Course Description

An introduction to multi-variable calculus. Topics for the course include: vector-valued functions, partial derivatives, directional derivatives, multiple integration, vector analysis, line and surface integrals, Green's theorem and Stoke's theorem.

1. Work with two and three-dimensional vectors algebraically and geometrically: magnitudes, directions, dot products, vector products.

2. Graph, analyze, and perform calculus operations on two and three-dimensional parametric functions of a single variable.

3. Graph, analyze, and perform calculus operations on two and three-dimensional vector-valued functions of a single variable. Understand the connections between vectors representing position, velocity, and acceleration.

4. Analyze completely, and be able read, generate, and interpret graphs for functions of two or more variables: surface plots, contour plots, evaluate partial derivatives, find extremums, evaluate directional derivatives, and gradients.

5. Setup and evaluate multiple integrals over generalized domains of integration described in rectangular, polar coordinates, cylindrical, and spherical coordinates.

6. Setup, evaluate, and interpret line integrals and surface integrals.

7. Green's Theorem, the Divergence Theorem, and Stoke's Theorem.

Materials

Textbook: The textbook for the course is Calculus (Early Transcendentals), 1st edition, by Jon Rogawski, W.H. Freeman. The textbook is available in the WWCC Bookstore for approximately $120 and is used for all four calculus courses Math 151, Math 152, Math 153, and Math 254. An electronic version of the text is available – ask for additional details.

Engineering Computation Paper: All handwritten work that is turned in for credit must be written on Engineering Computation Paper. The WWCC Bookstore, Whitman Bookstore, and Walla Walla University (College) Bookstore stock this paper.

Graphing Calculator: A graphing calculator is recommended. It is assumed that all calculus students know how to use their graphing calculator. If this is not the case,
then be sure to contact the instructor to arrange for a quick tutorial. Use of a
calculator will not be discussed in class, however, use of a computer algebra system
(Mathematica 7) is required and expected.

Mathematica 7: We will be working with Mathematica 7 throughout the four
course calculus series, linear algebra (Math 220), and differential equations (Math 238).
Mathematica 7 is accessible currently on computers in Room 207 and in the Math Lab.
A home license of Mathematica 7 is provided to for all students – more details given in
class. All course related materials such as lecture notes, interactive mathematical
explorations, handouts, assignments, exam reviews, exams, exam solutions, and the
like are Mathematica 7 notebooks.

Email Address: All course related emails will be sent to your WWCC Student Email
address. Information about how to activate and use your WWCC Student Email Account
can be found by going to WWCC's homepage and selecting Webmail in the Quick Links
drop down list. As long as students and the instructor use their college email
addresses course communication we can be reasonably assured that each others
emails will not by blocked by a spam filter or moved in a junk mail folder.

Attendance

Attendance at every class session is expected. I understand absences are sometimes
unavoidable and will work with students when such occasions arise. In the event of an
absence occurring on the date of a scheduled exam, prior arrangements must be
made in order to schedule another time to write the exam.

Cell Phones, PDA's, and Computer use during class

Our classroom is a no cell phone environment. No kidding! Cell phones are to be
silenced before class begins and put away. If I see a cell phone out, I just might
walk over and provide free transportion for your phone to the desk at the front of
the classroom where you can pick it up on your way out at the end of class. Using
a cell phone as a calculator is not acceptable – you should have a scientific calculator
for use in the course. Develop the habit of silencing your phone when entering the
classroom – I'm confident that everyone can manage to go 50 minutes without
touching their cell phone! If you are unable to discipline yourself enough to keep your
hands off your phone during our time together, then I am willing to help by taking
your phone away from you during class and returning it at the end of class – although
my preference is that you muster up enough self-discipline to manage it yourself!

Our classroom is equipped with computers that will be used during class sessions for
material related to calculus. Unless directed to use a computer during class, the machines should not be used. This means that web surfing, checking your email, using social networking sites (MySpace, Facebook, etc.), etc. is off limits during class time.

**Textbook Reading**

*Each assigned section of our textbook should be read completely.* Rather than using the textbook as a simple collection of exercise sets you should try reading, highlighting, and studying the material between exercise sets! This use of a mathematics text is perhaps a novel idea for many students, but with the new terminology and ideas being presented in calculus I would highly recommend heavy usage of the text.

**Homeworks, projects, and exams**

There will be three one-hour exams and a comprehensive final exam. Each of the exams will be comprised of an in-class portion done on paper using your brain, pencil, and graphing calculator and a take-home portion that will require the use of Mathematica. As should be expected there will be additional homework problems assigned with some being turned in for credit/grading as well as other assigned projects that will often require the use of Mathematica.

**Grades**

Course grades are simply a function of the percentage of possible points earned on all homeworks, projects, and exams.

\[
\text{CoursePercentage} = \frac{\text{SumOfPointsEarned}}{\text{TotalOfPointsPossible}}
\]

You can easily monitor your current grade status using a piece of paper on which you keep a running tally of your point total and point possible, an Excel spreadsheet, or even a Mathematica notebook. Let \( p \) be the percent of the possible course points earned by a student, the course grade is then given in the following table:

\[
\begin{align*}
93\% & \leq p \leq 100\% \rightarrow A \\
90\% & \leq p < 93\% \rightarrow A- \\
87\% & \leq p < 90\% \rightarrow B+ \\
83\% & \leq p < 87\% \rightarrow B \\
80\% & \leq p < 83\% \rightarrow B- \\
77\% & \leq p < 80\% \rightarrow C+ \\
70\% & \leq p < 77\% \rightarrow C
\end{align*}
\]
67% <= p < 70% -> D+
60% <= p < 67% -> D
0% <= p < 60% -> F