Syllabus for Math 150A, fall 2015

Ben Crowell, Fullerton College

prerequisites   The prerequisites are Math 141 (precalculus) and 142 (trigonometry) or math skills clearance.

office hours   All of my office hours will be in room 415-P (not my office). My office hours are: M 9-10, Tu 9-9:30, Tu 6-7, W 9-10, Th 8:30-9:30, and Th 6-7. I'm also usually available in my office (411-14) in the early mornings, and by appointment on Tuesday and Thursday afternoons. I urge you to pick at least one of these office hours to come to every week as part of your habitual schedule. When you show up to my office hours for help with homework, I expect you to bring a paper or electronic copy of the book. Squinting at the screen of a smart phone doesn't work.

web page   www.lightandmatter.com/area3math150.html
To e-mail me, use your Spotter account.

required materials   The text is *Fundamentals of Calculus*. From links on the class's web page, you can either download it for free or buy a printed copy. You will need the book in a form that you can bring to school. I'm a coauthor of the book. I do not receive any royalties from sales of the book. You don't need an expensive graphing calculator. A cheap handheld calculator or a web-based calculator will be fine for homework. Calculators will not be allowed on exams. If you need to review trig, I recommend the free book at mecmath.net/trig. You can use a dictionary on exams, but it has to be a printed dictionary, not an electronic one.

getting started   Here are the things you need to do by the second class meeting:

1. Download the book.

2. Read this syllabus.

3. Use the link at the class's web page to get a printout of your homework assignments.

4. Consult the schedule on page 3. Do the assigned reading and homework.

5. If you don't already have e-mail, get an account.

organization of lectures and responsibility for reading   A great deal of educational research shows that the traditional lecture format, in which the instructor introduces all the material from scratch by lecturing, is one of the worst possible methods of instruction. I will expect you to read the book before class, and we'll use class time mainly for the type of active-learning activities that have been shown to work better in practice than lecturing. The reading assignments are listed on p. 3 of the syllabus. When reading is assigned, the first 5 minutes of the class will be an easy, multiple-choice quiz on the reading. The quizzes are designed to test whether you did the reading and made some attempt to understand it, not to test whether you understood it deeply. Often there will also be one or more homework problems assigned that depend on that day's reading; these will usually be problems whose solution is given in the back of the book.

grading   Grades will be determined as follows (approximate numbers subject to change):

homework	152 problems @ 1 point each	151
reading quizzes	33 questions @ 2 points each	66
exams	5 @ 160 points each	800

points	grade
80%	A
69%	B
58%	C
47%	D

Spotter

Spotter is computer software I've written to help you check your answers to homework problems. It can check both numerical answers and symbolic ones. Having Spotter helps you more than having answers in the back of the book, because it is programmed to give you helpful pointers. If you put in an wrong answer that I've anticipated, it will explain why it's wrong. If your answer doesn't make sense in terms of units, it will tell you that. If you get a wrong answer, you can redo the problem and put in the right answer later for full credit.

Problems that are underlined on the homework page of the syllabus have purely mathematical answers, and are in Spotter. To get credit for an online homework problem, you need to enter a correct answer in Spotter, and also turn in your written calculations and explanations along with the rest of the homework. What I'm really trying to do here is get you to come to my office hours and get help if you can't get the right answer — Spotter helps you by letting you know whether you have the problem right *before* you turn it in.

You don't need to install the software; you just use it through a web browser. Start from the class's web page, then click on the "homework" link to the class's Spotter page. Once you're in Spotter, make sure to log in, or else you won't get credit for your work! Once you're logged in, all your answers will be recorded.

When using Spotter, you have to be careful about the notation you use for inputting mathematical expressions. Spotter is designed to allow you to use something resembling normal human mathematical notation, as opposed to the notation used in computer programs. However, human math notation is designed for humans, not computers, and you need to learn a few things about how to type your expressions in a form that Spotter will interpret correctly.

First, everything you type will be smashed down to one line of text, eliminating the superscripts and subscripts. For example, a variable name with a subscript, like x_1, is entered as `x1`. Since there are no superscripts, you have to enter exponents using the `^` symbol (shift-6), e.g., x^2 becomes `x^2`. You can enter a square root as either `sqrt(x)` or `x^.5`. There is no way to enter the times symbol, $\times$, without confusing the computer and making it think you meant the variable x, so in scientific notation you should simply leave a space where you would normally put the times symbol, e.g., 5×10^6 becomes `5 10^6`. Don't try to enter this as `5e+6`; that's what a lot of computer software would want, but Spotter is trying to interpret everything as normal human notation, so it will think you meant $5e + 6$, where e is a variable.

Human languages, including human math notation, are ambiguous. Use parentheses liberally to make your meaning clear. There are two main situations where you need to watch out. First, arguments to functions: `sin 2x` will be interpreted as $(\sin 2)(x)$; if you intended $\sin(2x)$, you should have entered `sin(2x)`. Second, the bottom of fractions: `1/3c` will be interpreted as $(1/3)c$, so if you want $\frac{1}{3c}$, you need to enter `1/(3c)`.

As you type your answer, the computer will display a rendering of it into "real" human math notation so that you can see how your input is being interpreted. If you're using this feature in a browser such as Internet Explorer that has poor math support, it will be slow, especially the first time you use it on a particular computer.

academic honesty policy

In cases of serious academic dishonesty, I will assign a zero on the work, and I will also pursue action at the college level, which may result in penalties such as suspension or expulsion.

Serious academic dishonesty includes cheating on an exam, or turning in homework that is plagiarized from my solutions.

I will also assign a zero in cases where two students turn in homework that contain identical or nearly identical work. A good rule of thumb is that if A is helping B, only B's paper should be out, and the pen should be in B's hand.

Schedule for Math 150A, fall 2015

		read sec.	hw	topics
Aug.25	Tu			
	Th	1.1-2	1*	The derivative.
Sep. 1	Tu	1.3-6	2	Powers and polynomials.
	Th	1.7-8	3	Leibniz notation, approximations.
8	Tu	2.1	4	Limits.
	Th	2.2-3	5	The derivative as a limit. Product rule.
15	Tu	2.4	6	Chain rule.
	Th		7	*exam 1*†
22	Tu	2.5-7	8	Generalized power rule. Quotients.
	Th	2.8-9	9	Continuity and differentiability.
29	Tu	3	10	The second derivative.
	Th	4.1-3	11	More about limits.
Oct. 6	Tu	4.4	12	Curve sketching.
	Th		13	*exam 2*†
13	Tu	4.5	14	Completeness.
	Th	5.1-4	15	Exponentials. Trig functions.
20	Tu	5.5-10	16	Inverse of a function. Logarithms.
	Th	6	17	L'Hôpital's rule.
27	Tu	7.1-2	18	Newton's method.
	Th	7.3-4	19	Related rates.
Nov. 3	Tu		20	*exam 3*†
	Th	7.5	21	Implicit differentiation.
10	Tu	8.1-2	22	The definite integral.
	Th	8.3-5	23	The indefinite integral. The fundamental theorem.
17	Tu	9.1-4	24	Basic techniques of integration.
	Th		25	*exam 4*†
24	Tu	9.5	26	Integrating some specific forms.
	Th			*Thanksgiving*
Dec. 1	Tu	10.1	27	Applications to probability.
	Th	10.2-3	28	Applications to economics and physics.
8	Tu		29	
	Th		30	*exam 5*†

†Bring a bluebook. All exams are cumulative. Each exam will concentrate on the material that you haven't yet been tested on.

Exams are open notes and closed book. The notes must be entirely in your own words. Calculators are not allowed. Exam 1 covers ch. 1. Exam 2 covers everything through ch. 2. Exam 3 covers everything through ch. 5. Exam 4 covers everything through ch. 7. Exam 5 is comprehensive.

* To get a printout of your individualized homework assignments, go to the class's web page at `lightandmatter.com/area3math150.html` and click on the link that says "homework printout."

I. Outcome: Upon successful completion of MATH 150AF Calculus I, the student will be able to determine the value of one-sided or two-sided limits analytically or graphically.
Assessment: Exam questions.

II. Outcome: Upon successful completion of MATH 150AF Calculus I, the student will be able to analyze a function to determine an appropriate method of differentiation, and apply the method to determine the derivative.
Assessment: Exam questions.

III. Outcome: Upon successful completion of MATH 150AF Calculus I, the student will be able to analyze a function for continuity, relative extrema, intervals of increasing/decreasing, concavity, and/or points of inflection.
Assessment: Exam questions.

IV. Outcome: Upon successful completion of MATH 150AF Calculus I, the student will be able to calculate the area between a curve and the coordinate axes using The Fundamental Theorem of Calculus and evaluate an integral using basic methods including substitution.
Assessment: Exam questions.