Clemson University
Department of Mathematical Sciences

MATH 2080-241 Differential Equations
Summer Session II 2015

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Course Description: MATH 2080 is an introduction to the theory and practice of ordinary differential equations (ODEs). These are equations involving functions and their derivative(s), and they arise all over applied mathematics, engineering, and science, especially in modeling. For many students, especially engineering majors, MATH 2080 is arguably the most important math class they will take at Clemson. We will cover most of Chapters 1–5, 8.1, 9–11 in the third edition of Brannan and Boyce's textbook. This covers standard topics such as: solving and modeling with 1st and 2nd order ODEs; systems of two first order ODEs; Laplace transforms; Euler's method of approximation; power series solutions; Fourier series; boundary value problems; elementary partial differential equations (PDEs).

Prerequisite: MATH 2060 (Calculus III).

Office Hours & Communication Strategy:

"Office hour meetings" can happen through Adobe Connect.

I plan to be available for a one-hour slot most weekdays, though I will be traveling at times, so I will keep you posted as to when I will login, at least 24 hours in advance.

Please send an e-mail for an appointment time outside of those times. These meetings could be individual or group. To log on to a meeting, go to `https://connect.clemson.edu/macauley/`

Email is the best way to reach me. I have not set up voicemail on my phone (as a way to encourage you to use email instead!), and I will be traveling to a few conferences during the class. I strongly recommend that you put Math 2080 in the subject line of any email – I will set up a Gmail filter for this.

Students are responsible for checking their Clemson e-mail regularly.

Useful websites:

Course webpage: `http://www.math.clemson.edu/~macaule/` (all relevant links posted here)

Blackboard: `https://bb.clemson.edu/` (exams will be taken through Blackboard)

Online homework: `http://edugen.wileyplus.com/edugen/class/cls448257/`

Text: *Differential Equations: An Introduction to Modern Methods and Applications*, by Brannan & Boyce. (Wiley.) Either the 2nd or 3rd edition is fine, as long as you have a WileyPlus account.

Required technology:

An Internet Browser that contains the Adobe Flash Player and Adobe PDF Reader is required.

Access to Blackboard at `https://bb.clemson.edu` is required. This online course will be partially conducted through Blackboard.

An individual WileyPlus account is required for taking online homework.

Adobe Connect - recommended for 'office hour meetings'.

Hardware – headset microphone - recommended, not required for meeting through Abode Connect.

Hardware – a computer with a webcam is required to take exams using the Remote Proctor NOW software.

Calculators/Other Technology: A calculator is not required for this course. Calculators can be used to assist with homework. However, the use of calculators or any other form of technology on exams will not be permitted.

Schedule: This course is being offered in an entirely ONLINE asynchronous format through Blackboard. The course calendar can be found on the course website.

Lectures: There will be 48 lectures, ranging in length from 20 to 60 minutes, that will be available on YouTube. Students will be required to watch approximately 2 lectures each day. The lecture schedule is listed on the course calendar.

Worksheets: Each lecture has an accompanying *Essential Skills Worksheet.* These were custom-written by the professor specifically with the goal of trying to convey to the students what the key skills and ideas are that they should aquire from the lecture. These will not be collected, but it is STRONGLY recommended that the students attempt these within 24 hours of watching the lecture, and preferably directly following the lecture.

Homework: WileyPlus is *required* for online homework. Students register for it at `http://edugen.` `wileyplus.com/edugen/class/cls448257/`. Students who obtain texts from sources that do not include a WileyPlus access code can purchase one separately online. Those students who registered in WileyPlus for previous sections of Math 2080 will not have to purchase a new access code. Late assignments will NOT be accepted.

Course Format: This course is being offered in one summer semester so EVERYTHING GOES QUICKLY.

You should expect to spend at least 4 hours per day on this course:

Listening to (usually) two online lectures.

Working written problems from the Worksheets.

Working online homework problems.

You will prepare for two video-proctored tests and a cumulative Final Exam.

Because this is an online course, our chief means of communication is through Blackboard and e-mail. It is important that you check your Clemson e-mail on a regular basis - at least once a day.

Attendance: Because this is an asynchronous online course, a zero on an online homework assignment or a written homework assignment that is not turned in will be counted as 1/2 of a missed class. Any student who accumulates 8 'missed classes' before July 17th (the last day to drop the course without a final grade) is subject to being dropped from the course.

Exams: There will be 2 exams (closed book and notes) during the semester and a cumulative final exam: Midterm 1 on Wed. July 8, Midterm 2 on Wed. July 22, and the Final Exam on Fri. July 31. These will be taken on your computer Remote Proctor NOW: which is a program that "locks down" your computer browser and videotapes you taking the exam. Each video is individually and personally reviewed by 3 staff members at the Remote Proctor NOW company, and the professor is alerted to any irregularities or suspicious activity. There is a nominal fee (approx. $12) per exam for this

service that you will be responsible for paying to Remote Proctor NOW. You must begin your exam by 11:59pm of the scheduled day. Calculators or compute software (e.g., WolframAlpha) will not be allowed on any exam. The Remote Proctor NOW will "lock down" your computer so that you cannot use your browser or other programs during the exam.

Exams will be a combination of multiple choice and short answer. I may break a longer problem into smaller steps, and have you give an answer at each step so you can "show your work" and so I can give you partial credit when appropriate.

Grading: Your final grade will be computed as follows:

Online HW	25%
Midterm 1	25%
Midterm 2	25%
Cumulative Final Exam	50%

I will drop either your lowest midterm grade, OR half of the weight of the final exam; whichever is lowest. Also, if you get at least an A or B on the final exam, then you get at least that grade in the course, *assuming you have a passing grade on the online homework.*

The letter grade will be assigned as follows:

A	90-100
B	80-89
C	70-79
D	60-69
F	59 and below

Make-Up Policy: In general, no make-up exams will be given. I will drop your lowest midterm, which means that if you miss a midterm, then your final exam grade will replace it. The homework deadlines will not be extended for individual students, and assigned homework must be turned in by the deadline. PLAN AHEAD: If you submit assignments minutes before the deadline, you take the risk of bad luck, e.g., a power outage, computer freeze or crash, personal emergency, zombie attack, etc., that could make you miss the deadline.

Course Objectives: The course objectives are to develop an understanding of the concepts of differential equations and their applications to practical problems from mathematics, science, and engineering.

Portfolios This course contributes to general education requirements in the Mathematical, Scientific, and Technological Literacy competency. Any exams or activities, particularly the more challenging or complex ones, could be placed in a portfolio as evidence for *Objective 1: Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods using multiple representations.* Any learning activities where computer software or a graphing calculator was used to advance learning and understanding of mathematical concepts could be placed in a portfolio for *Objective 4: Apply information technologies to intellectual and professional development*

Student Learning Outcomes: Upon successful completion of MATH 2080, students will be able to

Explicitly solve a variety of 1st and 2nd order ordinary differential equations (ODEs).

Understand how ODEs arise in modeling in biology, physics, chemistry, engineering, and finance.

Understand the connections between solutions to ODEs and direction fields.

Have a basic understanding of linear algebra and its role in the study of ODEs, and how to solve systems of linear ODEs.

Take a Laplace transform and use this to solve certain ODEs.

Derive the Fourier series of a periodic function.

Be able to solve partial differential equations (PDEs), and recognize the differences between the heat, wave, and Laplace equations, as well as different boundary conditions.

Explain in simple terms, e.g. to grandparents or to younger siblings, how differential equations are relevant to several familiar settings in your major.

Be *well-prepared* and *confident* to succeed in your upper-division math, science, and engineering couses.

... and much more!

Key Dates

June 24 (Wed)	Classes begin; late enrollment fee applies
June 25 (Thu)	Last day to register or add a class
June 29 (Mon)	Last day to drop a class or withdrawfrom the University without a W grade
July 6 (Mon)	Holiday
July 8 (Wed)	Midterm 1
July 22 (Wed)	Midterm 2
July 17 (Fri)	Last day to drop a class or withdraw from the University without final grades
July 29 (Wed)	Last day of class
July 30 (Thu)	Study Day
July 31 (Fri)	Final Exam
August 4 (Tue)	Grades Due
August 8 (Fri)	Graduation

Academic Integrity: "As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning'. Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form."

Special Accommodations: Students with disabilities who need accommodations should make an appointment with Dr. Arlene Stewart, Director of Disability Services, to discuss specific needs within the first week of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Student Disability Services is located in Suite 239 Academic Success Building (656-6848; sds-l@clemson.edu). Please be aware that accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.

Copyright Statement: Some of the materials in this course are possibly copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Refer to the Use of Copyrighted Materials and "Fair Use Guidelines" policy on the Clemson University website for additional information: http://clemson.libguides.com/copyright

Statement Included for Certification Purposes: In this online course, you will interact with the content, instructor and classmates on at least a weekly basis through course assignments, asynchronous discussions and/or synchronous sessions as indicated in this syllabus.