MATH 3410 Section 003 - Differential Equations I (Spring 2024 1)

Edit

Math 3410.003 Differential Equations I

TR 2-3:20pm, WH 117

Instructor. Bunyamin Sari, GAB 414, **bunyamin.sari@unt.edu (mailto:bunyamin.sari@unt.edu)**

Office hours. TR 3:30-5pm (or by appointment)

Textbook.

- **Elementary Differential Equations, William Trench, free digital commons textbook. (https://digitalcommons.trinity.edu/cgi/viewcontent.cgi?article=1007&context=mono)** (click to download)
- **Practice Problems with solutions. (click to download) (https://drive.google.com/file/d/0B70Q0VU9Pjwdc1VmQ3g1c2VHcW8/view?resourcekey=0-up5sjHGOpcp7NQA1sxA_kA)**

Prerequisites. Calculus II (1720) with a grade of C or higher is required. Linear Algebra (2700) is recommended, but may be taken concurrently

Exams with grade weights and tentative dates

20% Exam 1, Feb 8

20% Exam 2, Mar 7

20% Exam 3, Apr 25

30% Cumulative final exam, TBA

10% Homework. The weekly homework will be posted and submitted on Canvas. Homework are due Thursdays. All homework must be handwritten on paper and then scanned using an app and submitted on Canvas as a SINGLE pdf file. Most phones or tablets have the scan app built into it, and there are also many free apps. Please use a scan rather than a plain picture. The scans get rid of white spaces and make it legible. If the file is not legible the grader may deduct partial or all points.

Please make effort on your own to solve problems before seeking help elsewhere. This will help you retain the material and be more successful in exams.

Calculators. Calculators are not allowed during exams.

Disability. Please seek accommodation via ODA and also let me know.

Topics. Tentatively, we aim to cover the following sections of the book. Sections 1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 2.5, 2.6, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 7.1, 7.2, 7.3, 7.4, 8.1, 8.2, 8.3, 8.4, 10.1,

10.4, 10.5, 10.6

Course Summary:

Date	Details	Due
Thu Jan 18, 2024	Solving first order linear equations, integrating factor and variation of parameters (https://unt.instructure.com/calendar?event_id=791114&include_contexts=course_100771)	12am
Sun Jan 21, 2024	HW1- Basic concepts, integrating factor, separable equations (https://unt.instructure.com/courses/100771/assignments/2036821)	due by 11:59pm
Tue Jan 23, 2024	Separable equations, and existence and uniqueness theorem for first order linear equations (https://unt.instructure.com/calendar?event_id=791112&include_contexts=course_100771)	12am
Thu Jan 25, 2024	Existence and uniqueness theorem for first order nonlinear equations, and Exact equations (https://unt.instructure.com/calendar?event_id=791111&include_contexts=course_100771)	12am
Sun Jan 28, 2024	HW2-Existence and Uniqueness theorems and separable equations (https://unt.instructure.com/courses/100771/assignments/2036823)	due by 11:59pm
Thu Feb 8, 2024	Exam 1 (https://unt.instructure.com/courses/100771/assignments/2036817)	due by 11:59pm
Thu Mar 7, 2024	Exam 2 (https://unt.instructure.com/courses/100771/assignments/2036818)	due by 11:59pm
Thu Apr 25, 2024	Exam 3 (https://unt.instructure.com/courses/100771/assignments/2036819)	due by 11:59pm
	Exam Review: Covers Practice problems 4.1-4.6	

Date	Details	Due
	(https://unt.instructure.com/calendar?event_id=755394&include_contexts=course_100771)	
	Final exam (https://unt.instructure.com/courses/100771/assignments/2036820)	
	HW10-Systems of equations (https://unt.instructure.com/courses/100771/assignments/2036822)	
	HW3- Exact equations and mathematical models (https://unt.instructure.com/courses/100771/assignments/2036824)	
	HW4- Direction fields, autonomous equations and stability, second order linear equations (https://unt.instructure.com/courses/100771/assignments/2036825)	
	HW5- Second order linear homogeneous equations (https://unt.instructure.com/courses/100771/assignments/2036826)	
	HW6-Second order homog constant coefficients (https://unt.instructure.com/courses/100771/assignments/2036827)	
	HW7-Non-homog. equations and method of undetermined coefficients (https://unt.instructure.com/courses/100771/assignments/2036828)	
	HW8-Power series (https://unt.instructure.com/courses/100771/assignments/2036829)	
	HW9- Laplace transform (https://unt.instructure.com/courses/100771/assignments/2036830)	
	Lecture 10- Direction Fields (https://unt.instructure.com/calendar?event_id=755389&include_contexts=course_100771)	
	Lecture 11- Exam review (https://unt.instructure.com/calendar?	

Date	Details	Due
	event_id=755390&include_contexts=course_100771)	
	Lecture 12- Autonomous equations and stability of equilibrium solutions (https://unt.instructure.com/calendar?event_id=755387&include_contexts=course_100771)	
	Lecture 13- Second order homogeneous equations with constant coefficients (https://unt.instructure.com/calendar?event_id=755382&include_contexts=course_100771)	
	Lecture 14- Solutions to Exam 1 (https://unt.instructure.com/calendar?event_id=755384&include_contexts=course_100771)	
	Lecture 15- Theory of second order linear equations (https://unt.instructure.com/calendar?event_id=755383&include_contexts=course_100771)	
	Lecture 16- Theory of second order linear equations, fundamental set of solutions, Wronskian (https://unt.instructure.com/calendar?event_id=755385&include_contexts=course_100771)	
	Lecture 17- Review of complex numbers (https://unt.instructure.com/calendar?event_id=755380&include_contexts=course_100771)	
	Lecture 18- Second order linear homogeneous equations with constant coefficients- complex roots case, Textbook section 5.2, Practice problems section 4.1 (https://unt.instructure.com/calendar?event_id=755381&include_contexts=course_100771)	

Date	Details	Due
	Lecture 19: Repeated root case and the reduction of order, Textbook section 5.2, practice problems 4.1 (https://unt.instructure.com/calendar?event_id=755379&include_contexts=course_100771)	
	Lecture 2 (https://unt.instructure.com/calendar?event_id=755404&include_contexts=course_100771)	
	Lecture 20-Second order linear non-homogenous, Textbook section 5.3 (https://unt.instructure.com/calendar?event_id=755391&include_contexts=course_100771)	
	Lecture 21: Method of undetermined coefficients, Textbook Section 5.4-5.5, Practice problems 4.5 (https://unt.instructure.com/calendar?event_id=755392&include_contexts=course_100771)	
	Lecture 22: Method of undetermined coefficients, Reduction of order,Textbook Section 5.4,5.5, 5.6, Practice problems 4.4, 4.5 (https://unt.instructure.com/calendar?event_id=755393&include_contexts=course_100771)	
	Lecture 23-Variation of parameters (https://unt.instructure.com/calendar?event_id=755402&include_contexts=course_100771)	
	Lecture 24- Power series (https://unt.instructure.com/calendar?event_id=755401&include_contexts=course_100771)	
	Lecture 25- Power series (https://unt.instructure.com/calendar?event_id=755400&include_contexts=course_100771)	

Date	Details	Due
	Lecture 26-Laplace transform (https://unt.instructure.com/calendar?event_id=755399&include_contexts=course_100771)	
	Lecture 27- Laplace transform (https://unt.instructure.com/calendar?event_id=755398&include_contexts=course_100771)	
	Lecture 28- Laplace transform-derivative formulas (https://unt.instructure.com/calendar?event_id=755397&include_contexts=course_100771)	
	Lecture 29-Inverse Laplace transform (https://unt.instructure.com/calendar?event_id=755396&include_contexts=course_100771)	
	Lecture 3 (https://unt.instructure.com/calendar?event_id=755403&include_contexts=course_100771)	
	Lecture 30- Unit step function and s-axis shift formula (https://unt.instructure.com/calendar?event_id=755395&include_contexts=course_100771)	
	Lecture 4- Separation of variables (Section 2.2) (https://unt.instructure.com/calendar?event_id=755377&include_contexts=course_100771)	
	Lecture 5-Existence and uniqueness theorems (https://unt.instructure.com/calendar?event_id=755378&include_contexts=course_100771)	
	Lecture 6-Existence and uniqueness theorems (https://unt.instructure.com/calendar?event_id=755405&include_contexts=course_100771)	
	Lecture 7-Exact equations, Section 2.5	

Date	Details	Due
	(https://unt.instructure.com/calendar?event_id=755376&include_contexts=course_100771)	
	Lecture 8 - Mathematical models (https://unt.instructure.com/calendar?event_id=755386&include_contexts=course_100771)	
	Lecture 9- Mathematical models (https://unt.instructure.com/calendar?event_id=755388&include_contexts=course_100771)	
	Roll Call Attendance (https://unt.instructure.com/courses/100771/assignments/2036831)	