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COURSE WEB PAGE: http://acunix.wheatonma.edu/jsklensk/Calc2_Spring06/calc2.html

OFFICE HOURS: Monday 1:00-1:50, Tu 10:00-10:50, W 1:30-2:20, Th 11:00-11:50, and F 12:45-1:35.
If you can't make any of my office hours, please feel free to arrange an appointment at a time that works for both of us.

COURSE MATERIALS: *Calculus, from Graphical, Numerical, and Symbolic Points of View, Volume 2, 2nd edition*, by Ostebee and Zorn. The text should be brought to class every day. There is also an optional student solutions manual – it's up to you whether you get that or not.

Also, *Maple* is available for you to use on your own computer if it's connected to the campus network and is running a sufficiently recent operating system. It's also available in the Kollett Academic Computing Center, the CS lab, or the GIS lab.

OVERVIEW:
This course is of course a continuation of the topics covered in Calculus 1. Two intertwined and recurring themes this semester are the connections between the approximate and the exact, and the finite and the infinite. We will repeatedly see that if we are simply willing to explore infinity a bit, we can often find exact solutions where approximations at first seem to be our only option. Because finding exact solutions is not always possible, however, we will also develop various methods both to find approximate solutions to these same problems, and to find how good those approximations are.

We will continue to develop the concept of the integral begun in Calculus I, and to investigate the connection between area under a curve and the slope of the tangent line. We will also see how the 2-dimensional notion of the integral can be used to find arclength (a 1-dimensional concept) and volume (a 3-dimensional concept). We will see how polynomials can be used to approximate functions, how one integral can be used to approximate another, and how a sum of terms can be used to approximate an integral.

We will also explore the concept of area under a curve over an infinite interval, and spend a considerable amount of time developing the notion of adding an infinite number of terms, and exploring the connection between these infinite sums and integrals.

Examples of questions you should be able to answer by the end of the term:

1. How much foam goes into a Nerf football?
2. How does your calculator, or Maple, figure out that $\pi$ is approximately 3.141592654?
3. How can you *know* that the volume of a sphere is $\frac{4}{3}\pi r^2$?
4. How can you use functions to design a vase, or a wine glass – and find out how much material you'd need to buy to actually make it?
5. Is there (theoretically) a shape that can be filled with paint, but which could never be painted, no matter how long you tried?

6. Under what circumstances can you add up an infinite number of numbers and get a finite sum?

COURSE STRUCTURE, GOALS AND EXPECTATIONS:
Calculus is recognized as being one of humanity's outstanding accomplishments. Furthermore, the more math you learn, the more you hone your logical abilities. For both these reasons, one main goal for this class–the obvious one–is that you master the topics developed in this course. The others are that you improve at reading technical text and at communicating complicated material clearly. These are lifetime skills: if you can read technical material, think logically, and communicate then you can learn just about anything you want to, and share what you have figured out with others.

In this class, as with all others, how much you actually learn is entirely up to you. Math is a subject you can only learn by doing–observing me (and others) may give you a start, but it is certainly not enough. Class will combine lecture with time for in-class work so that you may *do* what you've just observed. This class work will naturally involve communicating mathematics verbally. As for written communication, you will get practice with both technical explanations and explanations to a general audience. In class, I will be focusing on selected topics and may give a fairly brief introduction. You are thus required to read the material we'll be covering each day **before** coming to class, and to send me the answers to some questions on the reading.

The rule of thumb for how much work you should expect to spend on any college class is 2 to 3 hours of work outside of class for every hour in class. No matter what your experience has been in other classes,

| Plan to spend at least 8 hours a week on Calculus outside of class! |
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Of course, some weeks you may spend more than 8 hours on this class, especially when studying for exams or finishing up projects, while others you may spend less.

IS THIS THE RIGHT MATH COURSE FOR YOU?
Calculus II is aimed at students who have had a solid grounding in Differential Calculus, with an introduction to Integral Calculus. For instance, if you've taken Calculus AB in high school, then Calc II is probably a good choice for you – whether or not you passed the AP test. If you've taken Calculus BC in high school – that is, if you've had both Differential and Integral Calculus, as well as some sequences and series – then you should consider taking Multivariable Calculus instead. If you have any questions as to whether this is the course for you, please do stop by and talk to me.

For most of you who have had Integral Calculus before, but not sequences and series, enough of this course will be new, I think, that you probably won't be bored. When we are reviewing material you've seen once before, please be considerate of those who have *not* previously seen it, by saving comments or questions on material we haven't yet gotten to for after class or during my office hours – it makes people nervous!

Calculus II is intended for students who want to take it, and also for those whose majors require them to take it. Calculus is not required for graduation, and may not be the best way to fulfill your math requirement if you have no especial interest in math.

READING ASSIGNMENTS:
I will put a copy of each reading assignment on the web – follow links from the course website. Each assignment will indicate what you are to be reading that day, which parts are especially important

and whether any can be skipped. Each assignment will also have questions that you are to answer by e-mail . The purpose of these assignments is two-fold: to help you continue to develop your mathematical reading skills, and to give you credit for your efforts. These responses are required.

| Reading assignments that are late but received before class will receive half-credit<br>Reading assignments received after class will receive no credit |
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For more details, see *Guidelines for Submitting Reading Assignments* and *Suggestions for Reading a Math Book* on the course web page.

PROBLEM SETS:
Mathematics in the real world is usually done as a combination of group and individual efforts. Thus it is important that you are able both to work on your own and to communicate complicated ideas to others. For that reason, your weekly problem sets will alternate between being done individually and in groups. Problem sets will be due every Tuesday at 1:00pm (the beginning of lab). **Begin the week's problems on Wednesday** – they represent a week's worth of learning. The assignments will be posted on the web. The assignments can be found through links toward the bottom of the course web page.

Consult the **Guidelines for Homework Presentation** on the course web page for information on how your problem sets should look.

| Late problem sets will have points deducted!<br>If turned in on Tuesday after lab but before 2:45<br>(and if everybody involved was working appropriately in lab),<br>I will deduct 0-25% depending on the situation.<br>I will deduct 25- 50% from problem sets turned in after 2:45 Tuesday<br>and before 2:45pm Wednesday.<br>I can not accept any problem sets after 2:45pm Wednesday<br>of the week the problem set is due. |
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PROJECTS:
You will work on 2 group projects this term. These will consist of questions which are more open-ended than homework problems tend to be. You will have one or two days of class time to work on these projects; the rest of the work you will do outside of class. The project consists not only of the mathematical solution to the situation, but – at least as important – your description of the solution and why it is true – in the form of a letter.

| Late projects will be accepted, but significant points will be taken off for each day that it is late! |
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ANTIDIFFERENTIATION EXAM:
Antidifferention is a fundamental tool for understanding the deeper concepts of the semester. The Antidifferentiation Exam will consist of four problems, and is graded with no partial credit. You must get every problem completely correct to get credit on the exam, but you may retake different versions of this exam as many times as necessary until you pass. If you pass it before the first

deadline, you get 100% on the exam. (There are three later deadlines, for 90%, 75% and for 50%. All of the important dates are on the syllabus.)

EXAMS:
During the semester, I will give three midterm exams to make sure that you are putting together the concepts and skills we have covered. The primary emphasis of the exams will be for you to show me how well you've mastered the underlying mathematical ideas. The final will be cumulative, and will be a take-home exam. The dates of these exams are fairly firmly scheduled, and are listed on the course syllabus.

For each in-class exam, you may bring one 8.5 x 11 page of notes, **handwritten (by you) on one side**, which you will turn in with the exam. The midterm exams will be given during the lab period, and may each be begun at 12:30.

**Notify me in advance** if you will be missing a midterm exam. If your reason for missing is acceptable, we will arrange that you take the exam **early**. If you miss an exam without notifying me in advance, I reserve the right not to give you a make-up exam. I will not give any student more than one make-up exam during the semester.

ATTENDANCE:
Clearly, missing class is not a wise idea. If you **do** miss class, your are responsible for the material that was covered. *Warning:* – I can only keep one day's worth of events in my head and may not remember something important, so ask your friends as well as me.

EVALUATION
I expect to use the weights below, although I reserve the right to change my mind if the semester does not go as expected.

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| Reading Assignments | 4% | Antidifferentiation Exam | 4% |
| Problem Sets | 9% | Three In-Class Exams | 48% |
| Two Group Projects | 14% | Final Exam | 21% |

If you question the fairness of any grade, bring it to me **within a week** of receiving it.

HONOR CODE
I expect you to abide by the Honor Code. *Remember: If you see a violation of the Honor Code occurring, you are bound by the Honor Code to report it.*

As part of the honor code, you are required to write

> I have abided by the Wheaton College Honor Code in this work

followed by your signature, on all written assignments. Every time you do, you should be pondering the question "how exactly does the honor code apply to *this* assignment, and did I *really* abide by it?" If, upon consideration, you do not feel you can truthfully write and sign the pledge, please come speak to me immediately!

So, specifically, how does the Honor Code apply in this class?

**For all assignments:** You may discuss the work with classmates, and you may use references that help you figure out how to do a problem on your own, but you may not use any references (people,

other people's projects or assignments, books, the web) which either give you the answer or lead you directly to the solution. When you do use references (as described above), you *must* cite them.

**For all group work:** You must make every effort to meet with your group at all meetings. You may not purposely exclude any member from a meeting.

You may not divide the work!

You must make every effort to participate and aid in finding the solutions. If you don't understand what someone else is saying, you must ask them to explain it. If someone asks you to explain your ideas, you must take the time to explain it. In the end, you must understand all the work that is being submitted under your name.

**Reading assignments:** You may discuss the questions with your classmates, but you must enter the responses yourself, in your own words.

**Homework:** For the individual problem sets, you must write the results on your own, in your own words. For the group problem sets, after your group has jointly figured out every problem, one person will be responsible for recopying your work. This primary author must change from week to week.

**Projects:** While you may not break the project up into different tasks that you divide up among you, if a repetitive process is called for, you may spread the task among you.

You *may* divide the writing of the paper in whatever way is agreeable to the group. You must proofread the entire paper for consistency and typos.

**Dividing Up Group Points:** Do not give, or take, credit that is not due.

**Antidifferentiation Exam:** The different versions of the Antidifferentiation Exam are numbered. If you and a classmate have both finished a certain version of the exam, you may look at it together and discuss it, but otherwise no sharing of the exams is to take place, either while taking it or after the fact.

**In-Class Exams:** You may not use any notes, books, or colleagues as reference during the exams, except for your "cheat sheet", which must conform to my stated rules. You may not look at anybody's exam or "cheat sheet" until after all exams have been returned. You may not use a calculator unless I specify that you may, and you may not use the graphing aspect of a calculator.

**Take-Home Final Exam:** You may only use your own notes and your own textbook; you may use Maple or a graphing calculator unless I have specifically instructed you not to; you may not look at anyone else's exam; you may not discuss it with anyone except me: neither a current classmate nor anyone else.