

MATH 2420 Spring 2017: Differential Equations with applications

Section: MATH 2420.Y01

Telephone: (972) 883 6349

Class Time: Tues., Thurs.: 10:00am–11:15am

E-mail: maxim.arnold@utdallas.edu

Class Location: CB 1.106

TA: Elvira Kadaub

Instructor: Dr. Maxim Arnold

TA Office Hours: TBD

Office: Founders Building 2.604F

Office hours: Thurs. 1:00 pm–2:00 pm or by appointment

Textbook and Reference

W.E. Boyce and R. C. DiPrima, *Elementary Differential Equations*, 11th Edition Textbook and Student solutions manual are recommended.

Co-requisites

Students must enroll in the problem session MATH 2460.399. The instructor will post important announcements through the course homepage at eLearning. The website of eLearning is <https://elearning.utdallas.edu>.

Materials to Cover

We will cover the following sections of the textbook.

Directional Fields

First Order Differential Equations

Second Order Linear Equations

Higher Order Linear Equations

Systems of First Order Linear Equations

Series Solutions

Laplace Transform (if time permits)

Course Description and Objectives

Students will learn concepts and techniques of the theory of Ordinary Differential Equations and develop a basic skills of the modeling of various biological and mechanical systems. Course topics include directional fields, phase portraits, stability analysis, matrix exponent, iterative schemes.

- Week 1 Review of the material which will be used in the course.
- Week 2 Solutions of some differential equations, Classification
- Week 3 Separable Equations. Differences between linear and nonlinear equations.
- Week 4 Exact equations and integrating factors. Modeling with the first order equations.
- Week 5 Homogeneous equations, Fundamental solutions, Linear independence, Complex roots of characteristic polynomials.
- Week 6 Repeated roots, Reduction of order, Non-homogeneous equations, Method of variation of parameters.
- Week 7 General theory of the linear equations.
- Week 8 Systems of first order equations. Review of Matrices.
- Week 9 Homogeneous linear systems. Fundamental matrices.
- Week 10 Repeated eigenvalues. Non-homogeneous systems.
- Week 11 Series solution near regular point.
- Week 12 Regular singular points. Euler's equation.
- Week 13 Solutions of the initial value problem.
- Week 14 Laplace transform, Convolution Integral.
- Week 15 Applications.

Course Policy & Grading Scheme

Assignments: A pdf file for assignment will be posted **weekly** during each weekend except for exam weeks. *Assignments* will be posted at the course homepage on

<https://elearning.utdallas.edu>

The assignments will be handed in during the problem sessions.

There will be no late graded assignments scores unless extreme circumstances accepted by the instructor arise. Assignments will contribute 20% to the final grade. The point of assignments is to increase the understanding of the material not simply to prepare students for exams. The list of exercises from the book provide ample chances to practice. It is highly recommended and is a very good learning habit that one works on the exercises immediately after each lecture, without waiting for problem sessions or posting of assignments. To be prepared for exams students should work through as many of the suggested problems as one needs in order to become comfortable with the material and the mechanics of problem solving.

Quizzes: There are weekly quizzes taken in the problem sessions. Quizzes will be administered weekly and will cover material up to and including material presented in lecture on the Tuesday preceding the quiz. The quizzes will be taken during the problem session and will be graded by the TAs. Quizzes will contribute 20% to the final grade.

Exams: There will be two midterm exams (20%) and a comprehensive final exam (20%).

Grading scheme: Students must be able to work problems related to the material covered, otherwise students will not pass the class. There will be no passing just for participation, in the final analysis students have to perform the mathematics adequately. *There will be no curving of the final grades.*

Two midterm exams: 20% each

Weekly assignments: 20%

Weekly quizzes: 20%

Final exam: 20%

All letter grades will be assigned in accordance with the table of numeric to alphabetic conversions given below.

[90; 93) A-, [93; 97) A, [97; 100+] A+
[80; 83) B-, [83; 87) B, [87;90) B+
[70; 73) C-, [73; 77) C, [77;80) C+
[60; 63) D-, [63; 67) D, [67;70) D+
[0, 60) F.

Calculators: Students may use a scientific or arithmetic calculator but are not required to have a graphing calculator. Programmable calculators with matrix and/or graphing features will NOT be allowed during tests and exams.

Important Dates

Monday, January 9, 2017: Classes begin

Monday, January 16, 2017: Martin Luther King Day

Wednesday, January 25, 2017: Last Day to Drop a Class without a "W" Full Term Session

First Midterm Exam, February, 24, 2017

Second Midterm Exam, March, 31 , 2017

Mon. March 13 . Sat., March. 18: Spring break, no classes

Friday, April 30, 2016: Last Day of Classes Full-Term Session

Final Exam: TBA

Technical Support

If you experience any problems with your UTD account you may send an email to:

`assist@utdallas.edu` or call the UTD Helpdesk at 972 883-2911.

Field Trip Policies Off-Campus

Instruction and Course Activities Off-campus, out-of-state, and foreign instruction and activities are subject to state law and University policies and procedures regarding travel and risk-related activities. Information regarding these rules and regulations may be found at the website address <http://www.utdallas.edu/businessaffairs/risk/travel.php5>. Additional information is available from the office of the school dean. Below is a description of any travel and/or risk-related activity associated with this course.

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD printed publication, A to Z Guide, which is provided to all registered students each academic year. The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Series 50000, Board of Regents, The University of Texas System, and in Title V, Rules on Student Services and Activities of the university's Handbook of Operating Procedures. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391) and online at <http://www.utdallas.edu/judicialaffairs/UTDJudicialAffairs-HOPV.html>. A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work. Scholastic Dishonesty, any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

Copyright Notice

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials, including music and software. Copying, displaying, reproducing, or distributing copyrighted works may infringe the copyright owners rights and such infringement is subject to appropriate disciplinary action as well as criminal penalties provided by federal law. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. As a UT Dallas student, you are required to follow the institutions copyright policy (Policy Memorandum 84-I.3-46). For more information about the fair use exemption, see the following website for details. <http://www.utsystem.edu/ogc/intellectualproperty/copypol2.htm>

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a students U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's Handbook of Operating Procedures. In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondents School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Deans decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semesters end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and

Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m. The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22
PO Box 830688
Richardson, Texas 75083-0688
(972) 883-2098 (voice or TTY)
disabilityservice@utdallas.edu

If you anticipate issues related to the format or requirements of this course, please meet with the Coordinator of Disability Services. The Coordinator is available to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Services to notify them of your eligibility for reasonable accommodations. Disability Services can then plan how best to coordinate your accommodations.

It is the students responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated. The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment. If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Sharing Confidential Information

Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required

by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Womens Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an o-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the

Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.

Campus Carry

The Universitys concealed handgun policy is posted on the campus carry website: <https://www.utdallas.edu>

These descriptions and timelines are subject to change at the discretion of the Professor.