MA 220 Multivariable Calculus

Syllabus

Instructor: Dr. Darien Lauten

Brief Course Description: Topics include, but are not limited to, the formal definition of the limit, infinite sequences and series, vectors and the geometry of space, vector functions, partial derivatives, parametric equations.

Course Objectives:

- Develop conceptual and contextual understanding of course topics
- Understand and be able to use mathematical abstraction and logical reasoning. Read mathematics and become independent learners of mathematics
- Develop conceptual and procedural understanding of the major ideas of calculus
- Model and engage in the solution of problems that can be solved using calculus. Write clearly and concisely about mathematical ideas and problem solutions
- Work with other students, to appreciate other students' ideas and approaches and to understand benefits in today's world.
- Use the TI-83 hand-held computer (graphing calculator), when appropriate, to understand concepts and to solve problems.
- Use Maple, mathematical software, when appropriate, to understand concepts and to solve problems.

Teaching Strategies:

- Exploratory, intuitive activities that involve students
- Lecture and group discussions with an expectation that all students will engage and participate in and question at any and all times during lectures and discussions
- Small and large group work with an expectation of student participation and engagement
- Student reading of mathematics
- Student writing about mathematical ideas. Problem solving
- Frequent quizzes and tests

Course requirements and policies:

Attendance.

- You are expected to attend all classes and arrive on time.
- Attendance will be taken at the beginning of each class meeting. If you arrive late please make sure your absence has been corrected.
- In case of illness; work-schedule conflicts, family commitments, or other emergencies that require absence from class, you are expected to notify me prior to the class meeting by sending an email message, a phone message, or placing a written note in the mailbox next to my office door.
- If you are absent for two class meetings, you are required to set up a meeting with me to discuss the advisability of your remaining in the course. The dean will be notified when you miss your third class. When necessary, missing part of a class is preferable to missing all of a class. Each class meeting
represents three class hours in a three-credit course.

**Handouts:** Please make arrangements for other students to collect handouts for you.

**Assignments:**

- Assignments will be taken from the exercises in the text or given to you on handouts.
- You are expected to do assigned exercises at the time they are assigned and revisit them before they are due.
- I will address questions on assignments at the beginning of the class after which the work is assigned. If you will be absent, place assignments in the mailbox near my office door. If you are unable to get to the College, you may submit an assignment by regular mail postmarked on or before the due date.
- The general rule is that late work is not accepted. For any appropriately documented exceptions to this policy, communicate with me in advance.
- You are expected to correct all assigned problems. The solution key will be available in the mathematics conference room after the assignment is due.
- You are required to submit assignments for each chapter the class meeting after the work is assigned (whether or not you attend class).
- The estimated time commitment includes reviewing class notes, reading the textbook, doing and studying the examples in the text, doing and reviewing assignments, and preparing for quizzes and tests.

**Active Participation**

- You are expected to participate and actively engage in full-class and small-group discussions and activities during the class meeting.
- You are expected to work cooperatively with others on small group projects and graded assignments.

**Time commitment**

- You are expected to spend four to eight hours per week outside of class learning course material. Depending on background and depth of inquiry, more or less time will be needed by individual students.
- The estimated time commitment includes reviewing class notes, reading the textbook, doing and studying the examples in the text, doing and reviewing assignments, and preparing for quizzes and tests.

**Email**

- You are required to have an email account and to check it regularly. I will communicate with you via email.

**Materials**

- Keep handouts, class notes, and assignments organized in a three-ring binder. Submit homework on 8 1/2" by 11" graph paper.
- For each section, include a heading with your name, the textbook section number, the page number, and assigned problems.
- Staple all submitted work. Paper clips and folded corners are totally unreliable.

**Calculator** You are expected to have a calculator that performs matrix operations, preferably a TI-83+, and to bring it to class each class meeting. The TI-83 is used in the calculus sequence and will be projected on the screen during class meetings. If you use a different calculator, you are expected to read the manual and figure out how to make it perform all required functions. I have long since given up trying to be an expert on how to use every brand and type of calculator.
Project(s) and graded assignments

- Project(s) and graded assignments will be done individually or in small student groups as assigned.
- Make arrangements to submit work on time even if you are absent. Absence from class is not an excuse for turning work in late. There is a mailbox near my office door or see mailing instructions under “assignments”.
- The general rule is that late work is not accepted. For any appropriately documented exceptions to this policy communicate with me in advance. Generally there will be full letter grade penalties.

Extra help

- Do you assignments in study groups with your classmates, since they are working on the same problem set. Study groups have been shown to be the most effective way to learn mathematics.
- Seek help from me. A few well-posed questions may clarify the problem. Some students like to compare and complete assignments in the mathematics conference room before the class meeting. Questions are welcome at this time. I also am available for questions after class. I also welcome e-mail questions that are submitted in time for a response before the class meeting.

Quizzes

- A short quiz will be given each class meeting at which a test is not given. The percent of quiz grades will be dropped. There are no make-up quizzes. I use quiz results to assess how well students are understanding concepts and able to perform procedures.

Test

- There will be three one-hour tests.
- Make-up tests are given only under extreme circumstances. To take a make-up test, you must provide appropriate written documentation from a doctor, court, etc. Workplace rule for absences apply.

Final examination

- The final examination will be given at the time and date scheduled by the registrar’s office. Any exceptions must have prior approval from the dean.

Plagiarism

All work submitted (for example: on projects, graded problems, quizzes, and tests) that is specified to be individual must be entirely your own. Examination questions may not be discussed with other class members. I adhere to the plagiarism policy that appears in the Rivier College catalog.

Study Help

Think of this course as three one-hour class meetings per week. Each week schedule yourself for three or (better yet) more uninterrupted two-hour study sessions. It is totally unrealistic to expect to learn, in one sitting, the mathematics covered in a three hour class meeting. Learning mathematics requires reading, thinking, trying problems, discussions with other students and then setting it aside for your brain to “mull over”. Has a solution ever come to you in the middle of the night or while you are standing in a line or taking a shower? Your subconscious seems to work on problems while you are doing other things. When you return for your second study session revisit the problems you had trouble with on the first attempt and reread your notes and the text—the mathematics should make more sense after time away and work by your sub-conscious. In the long run, you will find learning mathematics in several short study sessions each week will save your time.
Examinations (approximate dates):

- Test#1 Monday, Sept. 30. Chapter 8 Sequences and Series.
- Test#3 Monday, Nov. 4. Chapter 10 Vector Functions.
- Test#4 Monday, Nov. 18. Chapter 11 Partial Derivatives.

Methods of Assessment and Computation of Grades:

- Assignments, projects, and graded assignments 15%
- Attendance, active participation in full-class and group discussions and activities 10%
- Tests, quizzes, and final examination 75%

Guidelines for group work (Courtesy of Dr. Magnus)

Bibliography

<table>
<thead>
<tr>
<th>MA 220E</th>
<th>Calculus III. Course Calendar and Assignments. Fall, 2002</th>
<th>9/8/2002</th>
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<tbody>
<tr>
<td>Wk1</td>
<td>Aug. 26</td>
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<tr>
<td>Wk2</td>
<td>Sept. 2 Labor Day. NO classes day or evening</td>
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<tr>
<td>Wk4</td>
<td>Sept. 16</td>
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<td>Wk5</td>
<td>Sept. 23</td>
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<td>Wk6</td>
<td>Sept. 30</td>
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<tr>
<td>Wk7</td>
<td>Oct. 7</td>
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<tr>
<td>Wk8</td>
<td>Oct. 14 Columbus Day. Note that this is College-scheduled class time. It's OK with me, if we all agree, before Oct. 14, on a specific (but possibly distinct) three hours of make-up time. Tuesdays after 2:15 PM are fine with me. Thursdays &amp; Fridays are not. M and W would be very difficult for me until I am stronger. Physician said two months from Sept. 1. Someone, other than me, would have to organize this. Appendices A1 and A2-d: Formal Definition of Limit; A6-H: Polar Coordinates; A22-I: Complex Numbers.</td>
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<tr>
<td>Wk9</td>
<td>Oct. 21</td>
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<tr>
<td>Wk10</td>
<td>Oct. 21</td>
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Note: This sheet will be updated each week. Check date at top for most recent update.
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Wk11</td>
<td>Nov. 4</td>
<td>Chapter 11. Partial Derivatives. P. 748.</td>
<td>Test on Chapter 10</td>
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<tr>
<td>Wk12</td>
<td>Nov. 11</td>
<td>Chapter 12. Multiple Integrals. P. 838</td>
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<tr>
<td>Wk13</td>
<td>Nov. 18</td>
<td>Chapter 12. Multiple Integrals. P. 838</td>
<td>Test on Chapter 11</td>
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<td>Wk14</td>
<td>Nov. 25</td>
<td>Chapter 13. Vector Calculus. P. 916</td>
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<tr>
<td>Wk15</td>
<td>Dec. 2</td>
<td>Pull it all together.</td>
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<tr>
<td>Wk 16</td>
<td>DEC. 9</td>
<td>DEC. 9 Exam at regularly scheduled class time.</td>
<td>Exam</td>
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<td>Week</td>
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