# MATH 2415.002 (84571) Syllabus
# Calculus of Several Variables
# Fall 2016, Tu/Th 1:00pm–2:15pm, ECSS 2.410

**Instructor: Dr. Minkoff**
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Website: *http://www.utdallas.edu/∼sminkoff*
Note that I will maintain a web page for this course linked from my main web page.
I may also communicate with you using a class email list.
eLearning: eLearning Course MATH 2415.701 will be used to post grades of assignments and exams and give you access to WebAssign.
**Office Hours:** Tuesdays 2:30–3:30pm, or by appointment.

**Course Pre-requisites:** A grade of C− or better in MATH 2414 or equivalent. In general, success in Math courses strongly depends on your grade in previous relevant courses. *For Math 2415, the material in Math 2413 (Calculus I) is much more important than that in Math 2414 (Calculus II).*

**Co-requisites:** Students *must* be enrolled in one of the following problem sessions:

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|---|---|---|---|
| 84459 | Math 2415.301 | F 8:00-9:50 | SLC 1.204 |
| 84460 | Math 2415.302 | F 8:00-9:50 | SLC 2.302 |
| 84780 | Math 2415.303 | F 10:00-11:50 | SLC 1.202 |
| 84572 | Math 2415.304 | F 10:00-11:50 | SLC 1.204 |
| 84573 | Math 2415.305 | F 1:00-2:50 | SLC 2.304 |
| 84575 | Math 2415.307 | F 3:00-4:50 | SLC 2.302 |

Students *must* be enrolled in the following exam section (see below for exams dates):

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|---|---|---|---|
| 84458 | Math 2415.701 | F 7-8:30 pm | ECSS 2.410, ECSS 2.412<br>ECSS 2.415, GR 2.302 |

**Course Description (from the catalog):** Continuation of the Math 2413, 2414 sequence. The course covers differential and integral calculus of functions of several variables. Topics include vector valued and scalar functions, partial derivatives, directional derivatives, chain rule, Lagrange multipliers, multiple integrals, double and triple integrals, the line integral, Green's theorem, Stokes' theorem, Divergence theorem.

## Pilot PLTL Program

A limited number of Peer-Led Team-Learning (PLTL) sessions are available for MATH 2415. More details will be announced in class, on the course website, and by email.

## Required Textbooks and Materials

**Text:** "Calculus (Early Transcendentals)", Eighth Edition, by James Stewart, Chapters 12-16. (Do *not* purchase the 7th edition!) A less expensive Electronic Version is also available. You must have **WebAssign** access. Some Options:

1. Access code to Enhanced WebAssign (contains digital copy of the text) ISBN: 9781285858265
2. Loose leaf copy of the text bundled with Enhanced WebAssign access code ISBN: 9781305616691
3. Hardbound text bundled with Enhanced WebAssign access code ISBN: 9781305597624

**Material Covered:** The course will cover the following sections of the textbook: 12.1-12.6, 13.1-13.3, 14.1-14.8, 15.1-15.3, 15.6-15.9, 16.1-16.5, and (to the extent that time permits) 16.6-16.9.

**Online Resources:** I encourage you to make use of the online video lectures and other resources developed by MIT and the Khan Academy.

## Academic Calendar and Assignments

The Course Schedule and Homework Assignments are available off my web page.

## Grading Policy:

| | |
|---|---|
| Active Participation in Problem Sessions | 5% |
| Digital Homework | 10% |
| Paper Homework | 15% |
| Midterm 1 | 20% |
| Midterm 2 | 20% |
| Final Exam | 30% |
| Total | 100% |

**Participation:** 5% of your final grade will be assigned by The Teaching Assistant based on the degree to which you *actively* participate in small group learning in the Friday Problem Sessions. For each problem session you can earn a maximum of 5 points if you arrive within the first 25 minutes and actively participate. You can earn a maximum of 3 points if you are 25 minutes or more late and actively participate.

**Exams:** There will be two midterm exams, each 90 minutes.

- Midterm I: Friday Sept 30th, from 7:00-8:30pm, on 12.1-12.6, 13.1-13.3 (excluding curvature), 14.1, 15.8 (cylindrical coordinates only), 15.9 (spherical coordinates only).
- Midterm II: Friday Nov 4th, from 7:00-8:30pm, on 14.2-14.8, 15.1-15.3.

The final will be based on the whole course and a total time of 2 hours and 45 mins will be allocated for the final.

**Homework:** There is a strong correlation between homework grades and performance on exams. There will be required **digital homework (DHW)**, required **paper homework (PHW)**, and **recommended homework** posted on the course web page for each day of class. See the Instructor Policies section below for more information on required homework. *Recommended problems* will not be graded. However, since the only way to learn math is to do it, you are expected to do the recommended problems, and **some of them may appear on the exams!**

Please note that the homework constitutes a substantial portion of your overall grade. In order to learn the concepts and be able to apply them to solving problems on exams, etc., you are strongly encouraged to devote as much time as possible to working the homework problems. I encourage you to discuss the homework assignments with other students in the class. However, I expect the homework you submit for grading to be written up by you alone.

## Instructor Policies

**Class Attendance:** I expect students to attend class and to turn up **on time**. Rarely do students do well in classes which they do not attend, and I will be less likely to give outside assistance to students who regularly miss class. Further, students arriving late for class disrupt the entire class. Students who consistently turn up more than a few minutes late for class or who regularly miss class may be docked points from their final grade. **Students should also note that I do not allow cell phones, laptops or other electronic devices to be used in class and will ask that these items be turned off at the start of class.**

**Digital Homework (DHW):** Unless otherwise advertised in WebAssign or by email, **required digital homework (DHW)** assigned on TuTh will be due at **11:59pm the following Wednesday**. Each problem will be worth 5 points. Students will have three attempts, with a maximum score of 5/5 for the first and second attempts and a maximum score of 3/5 for the third attempt. You will be able to submit each part of a multi-part question separately. Therefore, if you get a part correct by second try then you get full credit for that part. You may ask me and the TA's questions about the digital homework.

**Paper Homework (PHW):** Unless otherwise stated on the course Schedule and by email **required paper homework (PHW)** assigned on TuTh will be due at the **start of your Problem Session on the Friday of the following week.** Each week about 6 of the assigned problems will be graded. **You must staple the cover sheet to the front of your paper homework and follow all instructions on the cover sheet.** *No late homework will be accepted!* Your lowest two paper homework grades will be dropped. You may ask me and the TA's questions about the paper homework and **you may collaborate with other students in the class. In fact you are encouraged to do so!** However the final write up must be your own. *Two identical homework papers will both be given a grade of zero.*

**Policy on Calculators:** You are allowed to use calculators and software tools such as Mathematica, Maple, and Matlab on your homework assignments. However, since the exams are designed to test your *understanding* of the underlying concepts covered in this class, *cal-*

*culators will not be permitted (or necessary) for use in the exams.*

**Tests:** No make-up exams will be given except *possibly* in the case of a serious emergency. In such a case I *must* be notified *in advance*. There will be no exceptions to taking the final exam at the date, time, and place specified by the University. The final exam will be comprehensive although material covered after the second midterm will be emphasized.

**Email:** I am happy to answer questions about the class via email. However, it is much better for you if we can talk in my office at the board. Answers given over email will be brief and intended merely to answer your direct question rather than to explain concepts. I reserve the right not to respond to email if I feel it would be best for the student to discuss his/her question in person during my office hours. I will not respond to email which does not include the name of the sender.

**Academic Conduct:** I will be vigorous in reporting all instances of cheating to the University administration. (See http://www.utdallas.edu/deanofstudents/dishonesty/) In particular, you may **not** use solutions manuals, solutions you find online, or solutions copied verbatim from other students for the digital or paper homework. The graders are trained to detect such instances of cheating and will report them to the course coordinator. The course coordinator reserves the right to recommend to the University administration penalties varying from receiving zero points for a particular homework, to zero for your entire homework grade for the course, to failing the course. Analogous statements apply to the exams.

*The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.*

## Student Learning Outcomes

Multivariable or Vector Calculus is an undergraduate course that generalizes the concepts you learned in first and second semester Calculus to higher dimensions. Specifically you will learn what it means to integrate and differentiate functions that have domains or ranges not in $\Re$ but in $\Re^n$. These concepts form the basis for a huge field of mathematics – the study of partial differential equations (pde's). PDE's are equations that model most of the interesting physical phenomena encountered in science and engineering (just a few examples include the propagation of light and sound waves through the air or earth, the flow of fluids in a reservoir or aquifer, etc). It is essential that you master the concepts in this course in order to be able to deal with models found in the physical world (we live in three space dimensions).

## Tips for Succeeding in this Class:

1. The textbook is intended to *supplement* in class lectures (and vice versa) so if you attend class but do not read the appropriate section in the book you will miss out on a wealth of good information and on an alternate view of the material. The text is an invaluable resource as it acts as a second teacher and as a reference point when topics are unclear. However, I will not test you on material in the text which I don't also cover in class.

2. Before you attempt the homework you should *read the sections* in the book which explain the concepts covered in the homework.

3. You will benefit greatly from working with others in the class so long as you use your peers as a way to hash over concepts and not a way to "get the answers". In other words, *start early* and use your fellow-classmates to discuss the best way to approach the problems. Then go off and try to work out the details yourself.

4. **Begin the new homework assignment the same day you turn in the previous assignment!** Do not wait 3–4 days to start the homework as then you will not have enough time to digest the material or understand the point of the problems.

5. Come to office hours and get help if you are stuck. It is much better to get help early than to wait. I may ask you to show me what you've come up with at the board so you should have at least attempted the homework problems before asking for help.

## Advice for Exams

A large collection of **past exams** are on the course web page together with some solutions. *Do them!*

Exams will include problems similar to those in the homework and in lectures as well as examining theory covered in class (definitions, theorems, concepts, examples). *You will not get any credit for an answer unless you also show how you arrived at that answer.* Some questions will be similar or even *identical* to homework questions. Others will look a little different from those you have seen before and will test whether you really understand the *concepts* we have discussed in class. At least one question on each exam will involve *written explanations* of the *theory* we discuss in class.

I encourage you to first master the theory and memorize calculation methods and formulae you need to know and then use this knowledge to work a range of problems *without looking at your notes*. To learn theory, calculation methods, and formulae with your lecture notes and book closed write down what you know about each item in the Math 2415 Learning Outcomes on the course webpage, as precisely and succinctly as you can. Only when you get stuck should you look at your lecture notes. If you do this about 4 times in the 10 days prior to the exam you should be in good shape. Don't forget to work lots of problems as well!

You should also spend *some but not all* of your preparation time studying in small groups to learn from each other. Presenting material to someone else is often the best way to work out whether you really know it yourself.

## UT Dallas Syllabus Policies and Procedures:

The information at `http://go.utdallas.edu/syllabus-policies` constitutes the University's policy and procedures segment of the course syllabus.