Course Policies - Math 236 - Multivariable Calculus

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Class Meetings: MWF 11:30-12:20, in SC 1314
Office Hours: M 2:00-3:20, Tu 1:15-2:35, Th 3:00-3:50
and by appointment, when necessary.

Course Website – Public: `http://jsklensky.webspace.wheatoncollege.edu/home.html` - Math 236: Multivariable Calculus
Links to course policies, syllabus, problem sets, WeBWorK, OnCourse, etc

Course Website – Private: the OnCourse page for this course
Includes links to in-class exercises, supplemental material if relevant, study guides, questionnaire

Course Materials:

- *Calculus,* by Taalman and Kohn. There is also an optional student solutions manual.
- Also, *Mathematica* 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 SC 1314, SC 1349, the CS lab, and (I believe) the computers in the library, the Kollett Center, or the GIS lab.

Overview:
Multivariable Calculus continues the development of both differential and integral Calculus. Calculus I and the first half of Calculus II focus on functions whose inputs and outputs both consist of a single variable. The restriction to a single variable gave us the opportunity to come to grips with the concepts, but limited the applications. In this course we continue the expansion begun in Calculus II, to functions whose outputs are vectors in 2 or 3 dimensions, or whose inputs are points in 2 or 3 (or n) dimensions, *or* whose inputs and outputs both live in more than one dimension. This allows us to move beyond curves in 2 dimensions, to curves that lie in 3 dimensions, to surfaces, and to objects called vector fields. This expansion allows for much more realistic and, of course, more complicated, models. For a list of topics covered, please see the course learning objectives and day-by-day syllabus.

Note: This course is connected to Chem 355 and/or 356 (Physical Chemistry I and/or II).

Is this the right math course for you?
This class is intended for any who want to take it, are ready and willing to put some time and thought into the course, and have had a solid grounding in both Differential and Integral Calculus.

However, **if you did not take Calculus 2 at Wheaton**, please come talk to me right away: because Calculus 2 at Wheaton includes much of Chapters 12 and 13 (and some of Chapter 10), taking this class without having taken Calc 2 here at Wheaton will require some extra effort (but is doable).

Learning Objectives:
Upon successful completion of Multivariable Calculus, a student will be able to:

broad objectives	distinguish between key similarities and differences between multivariable and vector calculus, and calculus of a single variable
	distinguish between similar complicated concepts
	use Mathematica for visualization and calculation of multivariable calculus concepts
	read and communicate advanced technical concepts
	engage in sophisticated, sound mathematical reasoning, including finding patterns and generalizing
	ask and answer relevant questions
	translate between graphical, symbolic, numerical, and physical representations of vector and multivariable calculus
	analyze the structure of problems arising from, or related to, math and science; plan solution strategies using appropriate tools
	deepen their mathematical vocabulary through oral and written communication
	formulate advanced mathematical concepts
	understand how advanced concepts relate to complex problems
specific objectives	understand parametric equations for curves and surfaces
	identify and sketch various types of surfaces
	compute the cross product of vectors and interpret it geometrically
	determine equations of lines and planes in space using vectors
	define vector-valued functions and sketch space curves
	compute derivatives and integrals of vector-valued functions
	find the arc length and curvature of space curves
	determine the velocity and acceleration of a particle moving along a path in space
	compute derivatives and integrals of functions of two and three variables, in cartesian and cylindrical coordinates
	define vector fields
	determine gradient vector fields and find potential functions
	understand conservative vector fields
	compute divergence and curl, interpret them using Stokes' Theorem (curl) and the Divergence Theorem (divergence)
	apply three versions of Green's Theorem
	evaluate surface integrals
	apply Stokes' Theorem to compute line integrals along the boundary of a surface

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Goals and Expectations:

Of course, the primary goal for this course is that you master the topics developed throughout the semester, listed on the previous page.

Secondary goals are that you continue to improve at communicating complex ideas in an organized and clear manner, and at reading technical text. These are lifetime skills that are necessary in nearly every career.

Math is a subject you can only learn by doing – observing others is not enough. This course is structured to give you repeated opportunities to work with the material, at increasing levels of depth and complexity.

Because more and more studies indicate that most students learn best when given opportunity to both practice what they've learned and to discuss the concepts with fellow students, our class time will often combine some lecture with opportunities for in-class work in small groups on introductory problems so that you may *do and discuss*. Your initial exposure to the material should come through your reading of the text before each class. I will often discuss the material you've read, but only enough to clarify it to someone who's already read it. Most of class time will be devoted not to my presenting the information to you for the first time, but to me helping you to work your way to a deeper understanding of the material. These efforts should help crystallize your understanding of the material, *or* to help you identify where some confusion is arising.

This initial exposure is followed by more drill problems from each section to be completed daily on-line; you will get immediate feedback on these, so you will know right away whether you are understanding the basics.

To solidify your grasp of the material, you will also have weekly problem sets consisting of a combination of more online problems and conceptual questions. To strengthen and deepen your ability to apply the concepts to more complex problems, there will also be two group mini-projects (essentially, group problem sets consisting of more substantial problems).

Finally, to encourage your mastery of the material, there will be two midterm exams and a final exam, each of which encourages you to look at the big picture and fit the material into its place within the course.

This structure not only aims to maximize your mastery of Multivariable Calculus, but also to help accomplish the secondary goals as well – improving reading of technical material, and learning to more clearly communicate complicated ideas–verbally, through working with partners on in-class work, and in writing, through problem sets.

The expectation for all classes taught at Wheaton is that you spend a minimum of 2 to 3 hours working outside of class for every hour in class. [In fact, this is a national standard for college courses.] No matter what your experience has been in other classes, *plan to spend at least 6-9 hours per week working on this course outside of class!* Of course, some weeks you may spend more than 9 hours on this class, while others you may spend less.

Intellectual Integrity and the Honor Code

Wheaton's Honor Code is designed to encourage students to act as true scholars, and to create a strong bond and morale among the student body, by giving students more freedom and opportunities to learn. With that freedom comes greater responsibility. As you know, all students at

Wheaton are expected to conduct themselves with the highest level of academic integrity.

You are each ultimately responsible for your own learning. In this class, this means that while you are encouraged to work with other students, all submitted work must reflect your own understanding. You must also cite your sources by giving credit for *any* help received, whether from a friend, a tutor, a relative, another professor, or an online source or the equivalent.

It is much better for you (intellectually, morally, and for your grade) to turn in an incomplete or not- thoroughly-thought-through assignment than it is to present work that is not your own. Aside from it being an Honor Code issue, this also helps me have a realistic view of how the class as a whole is doing and to make any necessary adjustments. (The penalty for violating the Honor Code in this class is a 0.)

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. If at any time you do not feel you can truthfully submit the pledge, please speak to me (or the Chair of the Math Program, or your advisor - whoever you feel most comfortable with) immediately.

For a discussion of how the Honor Code specifically applies to the various assignments and exams in this class, please see the last several pages of these policies.

Classroom Etiquette:

I would like to provide a classroom atmosphere with minimal distractions for both you and me, in which all students feel comfortable asking a question or contributing to a discussion.

This not only means that I ask that you not talk or whisper while someone else is speaking, but that you refrain from:

- texting
- using a computer. If you need a computer to for notes, please bring the accommodations letter to me as quickly as possible.

Ask questions when you do not understand something. I can guarantee that most of the time, if you have a question, so do at least two other people in the class.

When we are covering material that you've seen before or which comes easily to you, please be considerate of those for whom it is new or difficult.

Daily Assignments:
This class moves quickly, and in order to stay caught up, for each class you will need to have both read the new material for that day and have practiced the material from the previous day's class a bit. To this end, before every class you will be assigned some reading, and will also have on-line assignments consisting of a small number of exercises, due at 9:30am every Monday, Wednesday, and Friday. These assignments will both cover your reading for that day, and will remind you of recent vocabulary and basic ideas; doing them online allows you to receive instant feedback.

These assignments are done through a system called *WeBWorK*. You will find links to WeBWorK on my public webpage, OnCourse, and the syllabus.

Late daily assignments will not be accepted
(except in extreme circumstances).
I will drop the lowest two daily scores at the end of the term.*

* Students who do every daily assignment will receive a few bonus points.

Weekly Problem Sets:
In addition to the short daily assignments, you will have more extensive and more conceptual weekly homework assignments. These problem sets will consist of both online exercises through WeBWorK and more traditional handwritten exercises.

Problem Sets will be generally be due every Tuesday at 4pm. While they are only due once a week, they represent a week's worth of learning, and you should therefore work on them throughout the week.

In case you are wondering: the combination of daily WeBWorK assignments and weekly problem sets done both through WeBWorK and in the traditional handwritten way do **not** combine to be more exercises than I have assigned in the past, before WeBWorK. I have split my usual assignments between them. WebWork is helpful for giving you instant feedback; written exercises are helpful both for giving you access to partial credit and also for giving you weekly practice at organizing your thoughts in a forum where the presentation of your work counts as much as the final result does (which is more reflective of the real world). Dividing the weekly exercises between WeBWorK and Problem Sets should have the additional benefit of allowing me to return the handwritten Problem Sets more quickly than I have been able to in the past.

For more details on the assignments, see the links *A Description of Multivariable Homework Assignments* and *General Guidelines for Problem Set Presentation* on the public course web page.

The assignments will be posted online; you will find them through links toward the bottom of the public course web page.

Late weekly problem sets will have points deducted!

If turned in on Tuesday between 4pm and 5pm, I will deduct 2%. I will deduct 15% for problem sets turned in between 5pm Tuesday and 11:30am that Wednesday. Problem sets submitted between 10:30am and 5pm that Wednesday will lose between 15 and 25%. Problem sets turned in between that Wednesday at 5pm and 11:30am that Friday will lose 50%. I will not accept any problem sets after that, except in extreme circumstances.

(If you *do* find yourself in unusual circumstances, please do let me know. I can often be flexible, particularly with advance warning, but in those situations where I can not, I can make a note of your situation on my grade sheet, to remind me of your situation at the end of the semester.)

Projects:
Two (group) mini-projects will be due this term. These will be done in groups of 2-3 people, and will consist of longer or more complicated exercises that put together several ideas we've covered. These will be due on Fridays at 4pm – the specific dates are listed on the syllabus.

One (individual) project will be due this term – reading a book aimed at a general audience on math or on a mathematician and writing a review of it. There will be milestones along the way; all relevant dates are listed on the syllabus.

Late individual projects and group mini-projects will have points deducted

If turned in anytime between 4:00pm Friday afternoon and 9:30am Monday morning, I will deduct up to 20%, depending on the situation. I will then deduct an additional 15% each succeeding 24 hour period, and will not accept any projects more than one week late.

Exams:
During the semester, I will give two midterm exams to determine how well you are putting together the concepts and skills we have covered. The primary emphasis of these exams will be for you to show me how well you've mastered the underlying mathematical ideas; they will cover very little basic computational material.

You will have two hours for each midterm exam. These midterms will be given on Tuesday evenings. The dates are fairly firmly scheduled, and are listed on the course syllabus.

The term will culminate in a cumulative final. It will continue to emphasize concepts, and will assume a higher level of mastery than the midterms. Please remember that finals can not usually be rescheduled, and make your travel plans accordingly.

Notify me several days in advance if you can not make the scheduled time for either of the midterm exams, so that we can work out a mutually agreeable alternative time.

If you notify me only a day or two before a midterm, or miss any exam (midterm or final) without notifying me in advance, then I reserve the right not give you a make-up exam, if you do not have a suitably compelling reason.

I will not give any student more than one make-up exam during the semester without extensive documentation of a significant reason backed up by the advising office.

Attendance:
Clearly, missing class is not a wise idea. Your attendance or lack thereof is your choice and your responsibility. However, I do keep track of attendance to some extent, and may use it when assigning final grades at the end of the term, for students who are at the borderline between two grades.

If you **do** miss class, you are responsible for the material that was covered; it is not my responsibility to teach it to you.

Accommodations: Wheaton is committed to ensuring equitable access to programs and services and to prohibit discrimination in the recruitment, admission, and education of students with disabilities. Students interested in acquiring information on accessibility, or with disabilities requiring accommodations, should contact Abigail Cohen, Assistant Dean for Accessibility and Assistive Technology. Please email her or call her at (508) 286-8215.

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.

Daily Assignments	17%	Weekly Problem Sets	17%
2 Mini-Projects	6%	Individual Project	8%
Two Midterm Exams	30%	Comprehensive Final Exam	22%

*** Note on Final Exam:** If you earn over 95% on the final, you will not receive below a B in the

class, no matter what your overall total would otherwise indicate (except in extreme circumstances). Conversely, if you earn below 60% on the final you will not receive above a C, no matter what your overall total would otherwise indicate, except in extreme circumstances. Similarly, if you earn below 40% on the final, you will not receive above a D.

Discussing Grades with me: If you question the accuracy of any score or believe I did not see or understand something that you wrote, *of course* I would be happy to look at it again – but **bring it to me within a week** of receiving it. I also welcome discussing the scoring of work with me within a week of receiving it back, if your questions are about the nature and nuance of the material and why I considered an explanation to be incomplete or unconvincing.

However, if it seems to me that your aim is merely to talk me into a higher score, rather than pointing out a mistake I made or wanting to understand the material better, I reserve the right to lower your score on that assignment, test, or overall total.

If needed: The Counseling Center is a confidential resource on campus for all students, providing short-term solution-focused therapy, case management, emergency services and support. This year the Counseling Center is open Monday - Fridays from 8:30 am - 4:30 pm and students can call (508-286-3905) or stop by 42 Howard Street (the white building between Beard and Art Haus) to make an appointment or seek emergency services during office hours. Counseling Center staff is available to support students with a wide range of challenges including, but not limited to, anxiety, depression, sleeping and eating concerns, identity exploration, substance use and concentration challenges. We welcome any student to come and have a discussion with us regarding what their needs are and we will help with next steps of care, whether here on campus, or locally off campus. Outside of office hours, mental health concerns and emergencies should be directed to the Area Coordinator On Call via calling Public Safety at x3333 or 508-286-3333.

Honor Code

You are expected to abide by the Honor Code in all your work at Wheaton. Below, I detail how the Honor Code relates to the various assignments and exams in this course.

- 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. If, upon consideration, you do not feel you can truthfully write and sign the pledge, please come speak to me immediately.

- **If you see a violation of the Honor Code occurring that relates to this course, you are bound by the Honor Code to report it.** If you do not feel comfortable reporting it to me, the chair of the department or Dean Kuszaj are other resources.

- **For all assignments:** To help you figure out the concepts of a problem, you may discuss the work and use references, *but* you may not use anybody or anything which either gives you the answer or leads you directly to the solution.

- **When you do use references** (friend, classmate, tutor, online resource, book, etc), you *must* cite them. For instance, if you work with friends on a problem set, or if you get help from a tutor, write something like *I worked with Joe Friend on this assignment* or *I received help from Jane Tutor on Problems 3 and 7.*

- **Daily WeBWorK:** You may discuss the underlying ideas with your classmates, but you must do every problem on your own, and of course enter the responses yourself . Also, do not simply try every possibility until you reach the correct one.
- **Weekly Problem Sets:** You may discuss the underlying ideas, but you must do the problems on your own. You must understand every problem that is submitted under your name.
- **Group Mini-Projects:** Just as, on weekly problem sets, groups of students may discuss ideas together but each student must write up their own work in their own words reflecting their own understanding, the same rules apply to group mini-projects. Two or more groups may consult with each other, but in the end, each group must write up their own work in the group's own words, reflecting their own understanding. Furthermore, each group member is responsible for making sure they understand what their group is turning in, and have helped their fellow group members understand the material as well.
- **Individual Projects:** The work you do, and the work you turn in to me, must all be your own work. Furthermore, you must choose a book that you have not read before.
- **Exams:** You may not use any notes, books, or colleagues as reference during the exams, except for whatever references I explicitly state are allowed. Do not assume that I have implicitly allowed some reference. During an exam, you may not look at anybody's exam *or* "cheat sheet" (if I allow one) *or textbook* (if I allow open-book) until after all exams have been returned. You may not use a calculator or computer unless I specify that you may, and if I do so specify you must again conform to whatever conditions I specify.