MTH 301B Multivariable Calculus Section  
MF 1:35-2:30 ENG 101  
TR 12:55-1:50 Franz 034 

INSTRUCTOR INFORMATION  
Name: Aaron Wootton  
Office: BC278  
Telephone: 943-7377  
Email: wootton@up.edu  
Official Office Hrs (BC278): MF 12:30-1:30  
TR 10:00-11:00  
Drop by Hours (BC278): MF 2:30-4:00  
TR 2:00-4:00  
Course Webpage: http://faculty.up.edu/wootton/Calc3/Calc3B.html 

TEXT AND READINGS  
WARNING: The chapter numbering is different in both books - in “Calculus”,  
we do Chapters 12-16 and in “Multivariable Calculus”, we do Chapters 13-17, but  
the chapters do match up. 

TECHNOLOGY  
The course requires the use of a graphing calculator. Students will be allowed to  
use graphing calculators (including calculators with computer algebra systems like  
DERIVE) on all Midterms and the Final Exam. Calculators will not be allowed  
for some quizzes. 

COURSE/BULLETIN DESCRIPTION  
The study of functions in three dimensional space, with an eye on applications.  
Topics covered are:  
(1) Ideas and tools of two- and three-space: vectors, dot product, cross product  
and matrices.  
(2) Scalar valued functions of several variable: contour maps, partial derivatives,  
gradients, optimization, integration and integration in different coor-  
dinate systems.  
(3) Curves and surfaces including their parameterizations.  
(4) Differentiation and integration of vector-valued functions: chain rule, line  
integrals, surface integrals, curl and divergence, the integrations theorems  
of Green, Stokes and Gauss. 

(Prerequisite: MTH 202)
COURSE OUTLINE

Ch. 13 Vectors and Spacial Geometry (13.1-13.7)
Ch. 14 Vector Functions (14.1-14.4)
Ch. 15 Partial Derivatives (15.1-15.8)
Ch. 16 Multivariable Integrals (16.1-16.9)
Ch. 17 Vector Calculus (17.1-17.9)

COURSE PERFORMANCE OBJECTIVES

The first course in multivariable calculus provides students with an introduction to the methods and concepts of elementary differential geometry and functional analysis. Students will be familiar with elementary theory and proficient in its applications within mathematics and the applied sciences.

METHODS OF ASSESSMENT

Course performance objectives are assessed by traditional means: graded homework assignments, examinations, and other graded work that may include written and oral presentations. The development of analytical and logical reasoning skills are inherent in the nature of mathematics and assessed in conjunction with the course performance objectives. Computational technology use is required for successful completion of assignments and examinations. I will facilitate your path to meeting the course objectives with:

(1) Lectures to introduce new concepts.
   My lecture style is very informal. In order to generate some class discussion I will often throw out non-rhetorical questions. And you are encouraged to interrupt me with questions.

(2) Homework assignments.

MINIMAL PASSING HOMEWORK SCORE: This class is extremely fast paced and much more difficult than all your previous math classes. Doing homework regularly and on time is crucial to your success. For this reason, to encourage homework participation, you are REQUIRED to obtain a cumulative score of AT LEAST 60% to pass the class - you will fail the class REGARDLESS of your grade on all other graded material if you do not achieve the minimal passing homework score.

There are two types of homework assignment you will be required to complete. The first, called Webwork homework (WW), is an online homework provider which can be accessed through any internet connection - you have an instruction sheet on how to work with webwork attached to the Syllabus. You will find the login page linked to my webpage. For each section, there are a list of homework problems on WW which need to be completed.

The second type of homework is traditional pen and paper homework (PP) assigned from the text. You are encouraged to work in groups, but you are on your honor not to turn in work you don’t understand. Also, professional courtesy dictates that one acknowledges significant contributions of others.

On the day I finish teaching any section, all homework for that section is officially assigned (both WW and PP). In the table below is the day I will collect the homework (at the beginning of class) or the day WW will close the section (at 11:59pm that day):
<table>
<thead>
<tr>
<th>Day</th>
<th>Section is Completed</th>
<th>Homework Due Date</th>
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</thead>
<tbody>
<tr>
<td>Monday</td>
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<td>Thursday</td>
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<td>Tuesday</td>
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</tbody>
</table>

**BE WARNED:** it is your responsibility to be aware of due dates for homework - I will not keep reminding you in class.

As well as assigned PP and WW homework, from time to time you will be required to complete additional assignments in the form of additional WW sets and other types of PP homework. Such assignments will either count toward your homework grade or will sometimes be counted as extra credit. Additional sets will be assigned sporadically throughout the semester and will be announced in class.

**BE WARNED:** The collected homework (both PP and WW) is for my benefit so I can monitor your progress and assign grades - it is NOT the only homework you should complete. As a general case, when studying, you should complete as many problems as necessary until you feel comfortable with the material you are working on.

**LATE HOMEWORK:** Late homework will be accepted PROVIDED it is either given to me or is in my mailbox by 4pm THE DAY IT IS DUE. Any later homework will not be accepted and you will be awarded a total of 0 points on that assignment.

(3) **Quizzes and Examinations**

There will be three midterm examinations and one final examination. The midterms are (tentatively) scheduled to cover the following material:

- Midterm 1: Chapters 13 & 14
- Midterm 2: Chapters 15
- Midterm 3: Chapter 16 & Sections 17.1-17.4

The exact dates of the midterms will depend upon the speed the relevant material is covered and will be announced in class and on the website at least one week beforehand. The final exam is cumulative and is scheduled for 8:00-10:00 Monday December 11th.

Quizzes will be given frequently and generally unannounced. Missed quizzes cannot be made up unless prior permission has been given by the instructor. There will also be an in-class Calc I & II quiz on the first Friday of classes and a wrap-up quiz shortly before finals.

**GRADING STANDARDS**

Final grades will be based on assignments and examinations.

- Homework: WW: 100 points
  PP: 100 points
- Quizzes: 100 points
- Midterms (3): 100 points each
- Final Exam: 200 points
The total number of points available is 800. Final grades will be determined at the end of the semester, though will be no lower than those set forth in the following table PROVIDED the minimal passing homework score has been achieved.

<table>
<thead>
<tr>
<th>Points</th>
<th>Percent</th>
<th>Grade</th>
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<tbody>
<tr>
<td>720 - 800</td>
<td>90 - 100%</td>
<td>A</td>
</tr>
<tr>
<td>680 - 703.5</td>
<td>85 - 87.9%</td>
<td>B+</td>
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<tr>
<td>624 - 639.5</td>
<td>78 - 79.9%</td>
<td>B-</td>
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<tr>
<td>560 - 599.5</td>
<td>70 - 74.9%</td>
<td>C</td>
</tr>
<tr>
<td>520 - 543.5</td>
<td>65 - 67.9%</td>
<td>D+</td>
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<tr>
<td>464 - 479.5</td>
<td>58 - 59.9%</td>
<td>D-</td>
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<table>
<thead>
<tr>
<th>Points</th>
<th>Percent</th>
<th>Grade</th>
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<tbody>
<tr>
<td>704 - 719.5</td>
<td>88 - 89.9%</td>
<td>A-</td>
</tr>
<tr>
<td>640 - 679.5</td>
<td>80 - 84.9%</td>
<td>B</td>
</tr>
<tr>
<td>600 - 623.5</td>
<td>75 - 77.9%</td>
<td>C+</td>
</tr>
<tr>
<td>544 - 559.5</td>
<td>68 - 69.9%</td>
<td>C-</td>
</tr>
<tr>
<td>480 - 519.5</td>
<td>60 - 64.9%</td>
<td>D</td>
</tr>
<tr>
<td>0 - 463.5</td>
<td>0 - 57.9%</td>
<td>F</td>
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**CODE OF ACADEMIC INTEGRITY**

Academic integrity is openness and honesty in all scholarly endeavors. The University of Portland is a scholarly community dedicated to the discovery, investigation, and dissemination of truth, and to the development of the whole person. Membership in this community is a privilege, requiring each person to practice academic integrity at its highest level, while expecting and promoting the same in others. Breaches of academic integrity will not be tolerated and will be addressed by the community with all due gravity (taken from the University of Portlands Code of Academic Integrity).

The complete Code may be found in the 2004-05 University of Portland Student Handbook and as well the Guidelines for Implementation. It is each student's responsibility to inform himself or herself of the Code and Guidelines.

**ACCOMMODATION FOR DISABILITY**

If you have a disability and require an accommodation to fully participate in this class, contact the Office for Students with Disabilities (OSWD), located in the University Health Center (503-943-7134), as soon as possible.

**MAKE UP EXAMS**

I do not give make up exams with only two exceptions: absence due to extreme hardship or a University sponsored event. In either case, I must be informed in a timely manner and I reserve the right to deny make-up work and penalize absences which are not verified.

**WITHDRAWAL PROCEDURES**

It is the student's responsibility to drop the course if he/she is no longer planning on attending the course. If a student does not properly withdraw from a course, he/she may receive an F for the course.

**INCOMPLETES**

An incomplete (I) may be given when the quality of a student's work is satisfactory (C or better), but for some essential reason they are not able to complete the course. An (I) is reserved for emergency situations only and acceptance of a request for an (I) is at my discretion.
WEBWORK STUDENT MANUAL

Logging in:
(1) Go to the webpage -
   http://faculty.up.edu/wootton/Calc3/Calc3A.html
   and click on the link to the login page for webwork
(2) Do not worry that the course is listed as Mth 201 - it is the correct webpage,
   it is just an old template I have not updated. Type in your login and your password. Both your login
   and your password are your last name (all lower case) and the section letter in upper case letters. For example, my login
   and password would be woottonA if I were in section A and woottonB if I were in section B.

Changing Your Password/ Setting Your E-mail:
(1) Click on the Password/E-mail link on the left hand panel.
(2) Follow the instructions. Make sure you set the e-mail account you check
    the most - I will send you e-mails regarding Webwork through this.

Doing Problem Sets:
(1) Click on ”Homework Sets” in the left hand panel.
(2) Click on the set you want to do.
(3) Click on the problem you want to do.
(4) Type your answers to the questions in the relevant blank boxes.
(5) If you hit ”enter” or click on the ”preview answer” button, Webwork will
    preview your answer(s) for you. This is helpful in tracking down errors.
    You can do this as many times as you like until you are happy with the answers.
(6) When you are ready, click the ”submit” button. BE WARNED - some
    questions you will only have a couple of chances to answer, so make sure
    the answer you have previewed is the answer you want to submit BEFORE
    you submit it.
(7) After you submit your answers, Webwork will let you know whether you
    got the question right. If not, you can usually try again (until the due date)
    except for a small number of questions for which you will have a limited
    number of attempts.
(8) You can exit Webwork at any time using the logout button on the left hand
    panel.

Printing Problem Sets:
(1) You can download a hard copy of any problem set. You will need Adobe
    Acrobat Reader (which is free on the Web and on all university computers).
(2) To get a hard copy, click on the homework set you want a copy of. On the
    screen where the different questions are listed, there will be a link which
    reads ”Download a Hard Copy of this Homework Set”. Click this to get
    your hard copy.
(3) Answers will only be available AFTER the due date.

Help with Webwork and other Features:
(1) If the problem includes a picture that is hard to see, click the picture to get
    an enlarged version.
Webwork understands many functions such as "$\sin(x)$" and "$\ln(x)$". There is also special syntax used to answer questions (like how to express exponents). Most of the syntax and functions are fairly obvious, especially to those of you who are already familiar with computers. However, to be safe, I recommend printing the webpage 
http://webwork.math.rochester.edu/docs/docs/pglanguage/availableFunctions.html

which has a list of all the functions webwork accepts.

Some questions will have functions/syntax specifically tailored for that question, and it may differ from earlier similar questions. Make sure you always read the question in full to check you are using the right syntax.

If you are stuck or convinced a problem is defective, you should stop by during office hours to discuss them with me. If this is not possible, use the e-mail instructor button at the bottom of the page to send me an e-mail outlining your problem. BE WARNED - the "e-mail instructor" button is for use when you are really stuck and absolutely cannot see me. Generally you should look at the questions way in advance of the due date and speak to me about any problems long beforehand. If you e-mail me five minutes before the due time, I will not be able to help you!!

After the due date, the problem set closes and you will not be able to submit any answers for credit. A short time after the due date, the answers will become available so you can check your work.

You can check your score on Webwork by clicking the "Grades" button on the left hand panel. It will show all scores on all sets assigned to this course.

Problems with Webwork:

Webwork is a fairly new product and is still subject to minor (and sometimes major!) hiccups. I have listed some of the major problems encountered and the solutions you should use.

1. Website does not load: This is a problem with all websites - occasionally traffic gets too much for the site to handle. As a general case, wait a while and try again. If after a number of attempts there are still issues, contact me so I can check.

2. Problem is defective: Sometimes a bug in the program will make a problem defective. Usually, when a problem is defective, the screen will turn pink (though not always). If the screen turns pink or you are completely convinced there is a problem, stop by to see me. In extreme circumstances, use the "e-mail instructor" button, but it is usually much easier to repair a question if you are sat next to me telling me exactly what is wrong.

3. It will not accept the correct answer: Webwork is sometimes very sensitive with regards to decimal places. When in doubt, use a lot of decimal places. Also, the syntax sometimes changes between questions, so make sure you read the question completely and are using the syntax specified by that question.

Though at first it may be difficult to get the hang of, after time, I think you will really start to appreciate the different things Webwork has to offer that traditional pencil and paper homework does not. Also, remember, my office door is always open if you need help getting started. Good luck!
| Section 13.1 | 1 3 5 14 25 32 34 36 38 |
| Section 13.2 | 1 4 6 10 16 26 29 35 |
| Section 13.3 | 1 6 13 20 21 24 28 32 47 51 |
| Section 13.4 | 6 9 12 14 18 27 34 36 38 41 |
| Section 13.5 | 6 9 12 14 18 24 34 37 43 47 65 62 68 |
| Section 13.6 | 8 11 16 20 21–28 34 36 43 46 |
| Section 13.7 | 1 2 4 15 34 48 51 56 63 65 |
| Section 14.1 | 11 14 18 19–24 26 39 |
| Section 14.2 | 1 7 14 21 28 29 30 34 38 |
| Section 14.3 | 6 14 18 24 26 32 37 42 52 |
| Section 14.4 | 2 8 9 14 15 17 21 25 33 36 |
| Section 15.1 | 2 5 9 11 18 23 29 30 32 35 39 44 45 |
| Section 15.2 | 1 4 17 23 29 37 39 |
| Section 15.3 | 2 4 6 7 8 24 39 53 60 64 66 70 77 |
| Section 15.4 | 6 19 22 31 37 |
| Section 15.5 | 6 7 13 16 18 27 32 38 42 50 |
| Section 15.6 | 1 4 7 10 18 28 32 36 38 47 52 55 59 |
| Section 15.7 | 1 3 15 42 |
| Section 15.8 | 1 13 19 23 36 |
| Section 16.1 | 1 6 9 12 14 17 |
| Section 16.2 | 2 5 12 17 20 22 28 33 |
| Section 16.3 | 1 9 12 14 19 22 26 32 43 48 50 52 |
| Section 16.4 | 1 3 6 8 14 17 21 24 30 34 35 |
| Section 16.5 | 5 8 18 21 |
| Section 16.6 | 1 6 16 24 |
| Section 16.7 | 6 12 26 28 30 32 |
| Section 16.8 | 1 6 15 18 23 33 36 |
| Section 16.9 | 4 8 12 15 19 22 |
| Section 17.1 | 1 7 10 11–18 25 34 |
| Section 17.2 | 1 3 6 14 16 17 19 22 40 |
| Section 17.3 | 1 8 11 14 16 19 21 23 26 |
| Section 17.4 | 3 8 12 14 16 18 22 27 |
| Section 17.5 | 4 10 13 15 20 24 31 37 43 47 |
| Section 17.6 | 2 3 17 20 31 37 43 47 |
| Section 17.7 | 1 4 5 10 13 24 34 35 41 |
| Section 17.8 | 1 3 11 14 16 18 |
| Section 17.9 | 2 3 6 19 21 24 28 |