Math 23100: Calculus for the Life Sciences I (Class No: 26283)

Meets: MW 10:30 – 11:45a in IT 162
Final Exam: Saturday, December 12, 3:30–5:30p

Instructor: Carl Cowen   **Office:** LD 224P   **Phone:** 278-8846
Office Hours: M 12:00 – 1:30p, MW 5:00-6:00p, or by appointment
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URL: `http://www.math.iupui.edu/~ccowen/Math231.html`

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 here at IUPUI forms the mathematical foundation for many majors in the biological sciences. The course is open to all students who have the appropriate mathematical background in algebra and trigonometry, equivalent to a grade of "C−" or better in Math 15400 or 15900. The course will cover Chapters 2 to 5, and some review from Chapter 1 of the

     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.

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 the discussion in class and reading after will help solidify your un-

derstanding. 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 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 sporadically 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; the two lowest quiz grades will be dropped, 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 can only 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), updated regularly. I will *NOT* be checking Canvas or OnCourse for messages or posting anything on those platforms!! If you wish to communicate with me outside of class you should use email (see address above).

Test, Exam, and Grading Policies

In addition to the course-wide, departmental, Final Exam on December 12, there will be 4 tests during the semester, of which two, Test 1 and Test 4, will be "mastery tests" (see below). Each test will be contribute about 15% 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.

Tests 2 and 3 will be ordinary tests, covering Chapters 3 and 4, roughly, with 100 points possible and partial credit will be granted for answers that are mostly, but not completely correct. The grading scale on each test is not fixed, but will be announced after each test.

Test 1, on computation of derivatives (2.5, 2.7, and 2.8), and Test 4, on computation of integrals (5.1 and 5.5), cover the most basic and fundamental skills in the course and will be mastery tests. By "mastery test" I mean that the tests will cover 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 at arranged times until 3pm on December 16th or until a score of 90 or more is achieved. Each of these tests will have 20 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 20 questions correct, 100 points if you miss 1 question, 90 points if you miss 2 questions, 30 points if you get only 12 correct, and -30 points if you

get only 6 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 each of Test 1 and Test 4 after taking the tests 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 23100. These same policies will apply for all tests and quizzes in the course. These policies include:

- No calculators, cell 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.

- If a student MUST miss a scheduled test or exam, the student should supply a legitimate reason and evidence for the 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 December 11. For unexpected emergencies, the student should notify the instructor as soon as possible and provide evidence of the emergency 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

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

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Some Important Dates

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Date	
September 7	Labor Day, no classes
October 19, 20	Fall Break!! no classes
October 23	Last day to withdraw with automatic "W"
November 13	Last day to withdraw (requies permission of advisor and instructor)
November 25–27	Thanksgiving Break!! no classes
December 12	Final Exam, 3:30–5:30p
December 16	Last day to take Tests 1,4 (by 3:00p)

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General Academic Policies

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The work you submit for homework, quizzes, tests, and exams must be your own. For homework, you will probably find it beneficial to consult with other students about the material and this kind of conversation and collaboration is encouraged. At the end of the consultation, however, each participant is expected to prepare their own summary of the discussion and their own solution to the problem. More information about student conduct can be found at

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`http://www.indiana.edu/~code/`

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More information concerning adaptive services for learning or other disabilities at IUPUI can be found at

<div align="center">http://aes.iupui.edu/services.html</div>

The policies for this class will be those derived from IUPUI's policies on academic conduct and adaptive services.

This semester I will be using the FLAGS System

<div align="center">http://registrar.iupui.edu/flag_eas.html</div>

to provide real-time feedback on your performance in this course. Periodically throughout the semester I will be entering data on factors such as your class attendance, participation, and success with coursework, among other things. This information will provide feedback on how you are faring in the course and offer you suggestions on how you might be able to improve your performance. You will be able to access this information in the student center: One.IU>Student Services page>Student Center>My Academics and Grades>My Grades.

Information about withdrawal from a class can be found at

<div align="center">http://registrar.iupui.edu/withdraw.html</div>

and a description of administrative withdrawal can be found at

<div align="center">http://registrar.iupui.edu/withdrawal-policy.html</div>

Administrative Withdrawal: A basic requirement of this course is that you will participate in all class meetings and conscientiously complete all required course activities and/or assignments. Keep in touch with me if you are unable to attend, participate, or complete an assignment on time. 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. Example: Our course meets twice per week; thus if you miss more than four classes in the first four weeks, you may be withdrawn. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund. If you have questions about the administrative withdrawal policy at any point during the semester, please contact me.

After the conclusion of the 100% refund period for the relevant term or session

<div align="center">http://www.bursar.iupui.edu/refunds.asp</div>

all individuals attending classes on a regular basis MUST be officially enrolled in the class, attending the class based on formal arrangements to make up a prior grade of Incomplete, or enrolled as an auditor. One time visitors to classes may be allowed only on an exception basis with prior permission of the instructor. This policy does not apply to individuals who provide assistance to a student with a documented disability, such as Adaptive Educational Services sign language interpreters, individuals who are involved in the course in an instructional role, or administrative personnel.