MONTGOMERY COLLEGE – ROCKVILLE Department of Mathematics Spring 2019

Course: MATH 282 Differential Equations CRN Number: ______ Instructor: Dr. Paul Duty

Course Information

Course Times and Office Hours

This course meets on ______ from _____ in Science Center Building, Room SC 351. My office is in the Science Center, Room SC 254 F. My office phone number is (240) 567-5381. My e-mail address is paul.duty@montgomerycollege.edu. My office hours and office hour locations are:

- Monday, Wednesday
- Tuesday, Thursday
- Friday

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 covers first-order differential equations, higher-order linear differential equations, systems of linear first-order differential equations, solution of differential equations by power series and numerical methods, the Laplace transform, and applications to the sciences.

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

Required Textbook and Materials

The required textbook is *Differential Equations with Boundary-Value Problems*, 9th Ed. by Dennis G. Zill. You may purchase **either** the physical textbook packaged with a *WebAssign* access code or, alternatively, at a **discount**, a *WebAssign* access code that **includes** access to the e-book. To receive this discounted price, please see my instructions posted online in MyMC.

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

Note that if you did not pass MATH 282 last Fall 2018 but purchased the discounted *WebAssign* access above, you will **not** have to repurchase access. Simply follow the appropriate instructions accompanying this syllabus for free access. This **only** applies if you are retaking MATH 282.

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. Please see the attached instructions on how to install MATLAB for free on your personal computers.

Note that MATLAB is also installed in the computer labs in the Judy Ackerman STEM Learning Center in Science Center West Building, 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, *WebAssign* online exercises and quizzes count 15% of your grade, MATLAB assignments count 10% of our grade, and the final exam, which is cumulative, 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.

WebAssign Technical Support

Occasionally, you may encounter a technical problem running *WebAssign* on your personal computer for a variety of reasons, such as your internet browser, for instance. If this occurs and you are unable to resolve the problem, please contact *WebAssign* technical support for help, 24/7, at 1-800-354-9706 or by e-mail at http://webassign.com/support.

Free 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 Building, 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 Campus - Mannakee Building, Room MK 210; Germantown Campus - Sciences and Applied Studies Building, Room SA 250; Takoma Park/Silver Spring Campus - 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: http://cms.montgomerycollege.edu/EDU/Plain2.aspx?id=4162.

Support for Veterans and Service Members

The Combat to College program provides academic and social opportunities, resources, and services for veterans and active and reserve service members. This program features gathering spaces on each campus for veterans and service members, identified counselors for academic advising, benefits information and assistance, dedicated open gym hours, referral/coordination with external agencies and resources, and opportunities for financial assistance. To take advantage of these resources, visit one of the Combat to College offices (Locations: Rockville Campus – Student Services Building, Room SV 103; Germantown Campus – High Technology and Science Center, Room HS 248; Takoma Park/Silver Spring Campus -Resource Center, Room RC 210).

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.

1st Addendum to Syllabus: MATH 282 Course Schedule Spring 2019

This course schedule is *tentative* and changes or additions to material covered may be made at the instructor's discretion. You will be notified of any changes or additions to the schedule.

1/22	Т	Ch. 1	Definitions and Terminology
1/24*	Th	Ch. 1	Initial-Value Problems
1/29	Т	Ch. 1	Differential Equations as Mathematical Models
1/31	Th	Ch. 2	Solution Curves Without a Solution
2/5	Т	Ch.2	Separable Equations
2/7**	Th	EXAM 1	
2/12	Т	Ch. 2	Linear Equations
2/14	Th	Ch. 2	A Numerical Method
2/19	Т	Ch. 3	Linear Models
2/21	Th	Ch. 3	Nonlinear Models
2/26	Т	Ch. 3	Modeling with Systems of First-Order Differential Equations
2/28	Th	EXAM 2	
3/5	Т	Ch. 4	Preliminary Theory – Linear Equations
3/7	Th	Ch. 4	Homogeneous Linear Equations with Constant Coefficients
3/19	Т	Ch. 4	Undetermined Coefficients – Superposition Approach
3/21	Th	Ch. 4	n n
3/26	Т	Ch. 4	Nonlinear Differential Equations
3/28	Th	EXAM 3	
4/2	Т	Ch. 5	Linear Models: Initial-Value Problems
4/4	Th	Ch. 6	Review of Power Series
4/9	Т	Ch. 6	Solutions about Ordinary Points
4/11***	Th	Ch. 6	n n
4/16	Т	Ch. 7	Inverse Laplace Transforms and Transforms of Derivatives
4/18	Th	EXAM 4	
4/23	Т	Ch. 7	Operational Properties I of Laplace Transforms
4/25	Th	Ch. 8	Preliminary Theory – Linear Systems
4/30	Т	Ch. 8	Homogeneous Linear Systems
5/2	Th	Ch. 10	Linearization and Local Stability
5/7	Th	FINAL EXAM 5:00 PM –7:00 PM	

NOTES:

*Last day for a partial refund: 1/28/2019. **Last day to drop without a grade or to change from credit to audit or audit to credit: 2/11/2019. ***Last date to drop the class with a "W" on transcript: 4/15/2019.

2nd Addendum to Syllabus: MATH 282 Course Outcomes Spring 2019

Upon completion of this course/program a student will be able to:

- 1. Use qualitative and numerical methods to analyze the family of solutions to a first-order differential equation, particularly an autonomous equation.
- 2. Solve first-order separable and linear differential equations and corresponding initial-value problems.
- 3. Determine the domain of a solution and describe long-term behavior of a solution.
- 4. Know and be able to apply the theorem for existence and uniqueness of solutions to a firstorder differential equation.
- 5. Write and solve a first-order initial-value problem that models a practical situation involving a rate of change.
- 6. Rewrite a second-order differential equation as a system of first-order equations.
- 7. Use qualitative and numerical methods to describe and analyze the family of solutions to a first-order system.
- 8. Write a first-order system in matrix form, find the eigenvalues and write the general solution to the system.
- 9. Assume exponential solutions and solve a homogeneous or non-homogeneous linear second-order differential equation with constant coefficients
- 10. Understand and interpret the solutions to a second-order equation in terms of harmonic oscillator.
- 11. Use Laplace transforms to solve first- and second-order initial-value problems when the differential equation may be forced by a continuous or discontinuous function.
- 12. Use an advanced software tool (Maple, MATLAB, Mathematica, ODE software, and the like) appropriately and effectively to aid in understanding the behavior of solutions to differential equations.