MATH 2610
Section 1
Spring 2022

Instructor: Mitchell Faulk
Email: mitchell.m.faulk@vanderbilt.edu
Time: MWF 9:05am–9:55am
Place: Stevenson 1214
Office Hours: M 10am–11am, T 9am–11am (in SC 1408)
Webpages: Brightspace

Contents

1 Goals

This is a course in differential equations, with particular focus on first- and second-order equations, existence and uniqueness results, matrix methods, and stability.

General goals include

1. To understand fundamental concepts and techniques involved in the study of ordinary differential equations.

2. To deliberate, generate, understand, explain, and refine solutions to unfamiliar problems.

3. To write and discuss mathematics in an appropriate, logical, organized, complete, and comprehensive style.

4. To practice deriving theoretical results through elementary techniques and through analogy with known methods.

2 Policies

2.1 Safety

Health and safety protocols can be found on Vanderbilt's website.

2.2 Textbook

The textbook for this course is *Fundamentals of Differential Equations and Boundary Value Problems (7th Edition)* by Nagle, Saff, Snider.

The corresponding material in the textbook is Chapters 1, 2, 4, 6, 9, 12, and 13.

2.3 Office Hours

Office hours, which will be held in SC 1408, are scheduled for Monday at 10am–11am

and Tuesday at 9am–11am. Additional office hours may precede exams.

2.4 Assignments

There will be 10 written assignments, due by the end of class on those days indicated in the attached schedule.

Assignments will be graded out of 20 points for both accuracy *and* completeness in the following manner.

- 18 points (90%) for accuracy: After assignments are submitted, a subset of 6 problems will be selected by the grader, each to be worth 3 points. The grader has requested that each final answer be circled or highlighted. In addition, the failure to justify a final answer, even if correct, with accompanying work or computations could result in unearned points.
- 2 points (10%) for completeness: Work for the remaining problems will be in-

spected, and 1 point will be deducted for each problem without a reasonable attempt (spanning at least more than a single line) at a solution, for a maximum of up to 2 deducted points.

Resources that seem reasonably appropriate to consult, including other people, are permitted for use and consultation during the completion of assignments. In particular, collaboration is allowed (and encouraged). However, what is ultimately submitted should be one's own work written in one's own words (by one's own hand), and help, or the consultation of outside resources, must be cited properly, according to the principles set forth in the Undergraduate Honor Code.

2.5 Exams

There will be three midterm exams and one final exam.

Each exam may consist of a timed assessment or a take-home assessment, or both.

Soliciting or obtaining help from or through another person under any circumstances is *not* permitted during the completion of any aspect of an exam.

In the case of a timed portion, it will be completed during class time. Any outside resources, such as calculators, books, notes, materials on the internet, or other people, are **not** permitted during this portion of an exam.

In the case of a take-home portion, it will be completed over a period of several weeks. This portion of an exam is fully open-book, meaning that any existing resource, such as calculators or materials found on the internet, may be consulted, as long as the use of that resource does not involve soliciting or obtaining help from or through another person at any time in any manner whatsoever. Any outside resources that are used, however, must be cited properly.

More details about exam policies will be dis-

tributed prior to each exam.

2.6 Extra credit challenges

Near the occurrence of each exam, a "challenge" problem set may be made available. The problem set, which is optional, will be worth up to an additional 5 percentage points (about the difference between a plus/minus in a letter grade) counted toward the corresponding exam.

Collaboration on these problem sets is allowed. In such an instance, collaborators should craft a single submission, containing the names of all collaborators, and all members of the group will receive the same score.

2.7 Late Work

In order for late work to be considered for credit, a written request for extension must have been submitted to me at least 24 hours prior to the due date. Approval of such a request is not guaranteed and may include provisions for penalties. Please plan accordingly.

2.8 Honor Code

Any work submitted in this course is understood as "pledged" according to the principles of the Undergraduate Honor Code applied to the policies indicated in this syllabus or in any additional announcements preceding assessments. Any questions about how the honor code applies to these policies should be directed to the instructor. Suspected violations will be reported.

2.9 Registration

The last day for students to add a math course in YES is Monday, January 24th. After this date students will not be permitted to add a math course or change sections of a math course. Between January 25th and January 30th, students may change the level of a course (e.g. switching from Math 1301 to Math 1300 or vice versa) by contacting the DUS (John Rafter) or the Assistant DUS (Jakayla Robbins).

2.10 Students with disabilities

In order to receive any disability-related accommodations, students must be registered with Student Access Services. Students who have, or think they may have, a disability are encouraged to contact SAS for more information regarding policies and services available.

2.11 Grading

A cumulative score will be determined according to the following weights.

Assignments: 15%
Midterms: 55%
Final: 30%

3 Schedule

Date	Matl.	Due
1/19	1.1	
1/21	1.2	
1/24	1.3	
1/26	1.4	HW1
1/28	2.2	
1/31	2.3	
2/2	2.4	HW2
2/4	2.5	
2/7	2.6	
2/9	4.2	
2/11	EXAM	EXAM
2/14	4.3	
2/16	4.4	HW3
2/18	4.5	

Date	Matl.	Due
2/21	4.6	
2/23	4.7	HW4
2/25	4.8	
2/28	6.1	
3/2	6.2	HW5
3/4	6.3	
3/14	6.4	
3/16	9.3	
3/18	EXAM	EXAM
3/21	9.3	
3/23	9.4	HW6
3/25	9.4	
3/28	9.5	
3/30	9.6	HW7
4/1	9.7	

Date	Matl.	Due
4/4	9.8	
4/6	12.1	HW8
4/8	12.2	
4/11	12.2	
4/13	12.3	
4/15	EXAM	EXAM
4/18	12.4	
4/20	12.5	HW9
4/22	13.1	
4/25	13.1	
4/27	13.2	HW10
4/29	13.2	

4 Advice

Exams will be constructed to assess understanding of the course material in many ways, some of which may be reflected directly in the homework assignments, but some of which may not. As a result, additional practice and revision beyond the required homework is recommended. The textbook is outfitted with many examples and exercises to that end, and I will be available at office hours and through email.

Particular emphasis, especially in later chapters, will be placed upon the theory and conceptual understanding of the material. Assessments will often ask that you derive results in situations that are parallel or analogous to, but that may extend beyond, those of the textbook. To be able to complete such analogies then, it is therefore recommended to first cement one's understanding of the situations of the textbook (and lecture!) through adequate study and practice. Certain portions of the lec-

ture notes, especially those dealing with theoretical aspects, have been designed to *augment* or *clarify* the presentation of the textbook, and so active participation in lecture is strongly advised, especially during the final weeks.

Written solutions to exams will *not* be provided, but I often cover portions of each exam in the lecture that follows. In addition, I'm happy to discuss any aspect of an exam with you outside of lecture.

Finally, this is a course in differential equations, but the methods are primarily rooted in linear algebra. A main goal of this course is to explore how far those methods can take us in the realm of differential equations.