# MATH280 MULTIVARIABLE CALCULUS DEPARTMENT OF MATHEMATICS MONTGOMERY COLLEGE

# **COURSE INFORMATION**

**COURSE DESCRIPTION:** Calculus of vector functions; analytic geometry of space; partial differentiation; multiple integrals; classical theorems of Green, Gauss, and Stokes.

**PREREQUISITE:** A grade of C or better in MA 182 or equivalent, or consent of department. For computation of tuition, this course is equivalent to five semester hours. Five hours each week. 4 semester hours.

**TEXTBOOK:** J. Stewart, Multivariable Calculus: Concepts & Contexts, Fourth Edition, Brooks/Cole, 2005. Print or e-Book is acceptable.

**WebAssign** is required for this course. **WebAssign access** based on the above textbook can be purchased on the website:

http://www.webassign.net/manual/student guide/t s purchasing access ebooks online.htm or in the bookstore

**COURSE OUTCOMES:** Please go to the website below to find course outcomes for MATH280. <u>http://www.montgomerycollege.edu/Departments/math/outcomes.htm</u>

**CALCULATORS:** Students may use any graphing calculator, including the TI-89 in this course.

HOMEWORK: Homework will be assigned through WebAssign, an online homework system.

It is absolutely essential that you work hard and do your homework on a regular basis in order to be successful in this course! Assistance on the homework may be obtained from me during my office hours, or from student and faculty tutors in the Math/Science Center.

TUTORING CENTER: The center is located in Science Center West (SW) Room 100. Hours: Monday through Thursday Friday Saturday

**ATTENDANCE/CLASSROOM COURTESY:** You are expected to attend all classes and to arrive on time. Arriving late is disruptive to the class and is detrimental to your success. If you do miss a class, please find out what happened in class that day as you are responsible for what you missed. You are allowed a maximum of **four** absences during the semester. If your absences exceed this maximum, you may be dropped from the class or receive a failing grade.

Every student is expected to behave in ways that promote a teaching and learning atmosphere. Respect for others, both students and the instructor, is crucial to the success of all, and anything else will not be tolerated. Please turn off beepers and cell phones, sharpen your pencils before class, and once in class, please do not get up to leave the room except in an emergency.

Attendance will be taken at the beginning of every class. If you arrive after attendance has been taken it is **your responsibility** to inform me after class. In addition, please don't disrupt class by gathering your things and walking out early.

<u>Quizzes</u>: Six 20-point In-class quizzes will be given for about 5-20 minutes at the beginning of class on the announced date. If you are late you will lose your time. You will get a zero for missed quiz grade. No makeup will be given. The **lowest quiz score will be dropped.** 

**Exams:** Three one-hour exams (100 points each) and the **final exam** (200 points). Again If you are late you will lose your time. You will get a zero for missed exam grade. No makeup will be given.

MAKEUP POLICY: No make-up exam/quiz will be given unless you have a legitimate excuse (supporting document required). No Make-up exam/quiz will be given after the exam/quiz has been graded and returned to the class.

**PROJECTS:** There will be MATLAB projects. Instructions on how to install MATLAB is posted on Blackboard.

**GRADING: If you have not missed any exams**, your lowest hour exam score may be replaced by **1/2** of your final exam score provided this benefits you. You will then be assigned a grade based on the **total 800 points** of your **WebAssign homework** (100 points), **five quizzes (**20 points each**), three hour exams (**100 points each**), MATLAB** (100 points) and the **final exam (**200 points**)** as follows:

A: 720 - 800 (90% - 100%) B: 640 - 719 (80% - 89%) C: 560 - 639 (70% - 79%) D: 480 - 559 (60% - 69%) F: Below 480 (0% - 59%)

NO ELECTRONIC DEVICES OTHER THAN YOUR CALCULATOR WILL BE ALLOWED DURING QUIZZES AND EXAMS. Students not meeting this requirement may receive a score equal to 0 on the corresponding exam

# **EXAMS-CHAPTERS DEPENDENCY:**

EXAM	CHAPTER
1	9
2	10
3	11
FINAL	9 -13

**MATERIALS:** Course materials including worksheets and other useful information will be posted on BLACKBOARD. <u>https://bb-montgomerycollege.blackboard.com/.</u> A useful link to instructional resources is <u>http://libguides.montgomerycollege.edu/Math280</u>

#### Important Student Information Link

In addition to course requirements and objectives that are in this syllabus, Montgomery College has information on its web site (see link below) to assist you in having a successful experience both inside and outside of the classroom. It is important that you read and understand this information. The **link below provides** information and other resources to areas that pertain to the following: student behavior (student code of conduct), student e-mail, the tobacco free policy, withdraw and refund dates, disability support services, veteran services, how to access information on delayed openings and closings, how to register for the Montgomery College Alert System, and finally, how closings and delays can impact your classes. If you have any questions please bring them to your professor. As rules and regulations change they will be updated and you will be able to access them through the link. If any student would like a written copy of these policies and procedures, the professor would be happy to provide them. By registering for this class and staying in this class, you are indicating that you acknowledge and accept these policies.

# http://cms.montgomerycollege.edu/mcsyllabus/

**Disability Support Services:** Any student who needs an accommodation due to a disability should make an appointment to see the course instructor during office hours. In order to receive accommodations, a letter from Disability Support Services (LOCATIONS: Germantown-SA 189; Rockville-CB 122; or Takoma Park/Silver Spring-ST 122) will be needed. Furthermore, any student who may need assistance in the event of an emergency evacuation must identify to the Disability Support Services Office. **Communication:** The Montgomery College e-mail account is the official means of communication. Check your email account routinely for course announcements, invoices, important admission/registration information, waitlist status etc.

Course Changes: The instructor reserves the right to amend this syllabus as appropriate throughout the semester. Students will be notified of any such changes.

# MATH 280 Course Outcomes:

- Perform basic vector operations and understand their geometric interpretations.
- Describe surfaces parametrically in three-dimensional space and find the equation of a plane.
- Become familiar with the use of polar, cylindrical, and spherical coordinates. This includes the description of objects in the plane or in space by means of these coordinate systems.
- Describe and recognize graphs of vector functions and space curves.
- Evaluate limits of functions of several variables.
- Compute the partial derivatives of functions of several variables.
- Find the gradient and the directional derivative of a function.
- Find equations of tangent planes.
- Use and apply the chain rule for derivatives of functions of several variables.
- Differentiate functions of several variables.
- Find and classify critical points for functions of several variables.
- Use the method of LaGrange Multipliers to optimize functions of several variables subject to one or more constraints.
- Find volumes of solids bounded by surfaces.
- Change the order of integration and compute double and triple integrals.
- Determine the surface area of the graph of a function of several variables.
- Use a change of variables and the Jacobian to evaluate double integrals over non-rectangular regions.
- Make some elementary analyses of certain vector fields.
- Use a variety of methods to evaluate line integrals.
- Use the Fundamental Theorem of Line Integrals and Green's theorem to compute line integrals.
- Compute the divergence and curl of a vector function.
- Use a variety of methods to evaluate surface integrals.
- Use the Divergence Theorem and Stokes' Theorem to compute surface integrals.
- Use MATLAB or a similar computer algebra system as a visualization tool and as a comprehensive programming language to solve problems in engineering, mathematics and sciences using Multivariable Calculus.

# Course Schedule (Based on 15 full weeks)

Week	Section / Topic
1	9.1 Three-Dimensional Coordinate Systems
	9.2 Vectors
	9.3 The Dot Product
2	9.4 The Cross Product
	9.5 Equations of Lines and Planes
	9.6 Functions and Surfaces
3	9.7 Cylindrical and Spherical Coordinates
	Exam 1
	10.1 Vector Functions and Space Curves
4	10.2 Derivatives and Integrals of Vector Functions
	10.3 Arc Length and Curvature
	10.4 Motion in Space: Velocity and Acceleration
5	10.5 Parametric Surfaces
	11.1 Functions of Several variables
	11.2 Limits and Continuity
6	11.3 Partial Derivatives
	Exam 2
	11.4 Tangent Planes and Linear Approximations
7	11.5 The Chain Rule
	11.6 Directional Derivatives and the Gradient Vector
	11.7 Maximum and Minimum Values
8	11.8 Lagrange Multipliers
	12.1 Double Integrals over Rectangles
	12.2 Iterated Integrals
9	12.3 Double Integrals over General Regions
	Exam 3
	12.4 Double Integrals in Polar Coordinates
10	12.5 Applications of Double Integrals
	12.6 Surface Area
	12.7 Triple Integrals
11	12.8 Triple Integrals in Cylindrical and Spherical Coordinates
	12.9 Change of Variables in Multiple Integrals
	13.1 Vector Fields
12	13.2 Line Integrals
	Exam 4
	13.3 The Fundamental Theorem for Line Integrals
13	13.4 Green's Theorem
	13.5 Curl and Divergence
	13.6 Surface Integrals
14	13.7 Stokes' Theorem
	13.8 The Divergence Theorem
	Review for Final Exam
15	Final Exam