

# Syllabus for Math 231

## Calculus of Several Variables

Instructor:  
Sara Jamshidi

August 27, 2013

# BASIC INFORMATION

# Course Information

## Math 231: Calculus of Several Variables

- ▶ **Course Number:** 113341
- ▶ **Section:** 01
- ▶ **Class Time:** TR 9:05 PM - 9:55 PM
- ▶ **Location:** 107 Ag Sc & Ind Bldg
- ▶ **Instructor:** Sara Jamshidi
- ▶ **Prerequisite:** Math 141, or equivalent
- ▶ **Text:** *Calculus*, 7th ed., James Stewart

# Instructor Information

## **Sara Jamshidi** (jam-SHEE-dee)

- ▶ **Office:** McAllister Bldg 419
- ▶ **E-mail:** jamshidi@math.psu.edu
- ▶ **Office Phone:** (814) 863-9049 (avail. during office hours)
- ▶ **Office Hours:** MWF 11:10am - 12:00pm,  
TR 10:10am - 11:10am (after class), or by appointment

# COURSE GOALS, OBJECTIVES & TOPICS

# Course Goals

Goals: Students will

- ▶ be able to describe three dimensional objects mathematically
- ▶ learn how to describe movement in three dimensions with time
- ▶ know how to perform calculus on these higher-dimensional mathematical objects
- ▶ optimize problems in higher dimensions (finding maximums and minimums)

# Course Objectives

- ▶ There are many objectives in this course in order to bring us to our goal.
- ▶ Each section in our notes has a set of objectives listed in the beginning.
- ▶ These objectives are written as sentences you would be able to say once you've learned the material. They are meant to be a checklist for students.

# Course Topics

- ▶ Here are the topics we will cover:
  - ▶ Three-Dimensional Coordinate Systems,
  - ▶ Vectors, Dot Products, and Cross Products
  - ▶ Lines, Planes, Cylinders, and Quadric Surfaces
  - ▶ Derivatives and Integrals of Vector Functions,
  - ▶ Arc Length and Curvature,
  - ▶ Velocity and Acceleration,
  - ▶ Partial Derivatives, Chain Rule, Maximums and Minimums
  - ▶ Directional Derivatives and the Gradient Vector
  - ▶ Tangent Planes and Linear Approximations
  - ▶ Lagrange Multipliers



# COURSE PHILOSOPHY ON LEARNING

# Course Philosophy – Research

- ▶ The FACTS:
  - ▶ **Learning Changes the Brain.** New neurons and connections between neurons form in response to that new information. The brain responds physically, chemically and functionally to everything we think and do.
  - ▶ **Practice Makes Perfect.** Cab drivers have a significantly larger hippocampus, the region of the brain responsible for memory and spacial navigation. Before and after their career, this region is normal.
  - ▶ **Mistakes are Important to Learning.** When you make a mistake and reflect, you learn the concept *better* than you if you got it right the first time! Make mistakes and share them; they are learning opportunities.

# Course Philosophy – Conclusions

- ▶ My conclusions:
  - ▶ **If We Both Work, You Will Learn This Material.** If you have the practice and guidance you need, you will learn the material. I will do my best to provide you with all the necessary resources.
  - ▶ **We Need a Welcoming Environment.** We want a welcoming environment where we can all work together to think problems through. If we share mistakes, we will all learn the material better.

# Course Philosophy – Language

Here are some of my beliefs about math:

1. Mathematics is the formalization of quantitative problem solving.
2. We are all natural problem solvers.
3. It's the *formalization* that makes math hard.

In this sense, math is like a language.

- ▶ Study math like you would a language
  - ▶ Practice daily
  - ▶ Understand terminology
  - ▶ Review! Review! Review!

# Course Philosophy - Activity

In practice, I think:

1. Math is sometimes done under a time limit
2. Math is required to be accurate and precise
3. Math is expected to be presented clearly

The quickness and meticulousness required in mathematics makes learning the subject similar to learning a sport.

- ▶ Learn math like it is a sport.
  - ▶ Practice daily
  - ▶ Perfect how you do it  
(i.e. check your work, think about ways to do it better)
  - ▶ Take care of your mind like it is a muscle  
(i.e. sleep, eat well, do fun things, challenge yourself)

# Course Philosophy - Execution

With this in mind, the course is structured so that

- ▶ we learn in manageable chunks,
- ▶ we practice immediately and consistently,
- ▶ we review previous material as time allows,
- ▶ we see the presentation of homework as important,
- ▶ feedback is given as soon as possible so opportunities for improvement can be utilized, and
- ▶ we make revisions to our homework when mistakes are found.

# COURSE STRUCTURE

# Homework

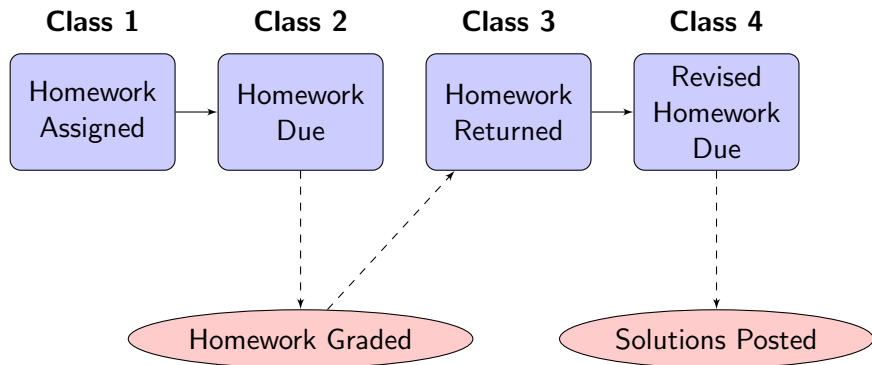
- ▶ Homework is essential to this course.
- ▶ It will be assigned at the end of **every lecture**.
- ▶ Homework is due **at the end of the following lecture it is assigned**.
  - ▶ NO LATE HOMEWORK WILL BE ACCEPTED.
  - ▶ Homework can be turned in **via email** by before 9:55 am.
  - ▶ You can come to **office hours** immediately after class to discuss any trouble and adjust your homework before it is graded.
- ▶ Half of your homework points are for completion, the other half come from correctness. Each problem will be graded as “all-or-nothing.”
  - ▶ Your homework must be clearly presented and neatly written.



# Homework Revisions

- ▶ Revising homework is an opportunity to learn from mistakes and recuperate lost points.
- ▶ Homework Revisions are due **at the end of the following lecture it is returned.**
  - ▶ YOU MAY NOT TURN IN LATE HOMEWORK.
  - ▶ You **must attach your original, graded homework** to the revised homework.
  - ▶ Homework can be turned in **via email** by before 9:55 am with a copy of your original, graded homework.
- ▶ You can get all lost points back for full credit!

# General Homework Schedule



# Course Outline & Assignments

## **Please check the website often!**

- ▶ Homework assignments will be posted on the website.
- ▶ All other materials can be found there as well.
- ▶ All material posted will be announced in class.

Please note that this class have very little leeway for review. It is important that you stay on top of the work.

# Attendance Policy

- ▶ Attendance is required for this class.
  - ▶ Homework will also be a tool for determining attendance.
  - ▶ I will administer quizzes if attendance is low.
- ▶ Participation is necessary for this class and, as a result, your presence is crucial to the course.
- ▶ You will be held responsible for all work covered in this course.
- ▶ It is university policy that students attend every class for which the student is scheduled.

*A student whose irregular attendance causes him or her, in the judgment of the instructor, to become deficient scholastically, may run the risk of receiving a failing grade or receiving a lower grade than the student might have secured had the student been in regular attendance (Policy 42-27).*

# Grade Point Breakdown

**Grade Policy:** Points (350 total) are distributed as follows

100 points ..... midterm examination I  
100 points ..... homework/quizzes/participation  
150 points ..... comprehensive final examination

## Homework Points:

- ▶ Weekday homeworks – 1 points
- ▶ Weekend homeworks – 2 points
- ▶ Quizzes, attendance and participation – 15 to 20 points total

**Grading:** Final grades are guaranteed to be at least...

|    |             |    |             |   |             |
|----|-------------|----|-------------|---|-------------|
| A  | 350-325 pts | B  | 304-290 pts | C | 269-245 pts |
| A- | 324-315 pts | B- | 289-280 pts | D | 244-210 pts |
| B+ | 314-305 pts | C+ | 279-270 pts | F | 209-0 pts   |

# HELP AND ASSISTANCE

# How to Solve Hard Problems

1. **Absorb**: Read the problem carefully, think about what it's saying, and draw some kind of representation.
2. **Meditate**: Think; make sure to *understand* the problem.
3. **Estimate**: Estimate the answer. What kinds of answers would make sense in this context?
4. **Translate**: Describe it mathematically.
5. **Hone in On**: Use mathematical techniques to solve.
6. **Deliberate**: Revisit the problem and compare it to the solution. Does the solution make sense? Does the technique fit the situation?

I will refer to this as A METHOD.

## How to Solve Hard Problems - Example

*Pearl has six times as many dimes as quarters in her piggy bank. She has 21 coins in her piggy bank totaling \$2.55. How many of each type of coin does she have?*



# Homework Help

- ▶ Talking problems out is one of the \*BEST\* things you can do to help you learn math. I highly recommend:
  1. Form study groups with friends
  2. Visit office hours
  3. Check out Penn State Learning
    - ▶ <http://pennstatelearning.psu.edu/resources/meet-math-tutor>
  4. Check out Academic Excellence Center
    - ▶ <http://www.engr.psu.edu/mep/AEC.html>

## Disability Access Statement

Penn State welcomes students with disabilities into the University's educational programs. The Office for Disability Services (ODS) Web site provides contact information for every Penn State campus: <http://equity.psu.edu/ods/dc1>. For further information, please visit the Office for Disability Services Web site: <http://equity.psu.edu/ods>.

In order to receive consideration for reasonable accommodations, you must contact the disability services office, participate in an intake interview, and provide documentation: <http://equity.psu.edu/ods/guidelines>. If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with me ASAP. You must follow this process for every semester that you request accommodations.

# Academic Integrity Statement

Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. All University policies regarding academic integrity apply to this course.

Academic dishonesty includes, but is not limited to, cheating, plagiarizing, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. All exam answers must be your own, and you must not provide any assistance to other students during exams.

Any instances of academic dishonesty **WILL** be pursued under the University and Eberly College of Science regulations concerning academic integrity.

# When In Doubt...

Talk to me as soon as possible.

No matter how small your difficulties may seem, I am willing to work with you.

I want everyone in this class to succeed. **Everyone.**

Help me with my goal by

- ▶ being committed to your own success,  
(make time for your work)
- ▶ being committed to the success of your classmates,  
(share ideas and mistakes)
- ▶ keeping perspective.  
(this is just one class, don't get too stressed out)