# MONTGOMERY COLLEGE – ROCKVILLE Department of Mathematics Spring 2018

# Course: MATH 284 Linear Algebra CRN Number: XXXXX Instructor: Dr. Paul Duty

# **Course Information**

#### **Course Times and Office Hours**

This course meets on \_\_\_\_\_\_ from \_\_\_\_\_\_ in Science Center, Room SW 203. My office is in the Science Center, Room SC \_\_\_\_\_\_. My office phone number is (240) 567-5381. My e-mail address is paul.duty@montgomerycollege.edu. My office hours are:

- Monday, Wednesday
- Tuesday, Thursday

Other office hours are by appointment. When you see me for help, I expect to see your **written** work for the exercises giving you trouble. This way, I may see that you have first made a sincere effort to solve the exercises and learn the process, which is **crucial** for me to effectively help you.

#### **Course Description and Prerequisites**

This course will cover the basic concepts of linear algebra including vector spaces, systems of linear equations and matrices, determinants, linear transformations, similar matrices, eigenvalues, quadratic forms, and applications to the sciences.

PREREQUISITE: A grade of C or better in MATH 182 or equivalent, or consent of the math department. For computation of tuition, this course is equivalent to five semester hours.

#### **Required Textbook and Materials**

The required textbook is *Linear Algebra and Its Applications*, **5**<sup>th</sup> *Ed.* by D. Lay, S. Lay, and J. McDonald. You may purchase either the physical textbook **packaged** with a *MyMathLab* access code, or, alternatively, just the *MyMathLab* access code since *MyMathLab* comes with the e-book.

Please create your *MyMathLab* account **immediately** using the instructions accompanying this syllabus, and check your *MyMathLab* account **daily** to see due dates/times for online assignments.

You are required to have one of these Texas Instruments calculators: TI-83, TI-84, or TI-89. You will also have computer assignments that require MATLAB. MATLAB is **free** for you, and is installed in the labs in the Judy Ackerman STEM Learning Center in Science Center West, Room SW 109.

## **Grading Policy and Course Schedule**

Course grades are assigned as follows: 90% - 100% A; 80% - 89.99% B; 70% - 79.99% C; 60% - 69.99% D; 0% - 59.99% F. Four regular exams count 50% of your grade, *MyMathLab* online homework exercises count 15% of your grade, MATLAB assignments count 10% of your grade, and the final exam counts 25% of your grade. **No exam grades are dropped**.

The course **schedule** accompanies this syllabus. Please read this course schedule to see the topics we will cover, exam dates, the last day to withdraw, and other important information.

#### How to Succeed in this Course

The best approach to prepare for exams is to do **all** assigned homework exercises diligently and to study your notes. Please set aside a **significant** amount of time for learning the material in this course. If you do not make this commitment, your chance of success is greatly diminished.

Additionally, attendance and class participation are **critical** for success in this course. A significant portion of class time will be used for students to work on assignments based on newly covered material. This active learning approach gives students the opportunity to ask me questions when they are having difficulty, and, also importantly, to learn from one another.

Good attendance and class participation are important factors in my student recommendations.

#### Make-Up Policy for Missed Exams

Make-up exams are generally given only in the case of a **documented**, **verifiable** medical emergency that causes you to miss the exam. Granting make-up exams for other types of emergencies, such as family emergencies, are at my discretion and require supporting, verifiable documentation as well. If you miss an exam, I expect you to contact me immediately.

#### Pearson Technical Support

Occasionally, you may encounter a technical problem running *MyMathLab* on your personal computer due to a variety of reasons, such as your internet browser, for instance. If this occurs, please contact Pearson technical support **toll free** 24/7 at (844) 292-7015 for help

#### Tutoring Available in Judy Ackerman STEM Learning Center

Students have **free access** to tutoring, MATLAB, and other resources in the Judy Ackerman STEM Learning Center located in Science Center West, Room SW 109. Their phone number is (240) 567-5200. Their hours of operation are:

- ✤ Monday Thursday 8:00 AM 8:00 PM
- ✤ Friday 8:00 AM 4:00 PM
- ✤ Saturday 10:00 AM 3:00 PM

## **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 will be needed from Disability Support Services (LOCATIONS: Rockville - Counseling and Advising Building, Room CB 122; Germantown - Sciences and Applied Studies Building, Room SA 250; Takoma Park/Silver Spring - Student Services Pavilion, Room ST 233).

Any student who may need assistance in the event of an emergency evacuation must identify to the Disability Support Services Office. The guidelines for emergency evacuations may be found at the website: <u>http://cms.montgomerycollege.edu/EDU/Plain2.aspx?id=4162</u>.

## **Delayed Opening or Closing of the College**

On occasion, Montgomery College will announce a late opening or early closing of a specific campus or the entire college because of weather conditions or other emergencies.

- If a class can meet for 50% or more of its regularly scheduled meeting time OR if the class can meet for 50 minutes or more, it will meet.
- Montgomery College will always operate on its regular schedule unless otherwise announced. Depending on the nature of the incident, notifications of emergencies and changes to the College's operational status will be communicated through one or more communication methods including the College's web page: <u>http://montgomerycollege.edu</u>.

For the most up-to-date information regarding College openings, closings, or emergencies, all students, faculty, and staff are encouraged to sign up for e-mail and text alerts via Montgomery College ALERT. Registration information is available at: http://www.montgomerycollege.edu/emergency.

#### **E-mail Communication Statement**

Montgomery College e-mail is the official means of communication for Montgomery College. Students are responsible for information and announcements sent via MC e-mail. Please check your e-mail **daily**. Students are expected to use their MC e-mail account to e-mail instructors.

## Additional College Policies that Support this Course

In addition to course requirements that are in this syllabus, Montgomery College has information on its web site: <u>http://cms.montgomerycollege.edu/mcsyllabus/</u> 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. This link 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, and how to register for the Montgomery College Alert System. 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. By registering for this class and staying in this class, you are indicating that you acknowledge and accept these policies.

## **Course Outcomes**

Upon course completion, a student will be able to:

- 1. Determine whether solutions of a linear system Ax = b exist. If so, determine whether the solution is unique and find a basis for the solution space.
- 2. Explain what it means for a set of vectors to be a subspace of  $R^n$ . Verify that a given set does or does not satisfy the defining properties of a subspace.
- 3. Demonstrate an understanding of the concepts of linear independence, spanning, and basis. Determine whether a given set of vectors is linearly independent and/or spans a given subspace. Produce a basis for a given subspace of  $R^n$ .
- 4. Perform matrix calculations, applying the rules of matrix algebra.
- 5. Find the column space, row space, and null space of a matrix. Show an understanding of the relationship between the dimension of the null space, the rank, and the number of columns of the matrix.
- 6. Define what it means for a function to be a linear transformation from  $R^n$  to  $R^m$ . Describe the kernel and range of a given linear transformation.
- 7. Produce the eigenvalues and associated eigenspaces for a given matrix. Explain geometrically the result of multiplying an eigenvector by the matrix.
- 8. Apply the dot product and its properties to problems of orthogonality, the magnitude of vectors, and the distance between vectors. Produce orthogonal bases of subspaces of  $R^n$ .
- 9. Use the techniques and theory of linear algebra to model various real world problems. (Possible applications include: curve fitting, computer graphics, networks, discrete dynamical systems, systems of differential equations, and least squares solutions.)

- 10. Effectively communicate the concepts and applications of linear algebra using the language of linear algebra in a mathematically correct way.
- 11. Use advanced software tools (e.g., Maple, MATLAB, Mathematica) to solve problems in linear algebra.