

# MA 222 Calculus 3

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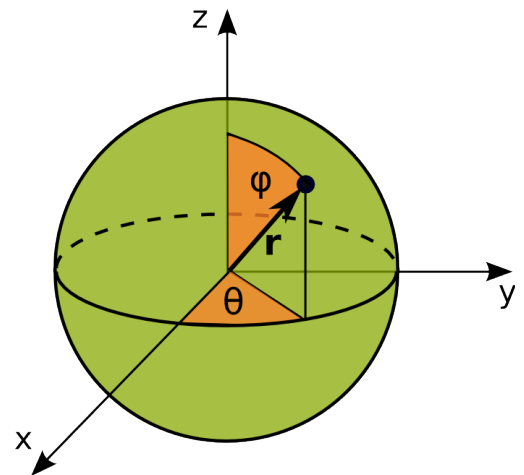
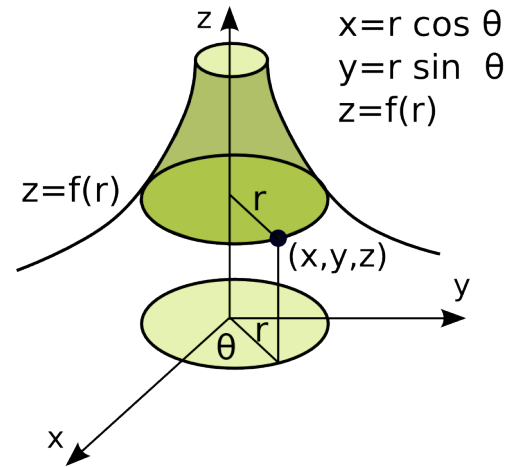
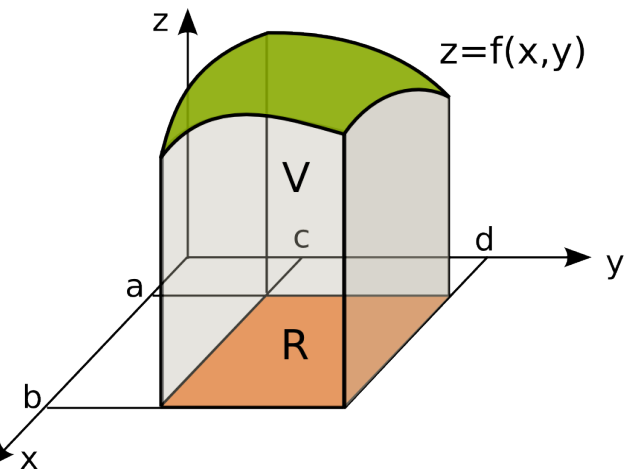
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Office Hours: Monday 1-2, Thursday 4-5, Friday 1-3 (no appointment necessary). Feel free to make an appointment if you cannot come to my regular office hours.

## Topics covered:

1. Three Dimensional Coordinate System. Surfaces in Space
2. Review of Vectors. Dot and Cross Products
3. Lines and Planes in Space
4. Space Curves. Derivatives and Integrals. Arc Length
5. Partial Derivatives. Chain Rule
6. Tangent Planes. Gradient Vector. Linear Approximations  
(Exam 1)
7. Maximum and Minimum Values
8. Lagrange Multipliers
9. Double Integrals. Double Integrals in Polar Coordinates
10. Surface Area. Applications  
(Exam 2)
11. Parametric Surfaces
12. Triple Integrals. Substitution in Triple Integrals
13. Line Integrals
14. Fundamental Theorem, Green's Theorem, curl and divergence  
(Exam 3)
15. Sequences. Series
16. Integral Test, Alternating Series. Ratio and Root Tests.
17. Power Series.
18. Taylor Series. Applications  
(Final Exam)



**Text:** No textbook required. Handouts with course material and practice problems will be distributed for each teaching unit. The course topics match chapters 12 – 16, and sections 17.1 – 17.6 (without 12.11, 13.6, 14.4, and 15.2) of *Calculus* by James Stewart (published by Brooks/Cole) which also covers topics of Calculus 1 and 2 courses.

**Technology:** All students are required to have a graphing calculator.

## Tentative Exam Schedule:

Exam 1. During week 4 (2/9)

Exam 2. During week 7 (3/1)

Exam 3. During week 11 (4/5)

Final Exam. During the finals week

## Grading:

Three Exams	18% each
Final Exam	24%
Homework Assignments	11%
Projects	11%
<b>TOTAL</b>	<b>100%</b>

Grades are computed according to the following system:

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
number grade	97 to 100	93 to 96	90 to 92	87 to 89	83 to 86	80 to 82	77 to 79	73 to 76	70 to 72	67 to 69	63 to 66	60 to 62	0 to 59

## Relevant Course Elements.

**Number of credits:** 4

**Prerequisites:** Calculus 2 or the permission of instructor.

**Attendance:** It is imperative that students attend all classes. Students are responsible for all material covered in class, even if attendance is not checked or assignments collected.

## Course Objectives.

- Obtain a well rounded introduction to the area of multivariable function calculus and number and power series.
- Deepen students' knowledge of problem formulation and problem solving techniques required for successful application of mathematics obtained in previous calculus courses.
- Competently use appropriate technology to model data, implement mathematical algorithms and solve mathematical problems.
- Cultivate the analytical skills required for the efficient use and understanding of mathematics.

**Learning outcomes.** Students will:

- be able to demonstrate proficiency in multivariable function calculus and number and power series.
- be able to differentiate and integrate multivariable functions.
- be able to use multivariable calculus in problem solving.
- demonstrate proficiency in using mathematical software.
- know how to use appropriate technology to solve problems applying calculus techniques.

## Assessment

### Exams

There will be **three semester exams and a cumulative final exam**. No makeup exam will be given unless the excuse for missing the scheduled exam is acceptable to the instructor. Any makeup exam must be taken **before** the next regularly scheduled exam. **No exam grade will be dropped.**

### Assignments and projects

There will be **four assignments and two Matlab projects** during the semester. There will be

no makeup assignments or projects. Assignments turned in after their due date will receive an automatic reduction in grade. **No assignment or project grade will be dropped.**

**Response time:** The assignments, projects and exams are typically graded in three days after they are turned in. Special circumstances like snow days, school closing or holidays, may occasionally delay the response time. Barring special circumstances, students' emails are usually responded to within one working day.

### **General Education Skills and their Assessment**

The course satisfies two General Education Skills: (1) Reasoning and Problem Solving, (2) Technology.

#### **Reasoning and Problem Solving**

**Relevant Learning Outcomes.** Students will demonstrate a logical approach to the solution of a problem. Specifically, students will be able to understand and solve multidisciplinary application problems using multivariable calculus.

**Learning Activities.** Problem solving in class. Includes (1) demonstration by instructor, practice by students, class discussion and developing problem solving skills, demonstration and practice in mathematical modeling; (2) Problem solving on assignments, projects, and exams. Emphasis on student learning. Students directly demonstrate acquired problem solving skills and success in applying problem solving in mathematics to problems in other disciplines.

**Means of Assessment and Evaluation.** Student's grade on three in-class exams and the comprehensive final exam will be used for assessment of the skill. The following grading scheme will be used.

Exceeded Expectations:	97% to 100%
Met Expectations:	73% to 96%
Approaching Expectations:	70% to 72%
Did Not Meet Expectations:	69% and below

#### **Technology**

**Relevant Learning Outcomes.** Students will demonstrate the ability to use advanced technology for professional activities. Specifically, (1) Students will know how to use appropriate technology to solve problems applying calculus techniques; (2) Students will demonstrate a proficiency in using mathematical software.

**Learning Activities.** Technology demonstration and practice. (1) Introduction to specific computer technology. (2) Solving problems using mathematical software.

**Means of Assessment and Evaluation.** Student's grade on two Matlab semester projects will be used for assessment of proficiency with mathematical software. The following scheme will be used.

Exceeded Expectations:	97% to 100%
Met Expectations:	73% to 96%
Approaching Expectations:	70% to 72%
Did Not Meet Expectations:	69% and below

**Academic integrity:** Academic integrity is at the center of the educational experience at USciences. Students are therefore expected to uphold the highest standards of academic integrity and not engage in or tolerate academic dishonesty. Academic dishonesty includes, but is not limited to, fabrication, cheating or plagiarism, and unauthorized collaboration. Any violation of

academic integrity will be investigated and, where warranted, the student will receive appropriate sanctions through the University's Student Conduct Process. Please familiarize yourself with the current USciences Student Handbook. Adherence to the Student Conduct Policy and Academic Integrity Policy will help to ensure that your learning and living experiences are founded on integrity.

**Americans with Disabilities Act (ADA) Compliance Statement:** USciences supports the educational endeavors of all students, including students with disabilities. ADA defines a disability as a mental or physical impairment that substantially limits one or more major life activities. If you believe that you have a disability that may impact your ability to fulfill your course or degree requirements, and you would like more information on applying for an accommodation under ADA, please contact the Administrator of Student Accommodations at 215-596-8758.

**Mental Health Wellness Statement:** USciences encourages students to recognize that academic success requires students to be emotionally and physically well. If you are having difficulty coping with stress associated with the classroom or are experiencing other personal issues, please go to USciences Health and Counseling (SHAC) located on the first floor of Whitecar Hall or call 215.596.8536. Additional emotional support is available 24/7 and can be obtained by contacting the National Suicide Prevention Hotline at 800.273.8255 or by texting "Go" to the Crisis Text Line 741-741. The services listed above are all free and confidential.