

# MA 341 Applied Differential Equations I Syllabus

## *CONTENTS*

<b>1 Instructor information</b>	<b>1</b>
<b>2 Course Description</b>	<b>1</b>
<b>3 Communications and Resources</b>	<b>1</b>
<b>4 Instructional Components</b>	<b>2</b>
<b>5 Coursework</b>	<b>2</b>
5.1 Exams . . . . .	2
<b>6 Grading</b>	<b>3</b>
<b>7 Course Policies</b>	<b>4</b>
<b>8 Schedule</b>	<b>5</b>

## *INSTRUCTOR INFORMATION*

**Name:** David White  
**Email:** dgwhite2@ncsu.edu  
**Office:** Language and Computer Labs (LAU) 108 ([map](#))  
**Office hours:** Mon. 12-1 PM and Tue. 10-11 AM in the course Zoom room;  
 also by appointment via Zoom or in person.

## *COURSE DESCRIPTION*

(3 credit hours)

Prerequisite: MA 242 or (MA 132 and MA 231)

Differential equations and systems of differential equations. Methods for solving ordinary differential equations including Laplace transforms, phase plane analysis, and numerical methods. Matrix techniques for systems of linear ordinary differential equations.

Credit is not allowed for both MA 301 and MA 341.

## *COMMUNICATIONS AND RESOURCES*

All course resources can be found through the Wolfware portal (<https://wolfware.ncsu.edu>). There students will find links to the following:

May 17, 2022

- Moodle: The course Moodle page will contain a link to the course Zoom room; links to lectures and homework, grouped according to the schedule; as well as supplementary materials, such as PDF copies of lecture notes, practice problems, etc.
- WeBWork ([https://webwork.wolfware.ncsu.edu/webwork2/MA\\_341\\_651\\_SUM1\\_10W\\_2022/](https://webwork.wolfware.ncsu.edu/webwork2/MA_341_651_SUM1_10W_2022/)): hosts the homework.
- Panopto (<https://ncsu.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx#folderID=%223507092d-0bbd-4734-b808-acd00013f6ea%22>): hosts the lecture videos.

**Email:** All emails will be sent to students' ncsu.edu (i.e. Unity) accounts, so these should be checked regularly.

## ***INSTRUCTIONAL COMPONENTS***

**Optional textbook:** Kent R. Nagle, Edward B. Saff, and Arthur David Snider. *Fundamentals of Differential Equations and Boundary Value Problems*. 7th ed. Boston: Addison-Wesley, 2012. ISBN: 987-0-321-74774-7

The text may be purchased through Wolfpack Outfitters at the following link:

<https://shop.ncsu.edu/adoption-search-results?ccid=23129&itemid=69783>

**Lectures:** These are pre-recorded videos, each approximately 75 min. in length. They are hosted on Panopto, for which there is a link on Wolfware. Links to individual lectures will be grouped on Moodle according to the week for which they are assigned. Students are expected view lectures at some point during their assigned week, but are otherwise free to choose when to do so.

**Problem sessions:** The instructor will hold weekly problem/review sessions Wednesdays 3-4:15 PM in the course Zoom room. These will be recorded and posted on Panopto.

## ***COURSEWORK***

**Homework:** Assignments will be completed online through WeBWork. Links to individual homework sets will be listed on Moodle in the order of their expected completion and grouped by due date. Specifically, homework sets will come in four groups corresponding to the exams, and all sets in a particular group will be **due at 11:59 PM on the evening prior to the corresponding exam window** (a Wednesday for each midterm group and Sunday for the final group).

### ***Exams***

There will be three midterm exams and a cumulative final exam. Each exam may be taken on one of two days. The dates and durations of the exams are as follows:

Midterm 1:		Thu. 2 or Fri. 3 Jun.
Midterm 2:	1 hr.	Thu. 30 Jun. or Fri. 1 Jul.
Midterm 3:		Thu. 21 or Fri. 22 Jul.
Final:	2 1/2 hrs.	Mon. 1 or Tue. 2 Aug.

(See also the [Schedule](#) below.) The allotted time periods may be altered in the case of accommodation approved by the [Disability Resource Office \(DRO\)](#).

The final exam can only be rescheduled for a date outside this window by requesting a change through the [Department of Registration and Records](#).

**Proctoring:** Each exam is to be taken either at one of the on-campus [DELTA Testing Services \(DTS\)](#) sites or at an off-campus test proctoring site which is approved by DTS. Appointments at the on-campus DTS sites can be made at the following webpage:

<https://apps.delta.ncsu.edu/proctoring/appointments/>

Requests to take exams at off-campus proctoring sites must be made through DTS at

<https://testing-services.delta.ncsu.edu/off-campus-submit-request/>

where a map of DTS-approved locations can be found as well. (The links for DTS appointment requests are also on Moodle.)

## GRADING

At the completion of the term, each student's lowest midterm exam grade will be dropped. A final numerical score  $N$  between 0 and 100, rounded to the nearest integer, will be computed according the following rubric:

<b>Homework:</b>	15%
<b>Midterm exam avg.:</b>	50% (25% for each of the top two midterms)
<b>Final exam:</b>	35%

A letter grade with  $+/-$  will then be assigned to the score  $N$  according the following scale:

A+ : $100 \geq N \geq 97$	A : $97 > N \geq 93$	A- : $93 > N \geq 90$
B+ : $90 > N \geq 87$	B : $87 > N \geq 83$	B- : $83 > N \geq 80$
C+ : $80 > N \geq 77$	C : $77 > N \geq 73$	C- : $73 > N \geq 70$
D+ : $70 > N \geq 67$	D : $67 > N \geq 63$	D- : $63 > N \geq 60$
	F : $60 > N$	

See [NCSU Reg. 02-50-03](#) for associated grade points.

## ***COURSE POLICIES***

As always, by enrolling in the course, each student implicitly agrees to, and is responsible for knowledge of, the University's policies, regulations and rules (see <https://policies.ncsu.edu/>). Below are course-specific policies and highlighted general ones.

**Grade corrections:** A request for a change to an exam grade must be submitted to the instructor via email **within three** days from the time that the exam was returned to the student. This should point out specifically any errors believed to have been made in grading.

**Missed work:** In the event of debilitating illness or other exigent circumstances, students may submit a request to the instructor via email to reschedule a midterm exam or receive an extension on a limited number of homework sets. This should be supported by a doctor's note or relevant documentation where possible. The instructor will determine a suitable accommodation in consultation with the student and in accordance with the spirit of [NCSU Regulation 02.20.03](#).

**Academic integrity:** Any assessed materials submitted by a student is assumed to that student's own work, unless an exception is made explicitly by the instructor. With any such submission, the student implicitly affirms the *honor pledge*: "I have neither received unauthorized aid nor given aid on this assignment".

The minimum penalty for cheating is a grade of zero on the assignment. Violations will be reported to the Academic Integrity Board, which may impose additional sanctions. See the [student code of conduct](#) for further details.

**Disability:** Reasonable accommodations will be made for students with verifiable disabilities. In order to be granted available accommodation, a student must register with the [Disability Resource Office \(DRO\)](#). If there is any question of whether a certain specific accommodation can be made, the student is encouraged to inquire with the instructor.

**Non-Discrimination:** NCSU prohibits discrimination, harassment or retaliation based upon a person's race, color, religion, sex, national origin, age, disability, gender identity, sexual orientation or veteran status. If you feel that have been the subject of prohibited discrimination, harassment or retaliation, you should contact the [Office for Institutional Equity and Diversity \(OIED\)](#), which can be reached by phone at (919) 515-3148.

**SCHEDULE**

Week	Video	Sec.	Topics
<i>Unit I — First-order differential equations</i>			
(1) 18-20 May	01	1.1 1.2	Background & introduction to differential equations Solutions & initial value problems (IVP's)
	02	1.3	Direction fields, phase lines
(2) 23-27 May	03	2.2 2.3	Separable equations Linear 1st-order equations
	04	3.2	Applications: compartmental analysis, mixing
	05	3.3 2.4	Applications: Newton's law of cooling Exact equations
<i>Unit II — Second-order differential equations &amp; Laplace transforms</i>			
(2) 23-27 May	05	4.1	Intro to 2nd-order diff. eqs.
(3) 31 May–3 Jun.	06	4.2 4.3	Homogeneous linear equations Auxilliary equations with complex roots
	07	4.4	Undetermined coefficients
<b>Unit I Midterm Exam: Thu. 2 or Fri. 3 Jun.</b>			
(4) 6-10 Jun.	08 09	4.5 4.6	Superposition principle Variation of parameters
	(5) 13-17 Jun.	10	4.9-10 7.2
11		7.2-3	Laplace transform: definition & properties
(6) 20-24 Jun.	12 13	7.4 7.5	Inverse Laplace transform Solving IVP's via Laplace transforms
	(7) 27 Jun.–1 Jul.	14	7.6
<i>Unit III — Systems of linear differential equations</i>			
(7) 27 Jun.–1 Jul.	15	9.1-3	Basic linear algebra
<b>Unit II Midterm Exam: Thu. 30 Jun. or Fri. 1 Jul.</b>			
(8) 5-8 Jul.	16 17	9.4 9.5	Linear systems in normal form Homogeneous linear systems with constant coefficients
	(9) 11-15 Jul.	18 19	9.6 9.7
(10) 18-22 Jul.		20	5.6
<i>Unit IV — Phase plane analysis and stability</i>			
(10) 18-22 Jul.	21	5.4 12.2	Phase plane Linear systems in the plane
		<b>Unit III Midterm Exam: Thu. 21 or Fri. 22 Jul.</b>	
(11) 25-29 Jul.	22	12.3	Almost linear systems
	23	—	Final review
<b>Final Exam: Mon. 1 or Tue. 2 Aug.</b>			