Math 23200: Calculus for the Life Sciences II
(Class No: 25246)

Meets: TuTh 10:30 – 11:45a in IT 160
Final Exam: Saturday, April 27, 3:30-5:30p

Instructor: Carl Cowen **Office:** LD 224P **Phone:** 317-278-8846
Office Hours: M 1:35-3:00p, Tu 12:15 -1:45p, W 3:10-4:00p, or by appointment
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General Information and Goals

Calculus is one of the outstanding intellectual achievements of the human mind, in addition to being the foundation of many applications of mathematics to physics, chemistry, biology, statistics, economics, and many other natural and social sciences. The roots of calculus go back to Eudoxus, Archimedes and other Greek thinkers more than 2000 years ago, but the calculus as we know it began with the work of Isaac Newton, Gottfried Leibnitz, and other mathematicians of the 17th century with many improvements in understanding, development of applications, and refinements and extensions of the theory in the 18th and 19th century. Much more recently, beginning in the second half of the 20th century, machines have been developed that, with human guidance, can solve calculus problems. In this course, we will keep all of these threads in mind as we learn about calculus and try to connect it to areas that are of interest to each of you.

Math 23100 and 23200 here at IUPUI form the mathematical foundation for many majors in the biological sciences. The course is open to all students who have a grade of "C−" or better in Math 23100 or a similar calculus course. This course will cover Chapters 6 to 9, with a very spotty review of chapters 2 to 5, of the book

Text: *Calculus for the Life Sciences*, (2006), by Bittinger, Brand, and Quintanilla

My goals for you in this course are
Short term goal: That you master the ideas and computations of the course, both
 theoretical and applied.
Long term goal: That you recognize the uses or ideas of calculus as you see them in your
 professional or your personal life and that you know or can quickly relearn the
 computations that are important to you throughout your life.
Long term goal: That you better appreciate and value the quantitative arguments of
 colleagues and collaborators in your work.

Attendance, Homework, and Quizzes

To quote from my colleague, Professor Morton: "Attendance is required to do well in this class. Based on experience, we can say with a fair degree of certainty, that if you do not come to class, you will not pass the course. Learning mathematics requires steady and persistent effort. Coming to class and making an effort to focus on the material being discussed is half the battle. The other half is practicing the concepts by doing the homework."

It is important to read the text, both before and after coming to class. Reading before will prepare you for discussion in class and reading after will help solidify your understanding. Reading mathematics books is a skill that will take time to master, but will pay off in your later study both in other math classes, but also in any classes that depend on

reading for detail. One of the biggest differences between reading mathematics and other kinds of reading is that to be successful in reading mathematics, you must read slowly and pay attention to the details you are reading. If you have trouble with material from the textbook, please ask me about it in class or in office hours.

Homework will be assigned regularly and will be collected most Thursdays with grading mostly to check that you are doing the work. Make-up/late homework will **not** be graded for credit.

Quizzes based on the homework will be announced in advance and will be the done the last ten minutes or so of the class. No make-up/late quizzes will be graded for credit, with missed quizzes counted as zeros.

Mathematica, Maple, and Derive are three well-known 'computer algebra systems' and Wolfram Alpha provides (free) online access to computations and other things using a large database of facts and Mathematica. A computer algebra system is a computer program that recognizes algebraic and other mathematical symbols and can do computations with them in their *symbolic form!* At this time, there are also some hand-held devices that can do symbolic calculations, and there will certainly be many more to follow. These systems contrast with numeric engines, such as Matlab, which mostly do numerical computations, giving answers as numbers, and accurate to a fixed accuracy. Depending on the time available, we may do some homework or examples using Wolfram Alpha.

The developing schedule for the course will be announced in class, but will also be on the website for the class (see the URL above) and on Canvas, both updated regularly. If you wish to communicate with me outside of class you should use email (see address above), come to my office hours, or make an appointment to meet at some other time.

Test, Exam, and Grading Policies

In addition to the course-wide, departmental, Final Exam on April 27, there will be 3 tests during the semester, of which the first will be a "mastery test" (see below). Each test will be contribute about 20% of the grade, the homework and quizzes, together, will contribute about 10% of the grade, and the Final Exam will be responsible for the the remaining 25-30% of the grade. The grading scale for Tests 2 and 3, the course, and, probably, the Final Exam will be A: 85% to 100%; B: 65% to 85%, C: 50% to 65%, and D: 40% to 50%.

Tests 2 and 3 will be ordinary tests, covering Chapter 6 and the first half of 7, and the second half of 7 and Chapter 8, respectively, with 100 points possible with partial credit granted for answers that are mostly, but not completely correct.

Test 1 will be a mastery test and will cover the most basic and fundamental skills in courses 23100 and 23200: computation of easy derivatives (2.5, 2.7, and 2.8) and easy integrals (5.1 and 5.5), material that must be mastered for success in the course. For these tests, no partial credit will be given – each answer is completely correct, or it will receive no credit. BUT, the tests may be repeated as many times as you wish, until a score of 90 or more is achieved, at arranged times until 3pm on May 1. Each of these tests will have 16 questions. A perfect score is 110 points, but for each incorrect answer, 10 points will be deducted. That is, on the first day the test is given, you will receive 110 points if you get all 16 questions correct, 100 points if you miss 1 question, 90 points if you miss 2 questions, 30 points if you get only 8 correct, and -20 points if you get only 3 correct. After the first day, 100 points will be the maximum score, given for no wrong or 1 wrong, and otherwise the scoring will be the same. I expect everyone will get 90 points or more on Test 1 after taking the test no more than three or four times because the tests will contain no "hard" questions.

The Department of Mathematical Sciences enforces course-wide policies for the Final Exam in Math 23200. These same policies will apply for all tests and quizzes in the course. These policies include:

- No baseball caps and no watches, calculators, phones, pagers, ipods, or other electronic devices are permitted to be on during the tests.

- No notes, books, or other of your papers may be used during the tests.

- The only items permitted on your desk during the test are the test paper and scratch paper provided by the instructor, and pen, pencil, and eraser.

- On test days, there is no re-entry to the testing room; that is, your test must be turned in before you leave the room for the first time.

- If a student MUST miss a scheduled test or exam, the student should supply a legitimate reason to the instructor at least a week before the test or exam so that an alternate test can be scheduled. For the Final Exam, the alternate exam date is the evening of April 26. For unexpected emergencies, the student should notify the instructor as soon as possible in order for an alternative test or exam to be scheduled.

Tutoring and mentoring is available in the Math Assistance Center (MAC). The MAC is located in Taylor Hall (UC), Room B001. To find it more about their schedule and other general information about the MAC, check out the MAC web page

`http://mac.iupui.edu/`

Some Important Dates

January 21	Martin Luther King Day, no classes
March 8	Last day to withdraw with adviser's signature and automatic "W"
	(Withdrawal after March 8 requires Dean's approval, which is rarely given)
March 9 to March 17	*Spring Break!! no classes!*
April 27	Final Exam, 3:30–5:30p
May 1	Last day to re-take Test 1 (finish before 3:00p)

General Academic Policies

General Academic Policies: IUPUI has certain policies that apply to every course; this course will follow these policies also. You should be familiar with the policies, especially those pertaining to academic integrity and adaptive services; they may be found at

`https://studentcentral.iupui.edu/register/drop-add/index.html`

and `https://studentcentral.iupui.edu/grades-progress/academic-misconduct.html`

This semester I will be using the FLAGS System to provide feedback on your performance in this course. You will be able to get data on factors such as success on homework, quizzes, and tests via the View Grades app in One.IU

Administrative Withdrawal: Success in this course requires regular attendance, doing the homework, and doing well on the tests. University policy is that if you miss more than half of the required activities within the first 25% of the course without contacting me, you may be administratively withdrawn from this course. Administrative withdrawal may have academic, financial, and financial aid implications and if you are administratively withdrawn from the course you will not be eligible for a tuition refund.

More information concerning adaptive educational services for learning or other disabilities at IUPUI can be found at   `http://aes.iupui.edu/`