Math 3410 Differential Equations Spring 2016

Sections: 001 SAGE 354 TR 12:30 & 003 CHIL 245 TR 3:30

Syllabus

Spring 2016

Instructor: Bünyamin Sarı

Office: GAB 414

e-mail: bunyamin@unt.edu (Please include Math 3410 in subject line of every email you send to me.)

Office hours: TR 10:30-12:30 PM or by appointment

Lectures: 001 SAGE 354 TR 12:30 & 003 CHIL 245 TR 3:30

Course description

First-order equations, existence-uniqueness theorem, linear equations, separation of variables, higher-order linear equations, systems of linear equations, series solutions and numerical solutions. See class schedule for details.

Textbook

Elementary Differential Equations and Boundary Value Problems, Boyce and DiPrima, 10th Edition

Course website

www.math.unt.edu/~bunyamin/ See here for homework and other announcements.

Grading scheme

Homework 10%, Quizzes 15%, 3 Midterms 45%, Final 30%

It is very important that you attend every class to succeed in this course. No make up tests or quizzes will be given. The weight of the missed midterm (with a valid excuse) will be transferred to the final.

Homework and Quizzes

We will have weekly Homework assignments, and they will be announced in class and posted here. The lowest homework grade will be dropped. Homework are to be handed in person to me at the beginning of the due date class. Homework will not be accepted after class.

Typically there will be a quiz every week. The dates are not set in advance and so please do not skip classes.

Schedule

Week 1 Read Sections 1.1, 1.2, and 1.3. **Homework 1 (Due Jan 26).** Section 1.1: 15-20, 23. Section 1.2: 15. Section 1.3: 1-6

Optional: Here is a Direction field Java software. (http://math.rice.edu/~dfield/dfpp.html) Download dfield.jar, see the instructions there. Using the software plot homework problems and additional problems 26-33 of Section 1.1

Week 2 Read Sections 2.1, 2.2, and 2.4. **Homework 2 (Due Feb 4).** Section 2.1: 4, 8, 16, 24, 28. Section 2.2: 6, 14, 25. Section 2.4: 2, 3, 6

Week 3 Read Section 2.3 and 2.4. **Homework 3 (Due Feb 11)** Section 2.3: 3, 8, 9, 10, 19, 23. Section 2.4: 8, 9

Midterm 1 Feb 16 Old midterm exam (../DEpdf/old-mt1.pdf), Old midterm exam solutions (../DEpdf/old-mt1-sol.pdf)

Week 4 Read Sections 2.5 and 2.6. **Homework 4 (Due Feb 16)** Section 2.5: 9, 15. Section 2.6: 5, 7, 10, 16.

Midterm 1 solutions 3410.001 (../DEpdf/mt1-sol-001.pdf) Midterm 1 solutions 3410.003 (../DEpdf/mt1-sol-003.pdf)

Week 5 Read Section 3.1. **Homework 5 (Due Feb 23)** Section 3.1: 1, 2, 4, 10, 15, 17

Week 6 Read Sections 3.2 and 3.3. **Homework 6 (Due Mar 3)** Section 3.2: 5, 8, 10, 13, 14, 16, 21, 25. Section 3.3: 1-6, 8, 18, 22, 29

Week 7 Read Sections 3.4 and 3.5. **Homework 7 (Due Mar 8)** Section 3.4: 12, 14, 23, 24. Section 3.5: 6, 7, 10, 21-28 part (a) only

** Midterm 2 is on Tuesday March 22

Midterm 2 review (../DEpdf/Midterm2review.pdf)

Midterm 2 solutions test A (../DEpdf/mt2-a.pdf), test B (../DEpdf/mt2-b.pdf)

Week 8 Read Sections 5.1 and 5.2. **Homework 8 (Due Mar 31)** Section 5.1: 5, 8, 24, 26. Section 5.2: 1, 5

Week 9 Read Sections 5.2 and 5.4 (Euler's equations only) **Homework 9 (Due Apr 5)** Section 5.2: 8, 12. Section 5.4: 1, 3, 4, 6, 11.

Week 10 Read Sections 6.1 and 6.2. **Homework 10 (Due Apr 14-This HW is long-start early!)** Section 6.1: 5 (a) (For 5a, find the transform using the definition), 13, 14, 16, 22, 24. Section 6.2: 1-10 12, 13, 15, 22

Midterm 3 is on Tuesday Apr 19

Midterm 3 review (../DEpdf/Midterm3review.pdf)

Week 11 Read Sections 7.1, 7.2 and 7.3. **Homework 11 (Due Apr 26)** Section 7.2: 2, 10, 11, 22, 23. Section 7.3: 16, 18, 19

Midterm 3 solutions test A (../DEpdf/mt3.pdf), test B (../DEpdf/mt3-b.pdf)

Week 12 Read Sections 7.4, 7.5, 7.6, and 7.8. **Homework 12 (Due May 5)** Section 7.5: 9, 15, 16, Section 7.6: 9, 10, Section 7.8: 2(c), 4(c), 8(a)

Systems of first order equations lectures (../DEpdf/systems.pdf)

Final practice problems (../DEpdf/final-review.pdf)

Course plan

Tuesday	Thursday
Jan 19: Basic notions, Mathematical models, Direction fields Section 1.1	**Jan 21:** Classification and solutions of some ODE's. 1.2, 1.3
Jan 26: First order ODEs, Integrating factors 2.1	**Jan 28:** Separable equations 2.2
Feb 2: Modeling with first order ODEs 2.3	**Feb 4:** Theory; existence and uniqueness theorem 2.4, 2.8
Feb 9: Autonomous equations and	**Feb 11:** Exact equations 2.6

population dynamics 2.5

Feb 16: Midterm exam 1	**Feb 18:** Second order ODEs; homogeneous DEs with constant coefficients 3.1
Feb 23: Theory and solutions of linear homogeneous DE's, the Wronskian	**Feb 25:** Complex roots of the characteristic equation, Repeated roots and the reduction of order 3.3, 3.4
Mar 1: The method of undetermined coefficients 3.5	**Mar 3:** Variation of parameters 3.6
Mar 8: Mechanical vibrations 3.7	**Mar 10:** Midterm exam 2
Mar 22: Power series 5.1	**Mar 24:** Series solutions near ordinary points 5.2
Mar 29: Euler equations 5.4	**Mar 31:** Series solutions near regular singular points 5.5
Apr 5: Laplace transform 6.1	**Apr 7:** Solutions of initial value problems 6.2
Apr 12: Step functions 6.3	**Apr 14: Midterm exam 3**
Apr 19: Matrices 7.2, 7.3	**Apr 21:** Systems of first order linear equations 7.4
Apr 26: Homogeneous system with constant coefficients 7.5	**Apr 28:** Complex and repeated eigenvalues 7.6, 7.8
May 3: Review	**May 5:** Review
May 10: Final Exam for Section 003, 1:30pm in class	
May 12: Final Exam for Section 001, 10:30am in class	

Tutoring

Tutoring available at UNT Learning center (http://learningcenter.unt.edu/tutoring) either

- in person: Ashlie Huelsebusch (lead tutor-Math), Tuesdays and Wednesdays 6-8 PM in Sage Hall 315, or
- online (https://unt.upswing.io/)

Resources

- Wolfram Alpha (http://www.wolframalpha.com/)
- Excellent lectures by Arthur Mattuck of MIT MIT OpenCourseWare video lectures (https://www.youtube.com/playlist?list=PLEC88901EBADDD980)

Note regarding standards of academic conduct

Please be aware of university policies regarding academic honesty. Cheating is not tolerated and will have severe consequences. Consult the Catalog for details.

Student Behavior in the Classroom

Student behavior that interferes with an instructor's ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Center for Student Rights and Responsibilities to consider whether the student's conduct violated the Code of Student Conduct. The university's expectations for student conduct apply to all instructional forums, including university and electronic classroom, labs, discussion groups, field trips, etc. The Code of Student Conduct can be found at www.unt.edu/csrr

Disability

Students requesting accommodations due to disability should contact the Office of Disability at 565 4323. Please also let me know.