

## Welcome to Math 273 Multivariable Calculus 2 – Fall 2015

8:00 - 8:50 M-F in Bouillon 106, occasional Thursdays in Bouillon 103

**Instructor:** Dr. Jean Marie Linhart

**Phone:** (509) 963-2123

**Webpages:** (course) <http://canvas.cwu.edu>

(HW) <http://webwork.math.cwu.edu>

(me) <http://www.cwu.edu/math/jean-marie-linhart>

**Office:** Bouillon 119

**E-mail:** [jmlinhart@cwu.edu](mailto:jmlinhart@cwu.edu)

**Office Hours:** M-Th 2:00 - 2:50 pm  
and by appointment.

**Required Text:** *Calculus*, by McCallum, Hughes-Hallett, et al, **6<sup>th</sup>** ed.; Wiley

Assignments and grades will be posted to Canvas. We will be using WeBWorK for online homework.

**Course Goals:** Particle physicists believe we live in a 10 to 26 dimensional universe. We can readily observe 3 spatial and one time dimension in our day-to-day lives, yet most of the math you've learned up to now is restricted to one or two dimensions. Then there are phenomena like the wind, which give a vector at every point of space; these are called vector fields. In order to describe this world and phenomena that depend on more than one influencing factor, we need multivariate (more than one variable) mathematics, and this is the subject matter we will be investigating this quarter.

Math 273 is a second course in multivariable calculus, and the main object of study is multivariable integration in a wide variety of flavors.

Perhaps the most important part of the course comes at the end, when we will discuss generalizations of the fundamental theorem of calculus to calculate such integrals: Green's Theorem, Stokes' theorem and the divergence theorem. That might all sound like gobbledygook for now, but I will do my best to help you understand what these things refer to in our physical world, as well as help you learn how to do mathematics with them.

In terms of book chapters, we will be covering Chapters 16 through 20.

Occasionally, we will be using the computer lab in Bouillon 103. I will announce these lab days ahead of time.

## Grades/Exams/Homework

### Grades

Grades will be calculated using the following weighting system:

WebWork Assignments: 15%

Quizzes and Written Assignments: 25%;

Exams: 60% total, broken up as follows: 17.5% for each mid-term and 25% for the final  
and the following scale:

	87 – 89.9 : B+	77 – 79.9 : C+	67 – 69.9 : D+	below 60 : F
93 – 100 : A	83 – 86.9 : B	73 – 76.9 : C	63 – 66.9 : D	
90 – 92.9 : A–	80 – 82.9 : B–	70 – 72.9 : C–	60 – 62.9 : D–	

### WebWork

WebWork is the online homework system for the math department at CWU. Problems assigned through WebWork are to make sure you get practice with some of the problems of multivariable calculus. WebWork can easily be started early and worked on incrementally; deadlines are firm, no extensions will be given. You will have unlimited attempts on any problem that requires a typed answer; for multiple choice and true-false questions you will only get one attempt, so check your answer before submitting it. The lowest assignment score will be dropped to take into account unexpected emergencies.

### Written Assignments

We will have a graded written assignment most weeks. These problems are to help you learn the material, in particular, in how to apply critical thinking to it. Some problems will attempt to get at the trickier concepts in the course.

Present your work neatly, in logical order. First restate the question, then present your solution. Use your words to explain what is going on, and always include a graph or diagram.

## Quizzes

We will have a weekly in-class quiz on Friday. These should take 10-15 minutes to complete. It will be on the material recently covered in class up through Wednesday. Students may make back half of their missed points by presenting a complete and correct solution to the problem and a reflection on the quiz refund form.

## Exams

There will be three exams: two in-class mid-terms and a final. The first mid-term will be on Friday October 9, the second mid-term will be on Friday November 6, and the Final Exam will be on Thursday December 10. If there are changes to the midterm dates, they will be announced in class and on Canvas. The Final Exam will be cumulative. You will be allowed to bring in one sheet of paper, filled out however they want, front and back, for use with exams. You must fill out your own note sheet.

## Late and Make-up Policy for Graded Assignments, Quizzes and Exams

Field trips, illnesses, accidents and deaths in the family are a part of life. I will arrange to take late work or for a make-up or an alternative if you contact me either ahead of time or within 24 hours and provide documentation.

Because everyone can run into an occasional conflict, I will accept at most **one** late homework or other take-home (not WebWork) assignment, no questions asked, for full credit, provided it is handed in at the beginning of the next class period, or if you get my written (emailed) agreement to hand it in later. Likewise, your lowest quiz grade and lowest WebWork score will be dropped to take care of conflicts.

Emailing me with information about absences and late work will help to make sure there's a documentation trail in case I don't remember a verbal conversation.

## Academic Integrity

You have to do your own practice in order to gain a new skill; we all know this. Most of academic integrity is simply making the work you hand in reflect the understanding in your brain. Since understanding something while you are reading it or looking at or having someone explain it to you it is often different from being able to explain or produce it yourself, try to write up your home work by yourself when you've put all the other resources away. Likewise, take the time to understand, answer, and write-up the WebWork assignments solo.

All in-class quizzes and tests are expected to be done without any resources except those explicitly authorized by the instructor. Do not discuss exams and quizzes with others who may not yet have taken the exam or quiz or within earshot of anyone who may be taking the exam or quiz at a later time. It is entirely possible for someone to be taking an exam or quiz at a later time than you are.

Cheating will result in at minimum a zero on the assignment, quiz or exam. Cheating will be reported to the office of student conduct. Egregious offenses may result in a failing grade for the course and/or more serious consequences as merited by the situation.

## Getting Help:

We've all needed help with something. Working with students on math is one of the best parts of my job. If you find yourself feeling uncertain, wanting a deeper understanding, wanting to get better grades, or struggling to learn and succeed, please ask questions in class, post questions on Canvas, and come see me. I want to answer all your questions thoroughly, even though it may not be possible to answer every question during class itself. Please give me a chance to help. If you can't attend office hours, please send me an email and suggest several times when you are available so we can find a mutually convenient time to meet.

## Secrets for success:

1. Read the book before class and take notes on what you read.
2. Attend class daily and participate willingly, whether it is by asking questions, answering questions, or working with others.
3. Budget time for homework – a minimum of 10 hours per week for work outside of class. It can help to have a regular times scheduled when you know you'll work on math.
4. Start on the homework problems as soon as you can.

5. Attempt to work on your math every day or at least every other day. The hardest part is usually getting started. Find a quiet place to work, get your book and notes together. Put away distractions such as your cell phone, TV, or laptop. Then, set a timer for 30 minutes (or 15 if you are having a bad day) and resolve to put your best effort in for at least that length of time.
6. Discussing problems and solutions with peers and using the internet is encouraged, with two caveats.
  - Before you go ask or look for a solution, make an honorable effort to solve the problem on your own. Spend time thinking and strategizing before asking or searching for help.
  - You must write up your understanding of a solution **on your own**. Practice makes perfect! See my [guide to group work and using outside resources](#), <http://www.cwu.edu/math/group-work-and-using-outside-resources>, on the web.
7. As you progress in your university studies and in your career, problems get more and more difficult to solve. You may have to start with easier (possibly unassigned) problems before you are even ready to start to work on an assigned problem. Some problems may take more than an hour to solve. Persistence pays off.
8. Explain what you are doing. Use your words. This will help you to understand the concepts critical to success in the class, and will help you get a higher grade.
9. I am always happy to help you if you are stuck. You will get the most out of my help and the University Math Center if you attempt the problem on your own or with your peers before asking an expert.
10. Do your scratch work before you do a final write-up of your work. What you hand in should be neat and professional and all pages should be stapled together.

## Important Dates

September 29 – Last Day for Add/Drop

October 9 – first mid-term exam scheduled

November 6 – second mid-term exam scheduled; uncontested withdrawal deadline

November 11 – Veteran's Day, no classes

November 25-27 – Thanksgiving Holiday, no classes

December 4 – last day of classes

December 10 - final exam at 8 am in our usual classroom

## Students with Disabilities

I am happy to work with students with disabilities. To set up academic adjustments in this class, you should give me a copy of your *Confirmation of Eligibility for Academic Adjustments* from the Disability Support Services Office and come see me in office hours or make an appointment to come see me as soon as possible so we can discuss how the approved adjustments will be implemented in this class. Students without this form should contact the Disability Support Services Office, Bouillon 140 or [dssrecept@cwu.edu](mailto:dssrecept@cwu.edu) or (509) 963-2171.

**Math 273 Tentative Schedule / Reading:**

Changes to the schedule will be announced in class; exam schedule changes will also be put on Canvas.

W Sept 23	Introduction and Review
Th Sept 24	16.1, 16.2 Iterated, Double Integrals
F Sept 25	16.2 Double Integrals
M Sept 28	16.3 Triple Integrals
T Sept 29	16.4 Double Integrals in Polar Coordinates
W Sept 30	16.5 Integrals in Cylindrical and Spherical Coordinates
Th Oct 1	(Lab)
F Oct 2	Quiz, Review, Catch up
M Oct 5	16.6 Applications to Probability
T Oct 6	Handout: Applications to Center of Mass and Moment of Inertia
W Oct 7	Handout: Applications to center of Mass and Moment of Inertia
Th Oct 8	(Lab) / Review
F Oct 9	Exam 1
M Oct 12	17.1 Parametrized Curves
T Oct 13	Return Exam 1, start 17.2 Motion, Velocity and Acceleration
W Oct 14	17.2 Motion, Velocity and Acceleration
Th Oct 15	(Lab)
F Oct 16	Quiz, Review, Catch up
M Oct 19	17.3 Vector Fields
T Oct 20	17.4 The Flow of a Vector Field
W Oct 21	18.1 The Idea of a Line Integral
Th Oct 22	(Lab)
F Oct 23	Quiz, Review, Catch up
M Oct 26	18.2 Computing Line Integrals Over Parameterized Curves
T Oct 27	18.3 Gradient Fields and Path Independent Fields
W Oct 28	18.3 Gradient Fields and Path Independent Fields
Th Oct 29	(Lab)
F Oct 30	Quiz, Review, Catch up and Halloween Celebration
M Nov 2	18.4 Path Dependent Vector Fields and Green's Theorem
T Nov 3	19.1 Flux Integrals and Divergence
W Nov 4	Catch Up
Th Nov 5	(Lab)/Review
F Nov 6	Exam 2
M Nov 9	19.2 Flux Integrals for Graphs, Cylinders, and Spheres
T Nov 10	Return Exam 2, start 19.3 The Divergence of a Vector Field
W Nov 11	Veterans Day Holiday
Th Nov 12	19.3 The Divergence of a Vector Field
F Nov 13	Quiz, Review, Catch up
M Nov 16	19.4 The Divergence Theorem
T Nov 17	19.4 The Divergence Theorem
W Nov 18	20.1 The Curl of a Vector Field
Th Nov 19	(Lab)
F Nov 20	Quiz, Review, Catch up
M Nov 23	20.2 Stokes Theorem
T Nov 24	20.2 Stokes Theorem
W Nov 25	Self Study Day
Th Nov 26	Thanksgiving Holiday
F Nov 27	Thanksgiving Holiday
M Nov 30	20.3 The Three Fundamental Theorems
T Nov 30	20.3 The Three Fundamental Theorems
W Dec 2	Catch up
Th Dec 3	Quiz, Review
F Dec 4	Review
Th Dec 10	Final Exam