<div align="center">**Welcome to Math 273 Multivariable Calculus 2 – Spring 2016**</div>

8:00 - 8:50 M-F in Bouillon 110, frequent Thursdays in Bouillon 103

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   (HW) http://webwork.math.cwu.edu   and by appointment.
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Required Text: *Calculus*, by McCallum, Hughes-Hallett, et al, **6th** 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 gobbeldygook 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.

On many Thursdays we will be using the computer lab in Bouillon 103. I will announce these lab days ahead of time.

Grades/Exams/Homework

Grades
We will be using Standards Based Grading this quarter in Discrete Math, which means that the course is broken down into standards, or key learning areas, and student's must demonstrate their competency on the standards to get a C, B or A for the course. Students may retest on the standards if their first attempt was not successful.

I have a list of 21 standards on Canvas for this course, with 9 identified as required areas. Standards will be graded with an A (4, excellent) or B (3, very good) or Not Yet (NY, 0) passed. Attendance and homework are both standards for the class.

To get a C in the course, a student must pass 13 standards, including all 9 required standards.

To get a B in the course, a student must pass 15 standards, including all 9 required standards, with at least 11 evaluated as an A.

To get an A in the course, a student must pass 16 standards, including all 9 required standards, with at least 13 evaluated as an A.

Other grades will be assigned based on this standard as logically as possible.

Standards Based Grading and Standards Testing
There will be three class days during the quarter that are devoted to testing, and testing will be offered on occasion in class as we finish up a unit. On challenging material, students should expect to test during office hours or by appointment. In order to take a test or re-test during office hours, students must email me or let me know on Canvas a day ahead of time so I can have the evaluation prepared for them. I may also, at my discretion, ask students to show practice or understanding and mastery of homework problems on that material. The **last** opportunities to test are Wednesday of the last week of the quarter and, after that, during the final exam period for our class.

- Email me a day ahead of time with the name of the evaluation you want to take to test or retest on during office hours or by appointment.
- In order to take a test or retest, you must have been to class that day or provide evidence of an excused absence.
- At my discretion, I may ask you to explain a homework problem or show evidence that you have been practicing problems based on the standard retested in order to retest outside of class.
- If you are not successful in a retest on a standard, I recommend you take time to meet with me to go over the questions you missed so that you are better prepared to retest. **I recommend you retest as soon as possible, and continue retesting until you are successful.**

Attendance

Regular attendance, as is required for any job or area of endeavor. A student is tardy if they arrive after the beginning of class (8 am) but before 8:06 am. Students with exemplary attendance and punctuality records (less than 2 absences and 2 lates) will earn credit for an additional passed evaluation at the end of the quarter. Students who are absent more than 10 days over the course of the quarter will be required to fulfill an additional evaluation to achieve a given grade.

Excused absences will be handled on a case-by-case basis. If you must be out of class for a field trip, court date, work event or other planned event, contact me and provide documentation ahead of time. If you are absence due to illness or emergency, contact me and provide documentation within 2 working days of the absence.

Students are responsible for all material presented in class. If you miss a day, get notes from a classmate.

Homework

Completing required practice carefully and thoroughly is also a standard for the course. Most of the homework we do will be on WebWork, which is the online homework system for the Math Department at CWU. Understanding and being able to neatly, concisely and correctly deriver solutions to the WebWork problems are required for success in this course.

When written homework is assigned, it is expected that your work will be neat, complete, correct and well-explained **by the day the homework is due.** Assignments will be graded accordingly. Students acquiring more than 75% of the offered homework points will be credited with an successful evaluation at the end of the quarter, and with more than 85% of the points will have this evaluated as an A.

Testing Days

Attendance at the Testing Days is **mandatory**, as it would be for an exam in a regular class. If you have an emergency or illness for one of these days, bring it documentation. Students who miss an in-class testing day will not be permitted to take or retake evaluations in office hours without an excused absence for that testing day until after the next testing day.

On testing days the first evaluations given to a student will be the oldest required evaluations. Once those are complete, students may use the remaining time to test and pass other evaluations.

Students will be given an opportunity in class and by email to let me know what optional evaluations they would like to take during the testing days.

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 undestanding 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 – CWU expects you to spend 10 hours per week on 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

March 29 – Classes Begin
April 1 – Self-study day
April 4 – change of schedule period ends
April 15 – Testing Day 1
May 13 – uncontested withdrawal period deadline
May 18-19 – Source Days
May 6 – (tentative) Testing Day 2
May 27 – (tentative) Testing Day 3
May 30 – Memorial Day (no classes)
June 1 – last day to test during office hours
June 3 – last day of class
June 6 – Final Exam (last opportunity to test) 8 am

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 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.

T March 29	Introduction and Review
W March 30	16.1, 16.2 Iterated, Double Integrals
Th March 31	16.2 Double Integrals
F April 1	(No Fool) Self-study day, 16.3
M Apr 4	16.3 Triple Integrals
T Apr 5	16.3 Triple Integrals
W Apr 6	16.4 Double Integrals in Polar Coordinates
Th Apr 7	(Lab)
F Apr 8	16.4, 16.5
M Apr 11	16.5 Triple Integrals in Cylindrical and Spherical Coordinates
T Apr 12	16.5 Triple Integrals in Cylindrical and Spherical Coordinates
W Apr 13	16.6 Applications to probability
Th Apr 14	(Lab) / Review
F Apr 15	Testing Day 1 (tentative)
M Apr 18	Handout: Applications to Center of Mass/Moment of Inertia
T Apr 19	Handout: Applications to Center of Mass/Moment of Inertia
W Apr 20	17.1 Parameterized Curves
Th Apr 21	(Lab)
F Apr 22	17.1 Parameterized Curves
M Apr 25	17.2 Motion, Velocity and Acceleration
T Apr 26	17.3 Vector Fields
W Apr 27	17.4 Flow of a Vector Field
Th Apr 28	(Lab)
F Apr 29	17.4
M May 2	18.1 Idea of a Line integral
T May 3	18.2 Computing Line integrals over Parameterized Curves
W May 4	18.3 Gradient Fields and Path Indepedent Fields
Th May 5	(Lab)
F May 6	Testing Day 2 (tentative)
M May 9	18.3 Gradient Fields and Path Indepedent Fields
T May 10	18.4 Path Dependent Vector Fields and Green's Theorem
W May 11	19.1 Flux Integrals and Divergence
Th May 12	(Lab)
F May 13	19.1/19.2
M May 16	19.2/21.1 Surface Parameterization/Flux Integrals
T May 17	19.2/21.1 Surface Parameterization/Flux Integrals
W May 18	19.3 The Divergence of a Vector Field
Th May 19	(Lab)
F May 20	19.3
M May 23	19.3 The Divergence of a Vector Field
T May 24	19.4 The Divergence Theorem
W May 25	20.1 The Curl of a Vector Field
Th May 26	(Lab)
F May 27	Testing Day 3 (tentative)
M May 30	Memorial Day (no classes)
T May 31	20.2 Stokes' Theorem
W June 1	20.2 Stokes' Theorem (last day to test in office hours)
Th June 2	(Lab)
F June 3	20.3 The Three Fundamental Theorems
M June 6	Final Exam (last day to test)