**Rochester Institute of Technology**

**College of Science**

**School of Mathematical Sciences**

**Fall 2019**

**Elements of Multivariable Calculus and Differential Equations**

**MATH 211-01**

**MWF 2-2:50pm**

**1174 Gosnell**

**Instructor:** Ms. Susan Bateman

**Office:** 8-3252

**Phone:** tba

**E-mail:** [smbsma@rit.edu](mailto:smbsma@rit.edu)

**Office Hours:** MWF 11-11:50am, F 1-1:50pm or by appointment

**PREREQUISITE:**

Grade of C- or better in either MATH - 172 or MATH - 182.

**COURSE DESCRIPTION:**

This course includes an introduction to differential equations, Laplace transforms, numerical methods in differential equations, and the calculus of functions of two variables. The emphasis is on the application of these topics to problems in engineering technology.

**ATTENDANCE:**

Attendance is extremely important as a graded assignment is completed each day in class. Each class day is worth 4 points. 2 points will be deducted if you are late or leave early and no points will be awarded if you are absent. Points will be deducted for lack of participation, at the professor’s discretion. This will be communicated to you during that class time.

**TECHNOLOGY:**

No calculators, phones, tablets, Google Glass, etc. will be allowed in class, aside from the occasional use of calculators during complex application problems. If I see anything that may be a disruption to your learning, I will remove it for the duration of class. If a cell phone rings, I reserve the right to take action. This is extremely disruptive to the class. Calculators are not permitted on exams, so I encourage you to try to accomplish as many assignments a calculator as it will help prepare you better for exams.

**Academic Honesty:**

Honesty is extremely important, so cheating will not be tolerated. For the first offense, you will receive a zero without any chances of retaking. The second offense will result in failure of the course.

**Make-Up Policy:**

There will be no make-ups given on exams, homework or workshops unless you have made arrangements with me PRIOR to the day or deadline of that graded assignment. Excused absences are the only means by which a make-up may be given and no more than one exam make-up is permitted per student. This is, of course, unless the circumstances are serious enough to allow otherwise. Your excusal from class and any extensions given are at the professor’s discretion.

**Workshops:**

Every day, you will come in and pick up the worksheet from on top of the podium. The first 5 minutes will be spent on the FRONT side of the worksheet. A 30 minute lecture will be followed by a 10-15 minute workshop where students will work on the back side of the worksheet. Workshops will not be collected, but you will not be permitted to leave class early without having completed the assignment. All in-class work MUST be done in GROUPS. Workshops are graded based on participation and effort and are worth 4 points each. If you are late to class and cannot complete the front side of the worksheet before handing it in, you start with a 2/4. Similarly, if you leave class early, you earn a 2/4. If you did not participate in group discussion to complete the assignment, you will lose points.

**Homework:**

There will be regular homework assignments throughout the semester. Assignments will NOT be accepted late and should be turned in before class begins on their due date. If you know you will be absent on the class day that a homework is due, you may hand in the assignment at an agreed upon time, provided that you have already been excused from class. Identical homework assignments will be given a 0%. While I encourage a group effort when completing your assignments, copying is not collaboration.

**Exams:**

There will be four (50 minute) in class examinations. There will be no make-up exams given, unless you have been excused previously. I will allow no more than one make up exam per semester. This is of course unless the circumstances are serious enough to allow for it. The final exam is mandatory in this course and is separate from the four in-class exams.

**MyCourses:**

Grades, Attendance and Content will all be found on MyCourses. In Content, you will find homework, workshop, and exam solutions as well as other helpful materials like formula sheets, videos and supplemental materials.

**Academic Accommodations:**

There are several resources available to students to help them succeed in the classroom. If you are a student in need of extended test time, you should make your professor aware of this with the appropriate documentation from the Academic Accommodations Office.

**Academic Support Center:**

Any student who feels they are falling behind in the course can take advantage of our Support Center and private mathematics tutoring. This is a free service and is located in the SAU Second Floor (above the coffee shop). See me for more information if you would like to take advantage of this opportunity.

**Bates Study Center:**

Located at 1200 Gosnell, the Bates Center is a place where students can get tutoring from teaching assistants, graduate students and sometimes professors in their math courses. Hours are M-Th 9am – 9pm, F 9am – 6pm.

**Grade Determination:**

Workshops: 10%

Homework: 25%

Exams: 45%

Final Exam: 20%

**Grade Scale:**

A 93% ≤ x ≤ 100%

A- 90% ≤ x < 93%

B+ 87% ≤ x < 90%

B 83% ≤ x < 87%

B- 80% ≤ x < 83%

C+ 77% ≤ x < 80%

C 73% ≤ x < 77%

C- 70% ≤ x < 73%

D 60% ≤ x < 70%

F 0 ≤ x < 60%

**Goals of the Course:**

• To introduce the basic definitions, concepts, rules, vocabulary, and mathematical notation of calculus.

• To provide the manipulative skills required for problem solving in calculus.

• To provide the knowledge and appreciation of calculus as a tool in solving applied physical problems.

• To provide a background in mathematics that can be used for the study of science and engineering.

**Learning Outcomes:**

• Explain the basic vocabulary, concepts, rules, definitions, and mathematical notation of differential equations.

• Demonstrate the standard techniques for solving differential equations.

• Use Laplace transforms to solve differential equations.

• Solve applied physical problems using differential equations.

**Workshop Grading Rubric**

Workshop participation deserving of a 4 will be strong in most categories below. Participation that is strong in some categories but needs development in others will receive a 3. A 2 reflects a need for development in most categories. Work receiving a 1 is typically unsatisfactory in several categories, and 0 work is unsatisfactory in nearly all.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Strong Work** | **Needs Development** | **Unsatisfactory** |
| **Contributions** | Routinely provides useful ideas when participating in the group. | Sometimes provides useful ideas when participating in the group. | Rarely provides useful ideas when participating in the group. May refuse to participate. |
| **Focus on Task** | Consistently stays focused on the task and what needs to be done. | Sometimes stays focused on the task and what needs to be done. | Rarely focuses on the task. Lets others do the work. |
| **Works with Others** | Almost always listens to, shares with, and supports the efforts of others. | Sometimes listens to, shares with, and supports the efforts of others. | Rarely listens to, shares with, and supports the efforts of others. |
| **Quality of Work** | Provides high quality work which displays a high level of critical thinking. | Provides work that occasionally needs to be checked/redone by other group members. | Provides work that usually needs to be checked/redone by others to ensure quality. |

**MATH 211 Course Schedule:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Monday | Wednesday | Friday |
| Aug 26 – 30 | Intro to Course | Functions of Several Variables | Partial Derivatives |
| Sept 2 - 7 | No Class | Total Differential | Second Partials Test |
| Sept 9 - 13 | Iterated Integrals  Homework 1 Due | Double Integrals and Area | Double Integrals and Volume |
| Sept 16 - 20 | Review  Homework 2 Due | Exam 1 | Intro to First Order Equations |
| Sept 23 - 27 | Separation of Variables | First Order Linear Equations I | First Order Linear Equations II |
| Sept 30 – Oct 4 | Compartmental Analysis  Homework 3 Due | Newtonian Mechanics | Kirchhoff’s Law |
| Oct 7 - 11 | Review  Homework 4 Due | Exam 2 | Intro to Higher Order Equations |
| Oct 14 - 18 | No Class | Homogeneous Equations | Nonhomogeneous Equations I |
| Oct 21 - 25 | Nonhomogeneous Equations II | Pendulums  Homework 5 Due | Spring Mass Systems |
| Oct 28 – Nov 1 | Kirchhoff’s Law | Beam Deflection | Review  Homework 6 Due |
| Nov 4 - 8 | Exam 3 | Intro to Laplace Transforms | Algebraic Manipulation I |
| Nov 11 - 15 | Algebraic Manipulation II | Shifting Formulas I | Shifting Formulas II |
| Nov 18 – 22 | Initial Value Problems  Homework 7 Due | First Order Applications (IVP) | Second Order Applications (IVP) |
| Nov 25 - 29 | First Order Applications | No Class | No Class |
| Dec 2 - 6 | Higher Order Applications (IVP) | Review  Homework 8 Due | Exam 4 |
| Dec 9 - 13 | Final Exam Review |  |  |
| \*\* Please check SIS for the Final Exam date, time, and location. Final Exams are Dec 11 - 18 | | | |