collected except as noted under “Review of Notes/Homework” below. It is important for the success of the student that the assignments be completed as they are assigned. Collaboration is encouraged. However each student should be sure that he or she can **solve problems unaided by notes, the textbook, or other people**. Use good style on homework. Daily practice develops valuable mental habits.

Review of Notes/Homework: On occasion, students may be required to show their notes and homework to the instructor for critique. They will not be graded per se, but the process is worth 25 points in the overall grading scheme. When there is evidence of a lack of effort or a failure to improve habits, full credit will not be earned.

Problem Sets: Frequently, a set of problems will be given to be written out for the next class. Students may be called upon in class to write solutions on the board.

Calculators: Calculators will not be allowed on tests.

Gateway Exams: In order to pass this course, the student must pass two Gateway Tests, one on algebra and one on transcendental functions. There will be **THREE** opportunities for the student to earn all 25 points for each test. A perfect paper earns 25 points. If the student misses only ONE problem, the student may choose to keep a score of 22 points and not retest. If the student misses TWO problems, the student may choose to keep 18 points and not retest. If the student misses more than two problems, the student fails the test. The Gateway Exam A and T are scheduled on the attached sheet.

Gateway Test A (Algebra) has eight problems as follows: one law of exponents problem, one factoring problem, one operations with fractions, one complex fraction to simplify, two solving equations, and two graphs of functions to sketch and label. The problem is correct only if everything related to the problem is correct. The student must have at least six problems completely correct to pass.

Gateway Test T (Transcendental Functions) has eight problems as follows: one trigonometric value, two trigonometric graphs to sketch and label, one trigonometric identity, one trigonometric equation to solve, two logarithmic/exponential equations to solve, one logarithmic or exponential function to sketch and label. The student must have at least six problems totally correct to pass.

Major Tests: Four tests will be given at 8:00 a.m. as follows: **Test 1 on Thursday, September 22; Test 2 on Tuesday, October 25; Test 3 on Tuesday, November 15; Test 4 on Thursday, December 8.** Students are expected to take tests at the scheduled times. Conflicts, problems and emergencies will be handled on an individual basis. For reasons deemed legitimate by your professor, arrangements may be made for a student to take a test prior to the testing time. Any student who needs special accommodations must provide documentation several days in advance of the needed accommodation so that appropriate arrangements may be made.

Grading: The student's final course grade will be determined as follows:

Gateway Exams A and T @ 25 pts	50 points
Major tests (4 @ 100 points)	400 points
Review of Notes/Homework	25 points
Problem Sets	50 points
Final Exam (Comprehensive)	175 points
	<hr/> 700 points

In general, letter grades will be determined as follows:

A: 630 or more points
B: 560 – 629
C: 490 – 559
D: 420 – 489
F: fewer than 420 points

Grades of A-, B+, B-, C+, C-, D+ may be assigned for sums of points near the above cut-off scores in total points.

SI/Help Sessions/Tutoring/Office Hours: The supplemental instructor (SI) is a student who has taken the course before, has a good understanding of the material and knows how to succeed in the course. The SI leaders will schedule study sessions each week on a particular topic. Each student is expected to select at least one of the times per week and attend regularly. Studies have shown that students who attend SI

sessions regularly do significantly better in the course.

Help sessions will be scheduled as there is demand for them. Attendance is optional.

Office hours of the instructor will be posted weekly on the class conference **Math110AFall2005**. Students should use this time to come by and ask specific questions related to this course.

Student tutors will be available to help with homework problems. A schedule of tutoring hours will be provided early in the semester. Tutoring sessions will be in the Gregory Room in JRC.

Study groups organized by students are highly recommended. The meetings should be scheduled weekly and should be part of a regular weekly routine.

e-Reserves/WebSite: The student is responsible for obtaining the handouts on e-Reserves through the library web page. Handouts include information and exercises to supplement the textbook.

In addition, there is a Calculus Page at the following web site, which is accessible through e-Reserve:

<http://www.oxford.emory.edu/OXFORD/RESTRICTED/UNIVERSITY/Classes/Chen/Calculus/Index.htm>

Learnlink: There is a class conference on Learnlink, **Math110AFall2005**. Students should have the class conference on their desktops and should consult this conference frequently for homework assignments, announcements about office hours, SI sessions, tutoring, outlines for tests, posting of grade distributions, etc. Students may ask questions and make requests of a general nature on this conference. Individual concerns should be sent directly to your professor.

Summary of Important Dates

September 5	Labor Day
September 15	Gateway A – Test 1 at 8:30 a.m.
September 22	Test 1 at 8:00 a.m.
September 29	Gateway A – Test 2 at 8:30 a.m.
October 5	Last Day to drop a course
October 10, 11	Mid-Semester Break
October 18	Gateway A – Last Chance at 8:30 a.m.
October 25	Test 2 at 8:00 a.m.
November 1	Gateway T – Test 1 at 8:30 a.m.
November 10	Gateway T – Test 2 at 8:30 a.m.
November 15	Test 3 at 8:00 a.m.
November 23-25	Thanksgiving Break
December 1	Gateway T – Last Chance at 8:30 a.m.
December 8	Test 4 at 8:00 a.m.
December 13	Last Class Day
December 14	Reading Day

Written Style: Neatness is one way of showing courtesy toward your instructor and pride in your work. Thoughts in mathematics are expressed in sentences, such as “ $1 + 1 = 2$ ”. There is a subject “ $1 + 1$ ”, a verb “ $=$ ”, and a predicate “ 2 ”. The student should strive to be neat and to use mathematical symbols appropriately.

THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. BY YOUR SIGNATURE ON SUCH WORK YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE WORK OR IN THIS SYLLABUS.

Math 110A Class Calendar (Tentative)
Fall, 2005

Wednesday, August 31 Algebra Review

Friday, September 2

Wednesday, September 7

e-Reserve: Handout A Algebra Review

Monday, September 5

Labor Day

Friday, September 9

Review of Graphing

Monday, September 12

Algebraic Functions, Piecewise Functions

e-Reserve: Handout B Graphs of Functions
 Calculus Page: Piecewise Functions

Wednesday, September 14

Limits

Friday, September 16

e-Reserve: Limits

Thursday, September 15 Gateway A – Test 1 at 8:30 a.m.

Monday, September 19

Continuity

e-Reserve: Continuity

Wednesday, September 21

Review for Test 1

e-Reserve: Review for Test 1

Thursday, September 22

Test 1 at 8:00 a.m.

Friday, September 23

Intermediate Value Theorem
 Properties of Continuous Functions

e-Reserve: Properties of Continuous Functions
 Intermediate Value Theorem

Monday, September 26

Definition of Derivative

Wednesday, September 28

Tangent Lines and Normal Lines

e-Reserve: Definition of Derivative

Thursday, September 29 Gateway A – Test 2 at 8:30 a.m.

Friday, September 30

Trigonometric Functions

Monday, October 3

e-Reserve: Trig Handout

Wednesday, October 5

e-Reserve: Notes on Transcendental Functions – Sections A,B,C,D

Friday, October 7

Monday, October 10 is Mid-semester Break

Wednesday, October 12 Review Trigonometric Functions
e-Reserve: Trig Handout
 Notes on Transcendental Functions – sections A, B, C, D

Friday, October 14	Rules on differentiability
Monday, October 17	
e-Reserve:	Differentiation

Tuesday, October 18 Gateway A – Last Chance at 8:30 a.m.

Wednesday, October 19
e-Reserve: Derivative of Trigonometric functions
Differentiation - Find $f'(x)$

Friday, October 21
e-Reserve: Review for Test 2

Tuesday, October 25 Test 2 at 8:00 a.m.

Monday, October 24
Wednesday, October 26
e-Reserve: Notes on Transcendental Functions, sections F and G

Logarithm and
Exponential Functions

Friday, October 28	Chain Rule
Monday, October 31	Continuity and Differentiability
<u>e-Reserve:</u>	Differentiation
<u>e-Reserve:</u>	Continuity and Differentiability

Tuesday, November 1 Gateway T – Test 1 at 8:30 a.m.

Wednesday, November 2 Higher Order Derivatives
e-Reserve: Differentiation- Find $f'(x)$ part 2

Friday, November 4

e-Reserve: Mean Value Theorem

Mean Value Theorem

Monday, November 7	Extrema and Optimization Problems
Wednesday, November 9	<u>e-Reserve:</u> Optimization Problems
Friday, November 11	<u>e-Reserve:</u> Optimization – Examples for Class

Thursday, November 10 Gateway T – Test 2 at 8:30 a.m.

Monday, November 14
e-Reserve: Review for Test 3

Review for Test 3

Tuesday, November 15		Test 3 at 8:00 a.m.
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Wednesday, November 16	Graphing Polynomials	
Friday, November 18		
<u>e-Reserve:</u>	Graphing Handout Calculus Page – Graphing Tutorial (Polynomials)	
Monday, November 21	Infinite limits and limits at Infinity	
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Wednesday, November 23—Friday, November 25		Thanksgiving Break
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Monday, November 28	Review of limits	
<u>e-Reserve :</u>	Limits Review	
Wednesday, November 30	Graphing Rational Functions	
Friday, December 2		
<u>e-Reserve:</u>	Graphing Handout Calculus Page – Graphing Tutorial (Rational Functions)	
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Thursday, December 1		Gateway T – Last Chance at 8:30 a.m.
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Monday, December 5	Review differentiation	
<u>e-Reserve:</u>	Review Differentiation	
Wednesday, December 7	Review for Test 4	
<u>e-Reserve:</u>	Review for Test 4	
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Thursday, December 8		Test 4 at 8 a.m.
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Friday, December 9	<u>Review for Final</u> Continuity, Intermediate Value Theorem, Mean Value Theorem, Optimization Problems	
<u>e-Reserve:</u>	Review for Final I	Review for Final II
Monday, December 12	<u>Review for Final</u> Differentiation and Limits, Graphing	
<u>e-Reserve:</u>	Review for Final III	Review for Final IV
Wednesday, December 14 is Reading Day		
The Final Exam will be given according to the exam schedule.		

Suggestions¹

Organizational Guidelines for students:

(1) As soon as you get your syllabi from your courses, put all important dates on a single calendar, clearly labeled.

(2) Stay current in your subjects by setting aside 8 to 9 hours per week to study each subject. You may need more time in some subjects. Spread your per-subject time out over the week. Marathon studying, especially in mathematics, does not work well! So, make a schedule and keep to it! Be flexible enough to make changes in your schedule but don't schedule marathon studying.

(3) Plan ahead so that you get enough sleep before a test or you will not be able to think clearly and logically.

(4) Take advantage of the available outside help for each of your courses. Schedule at least one SI session per week for this course.

(5) Plan ahead for all your papers and projects so that studying for tests is not compromised. Create and schedule mini-goals to attain the major goal of completion on time.

(6) Have needed supplies for each course. Make sure you get copies of the e-Reserves PRIOR to the topic for which they are needed.

(7) Follow each syllabus carefully.

Notes to the serious calculus student:

1. **How much to study:** Calculus, to some, is a hard subject. It may be your most challenging course this semester. You should spend around 10 hours a week studying calculus, even if you have "seen it before." Don't assume you know the material! If you cannot make this level of time commitment this semester you will likely be better off taking calculus at another time.

2. **How to study:** Students often find calculus texts hard to read. They are not to be read like a novel, or a history or even a biology text. Your text is a reference book and should be read in a series of passes. The first pass through a section, done **before** the class for which the topics will be studied, you should skim through it lightly, reading definition and theorems, and trying to **work** through some of the examples. After class, re-read the text, your notes and e-Reserves. Don't expect to understand fully much of what you've read until you start working on the exercises. In fact, you should spend most of your study time working problems, thinking about those problems, and discussing problems. As you get stuck, go back, rereading the text or your notes or the e-Reserves, studying the examples and derivations, on a "need-to-know" basis.

3. **Come to class and be prepared:** Many college students treat class attendance as optional. If you do this in calculus courses, you can get way behind very fast. You should come to class every period unless you are seriously ill. Go over related e-Reserve handouts and sections in the book BEFORE the class. Take good notes. Pay close attention. Ask questions. Asking questions is a sign of maturity, not ignorance, as long as the student thinks clearly before asking. If you still don't understand everything in class, don't get frustrated. Ask the professor right after class, during the office hours, and use SI sessions and e-Reserves.

4. **Homework:** After class, study class notes, e-reserve handout examples, related sections in the book BEFORE you do the homework problems. Work lots and lots of problems. Ask questions. When you finish the current section, go back and work review problems. Furthermore, you have

¹ Part of the Suggestions were taken from Dr. Evelyn C. Bailey's advice to her students.

not completed the homework just because you have the right answers, you must understand **why** your methods worked. If all you are doing is blindly applying formulas and mimicking examples, get extra help. The problems should make logical sense to you. You must get to the point where you are able to work problems correctly, from start to finish, without having "to flip" back to the answer or to previous work. Time to reflect on your work helps build confidence and speed and enables you to retain the material.

5. Studying for tests: If you were an athlete preparing for track meet, and you slacked off during the weeks before the meet, doing just what you needed so coach wouldn't get on your case, and then stayed up running the whole night before your meet, you'd lose. Many students prepare for tests by cramming; they procrastinate and then believe that they can "stuff in" what they need for success by staying up all night attempting to study. Your brain will not be in top shape by marathon studying. The right way to study is to do your work at a steady pace throughout the semester. There are a few facts and formulas you'll need to remember for a test. Make note cards for those facts and formulas and "touch base" with them often. In order to think well, you need to rest sufficiently and exercise adequately. Remember that aerobic exercise circulates blood to the body and that includes the brain.

6. Use outside help: Schedule at least one SI session per week. Stop by and see your instructor during office hours to ask pertinent questions. Take charge of your learning!

7. Writing style is important. If you write well, it is less confusing for yourself. Keep a list of errors you are prone to make and remind yourself not to make the same mistakes again. Understand that the instructor is not trying to "nit pick" when grading and remember that grading is the responsibility of the instructor. Accuracy is important in this class!

8. Remember that part of what you are acquiring in this mathematics course are liberal arts qualities, such as organization skills, discipline, the abilities to understand and reason, development of characters and positive attitudes.