

University of Delaware  
Department of Mathematical Sciences  
MATH 243 – Analytical Geometry and Calculus C  
Section 50 – Fall 2012

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Office hours: Monday through Thursday, 4:30pm–6:00pm, or by appointment.

Meetings: Monday and Wednesday, 7:00pm–9:00pm, 204 Gore Hall.

## 1 About me

I am a postdoctoral researcher at the Dept. of Mathematical Sciences at the University of Delaware since September 2011. I earned my Ph.D. in Engineering Sciences at the *Université libre de Bruxelles* (Free University of Brussels) in Brussels, Belgium. Before that, I obtained a M.S. in Intelligent Systems at the *Tecnológico de Monterrey* (Monterrey Institute of Technology) in Monterrey, Mexico and a B.S. in Computer Systems Engineering at the *Instituto Politécnico Nacional* (National Polytechnic Institute) in Mexico City, Mexico.

My main research interest is swarm intelligence, which is the collective problem-solving behavior of groups of animals or artificial agents. I have worked on the three main areas of application of swarm intelligence: data mining, optimization, and swarm robotics. More information about my research can be found at <http://www.math.udel.edu/~mmontes/>.

My favorite topic of this course is optimization. If time permits, we will see how some of the concepts we will learn in this course can be used to tackle artificial intelligence problems.

I like modern latin jazz (basically Brazilian bossa nova), and classical music (especially Beethoven's compositions). I also enjoy cooking and running.

## 2 About the course

This course deals with the extension of the basic ideas of calculus to problems that involve two, three, and perhaps more variables. In particular, we will study:

Topics	Book Section
3D coordinate systems	12.1
Vectors	12.2
The dot product	12.3
The cross product	12.4
Equations of lines and planes	12.5
Cylinders & quadratic surfaces	12.6
Vector functions & space curves	13.1
Derivatives and integrals of vector functions	13.2
Arc length & curvature	13.3
Motion in space	13.4
Functions of several variables	14.1
Limits and continuity	14.2
Partial derivatives	14.3
Tangent planes & linear approximations	14.4
The chain rule	14.5
Directional derivatives & the gradient vector	14.6
Maximum & minimum values	14.7
Lagrange multipliers	14.8
Double integrals over rectangles	15.1
Iterated integrals	15.2
Double integrals over general regions	15.3
Double integrals in polar coordinates	15.4
Surface area	15.6
Triple integrals	15.7
Triple integrals in cylindrical coordinates	15.8
Triple integrals in spherical coordinates	15.9
Vector fields	16.1
Line integrals	16.2
The fundamental theorem for line integrals	16.3
Green's theorem	16.4
Curl and divergence	16.5
Parametric surfaces and their areas	16.6
Surface integrals	16.7
Stoke's and divergence theorem	16.8 & 16.9

## 2.1 Textbook

*Math 241/242/243, University of Delaware* by James Stewart. The book *Calculus: Early Transcendentals* 7th edition by J. Stewart works just as well. The chapters this course is based on are: 12, 13, 14, 15 (except 15.5), and 16.

## 2.2 Other resources

While the course is based on the aforementioned book, the book *Vector Analysis* (Schaum's Outline Series) 2nd ed. by Spiegel and Lipschutz can also help you because it has many solved exercises.

Another resource you should definitely use is my time during office hours. If you have difficulty with a problem, come to office hours well-prepared. I suggest you to bring your notes so that you can show me exactly where you are stuck or confused.

## 3 Evaluation

Your grade will be based on three main components: Homework, Quizzes, and Exams.

### 3.1 Homework

Homework will be assigned and collected throughout the term. Each homework will be graded on a scale from 0 to 100 points. These homeworks will be posted on the course website, so make sure that you check it

regularly. Most homeworks will consist of 10 problems but the actual number may vary from one assignment to another.

The homework schedule is the following:

HW #	Due Date
1	September 10
2	September 17
3	September 24
4	October 1
5	October 8
6	October 15
7	October 22
8	November 5
9	November 12
10	November 19
11	November 26
12	December 3

I will drop the worst two homework grades to allow for missed homeworks.

### 3.2 Quizzes

There will be seven quizzes during the course (see schedule below). Each quiz consists of four problems and a bonus question to be solved in 30 minutes. The grading scale for each quiz will be 0 to 100 points.

Quiz #	Date
1	September 10
2	September 19
3	October 8
4	October 17
5	November 7
6	December 3

I will drop the worst quiz grade.

### 3.3 Exams

There will be four exams: Three midterm exams and one comprehensive final exam. Exams consist of five problems plus a bonus question to be solved in one hour. Each exam will be graded on a scale from 0 to 100 points. Exam absences due to recognized University related activities, religious holidays, verifiable illness, and family/medical emergencies will be dealt with on an individual basis.

The exams schedule is the following:

Exam #	Date
1	September 26
2	October 24
3	November 26
Final*	December 7–14

\* Check <http://www.udel.edu/exams> toward the end of the term to know the exact date and location. It is University policy to **NOT** allow the use of computers, calculators or any other electronic device during exams.

## 4 Grading Policy

The final grade composition is

Component	Weight
Homeworks	15%
Quizzes	10%
1st exam	15%
2nd exam	15%
3rd exam	15%
Final exam	30%

The following scale will be used to determine the final grade:  $[93, 100] \rightarrow A$ ,  $[90, 93) \rightarrow A-$ ,  $[87, 90) \rightarrow B+$ ,  $[83, 97) \rightarrow B$ ,  $[80, 83) \rightarrow B-$ ,  $[77, 80) \rightarrow C+$ ,  $[73, 77) \rightarrow C$ ,  $[70, 73) \rightarrow C-$ ,  $[67, 60) \rightarrow D+$ ,  $[63, 67) \rightarrow D$ ,  $[60, 63) \rightarrow D-$ ,  $[0, 60) \rightarrow F$ .

## 5 Expected Behavior

### 5.1 Attendance

You are advised to attend all the scheduled meetings. It is very easy to get lost if a class is missed. Do not expect me to give you a private lesson during office hours on topics covered in a class you missed.

Please see the University's attendance policies for more information (Go to <http://academiccatalog.udel.edu>  $\rightarrow$  2012-2013 Undergraduate Programs  $\rightarrow$  Academic Regulations for Undergraduates  $\rightarrow$  UNIVERSITY ATTENDANCE POLICIES  $\rightarrow$  Class Attendance).

### 5.2 Tardiness

Please arrive on time to avoid distracting your classmates (especially during exams or quizzes). If you need to arrive late or leave early please inform me in advance.

### 5.3 Academic Honesty

All University of Delaware Policies regarding ethics and honorable behavior apply to this course. The student guide to university policies (read more at: <http://www.udel.edu/stuguide/12-13/code.html#honesty>) is very clear: "All students must be honest and forthright in their academic studies. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an assignment, or to allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance."

## 6 Accessibility for Students with Disabilities

If you are a student with a disability and wish to request accommodations, please contact the Office of Disabilities Support Services, 325 Academy St. Suite 161, or call (302) 831-4643. Information regarding your disability will be treated in a confidential manner. Because many accommodations require early planning, requests for accommodations should be made as early as possible.

## 7 Disclaimer

The above schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances and/or to ensure better student learning.