Spring 2022 Math 3350-21 Higher Math for Engineers & Scientists I

Instructor: Dr. Alexander Solynin	**Place:** MATH 011
Office Hours: TR 9:30-10:30am and 3:30-4:30pm or by appointment	**Text:** *Advanced Engineering Math*ematics, 6th Edition by Dennis G. Zill & Warren S. Wright
Office: MA 231	**Time:** 11:00-12:20 TR
Email: alex.solynin@ttu.edu	**Prerequisites:** 2350 or 2450

Prerequisites: MATH 2350 or 2450.

About the Course: This course covers topic in ordinary differential equations. Topics to be covered include: First-order differential equations; Modeling with first-order equations; Higher-order differential equations; Laplace transform; Series solutions of linear equations.
We will cover **Chapters 1 – 5**. The goal here is developing the student's analytic and geometric insights into some concepts of the theory of differential equations and applying these concepts to problem solving and "real world application".

Calculators: Calculators are allowed and may be useful in class. **Calculators are not allowed on the Final, in-class Exams, and Quizzes.** Time will not be spent in class on calculator instruction.

Formula sheets: At least one class before the Final and in-class exams, I will provide students with a page, valid for that particular exam, where you may write (do not type!) formulas and theorems, which you are going to use in class. Students are not allowed to use their own pages as formula sheets in class.

Student Learning Outcomes: Math 3350 students will study topics of differential equations, their solutions, and applications to physical sciences and engineering. In particular, students will learn to:
a) recognize a differential equation and its solution; b) compute solutions of first order differential equations; c) compute solutions of higher order differential equations; d) use the Laplace transform; e) use the fundamental properties of power series to solve linear differential equations.

Methods for Assessment of Learning Outcomes: The expected learning outcomes for the course will be assessed through graded activities and ungraded activities. The graded activities include exams, homework and quizzes. The ungraded activities will be used to monitor your progress. A variety of these ungraded assessment techniques may be employed, including problems to be completed during class, direct questioning of students, answering students questions in class, one-minute classroom assessment techniques, and discussions during office hours.

General Policies:

Covid Information from the Memorandum of President Lawrence Schovanec:

"Consistent with the latest CDC recommendations, we have revised our guidance for students, faculty and staff who have a known exposure or tested positive. Anyone with a known exposure should wear a mask for 10 days and should seek a COVID-19 test on day five after exposure. If you test positive or develop symptoms, you should immediately self-isolate and seek a COVID-19 test. Anyone who tests positive is required to self-isolate for five days. Following the five-day isolation period, if you are asymptomatic or your symptoms are resolving, you may return to work but should wear a mask for five additional days. All positive tests should be reported through our campus reporting system."

***Absence due to religious observance*:** The Texas Tech University OP 34.19 states that a student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. As your instructor, I request that notification be made in writing and submitted no later than the 15th class day of the semester. Absence due to officially approved trips - The Texas Tech University OP 34.04 states department chairpersons, directors, or others responsible for a student representing the university on officially approved trips must notify the student's instructors of the departure and return schedules. The instructor so notified must not penalize the student, although the student is responsible for material missed. Any student absent because of university business must be allowed to make up missed work within a reasonable span of time or have alternate grades substituted for work due to an excused absence. Students absent because of university business must be given the same privileges as other students.

***Academic Integrity* (extracted from OP 34.12):** It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension.
Scholastic dishonesty includes, but it not limited to, cheating, plagiarism, collusion, falsifying academic records, misrepresenting facts, and any act designed to give unfair academic advantage to the student (such as, but not limited to, submission of essentially the same written assignment for two courses without the prior permission of the instructor) or the attempt to commit such an act.

Civility in the Classroom: Incivility is any action that interferes with the classroom learning environment. This includes, but is not limited to, eating, arriving late, leaving early, a ringing cell phone, text messaging, sleeping, chatting during class, dominating the class discussion by not allowing other students to speak, and putting books away before the end of class. Be respectful to the instructor and to your fellow students. I will ask anyone participating in what I perceive to be inappropriate behavior to stop immediately.

***Accommodation for Students with Disabilities* (extracted from OP 34.22):** Any student who, because of a disability, may require some special arrangements in order to meet course requirements should contact the instructor as soon as possible to make the necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until the appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.

Absence due to officially approved trips: The Texas Tech University Catalog states that the person responsible for a student missing class due to a trip should notify the instructor of the departure and return schedule in advance of the trip. The student may not be penalized and is responsible for the material missed.

Title IX Syllabus Statement - TTU Resources for Discrimination, Harassment, and Sexual Violence:
Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the *Office for Student Rights & Resolution*, (806)-742-SAFE (7233) or file a report online at titleix.ttu.edu/students. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: **TTU Student Counseling Center,** 806-742-3674, https://www.depts.ttu.edu/scc/ *(Provides confidential support on campus.)* **TTU Student Counseling Center 24-hour Helpline**, 806-742-5555, *(Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.)* **Voice of Hope Lubbock Rape Crisis Center**, 806-763-7273, voiceofhopelubbock.org *(24-hour*

hotline that provides support for survivors of sexual violence.) **The Risk, Intervention, Safety and Education (RISE) Office**, 806-742-2110, rise.ttu.edu *(Provides a range of resources and support options focused on prevention education and student wellness.)* **Texas Tech Police Department**, 806-742-3931, http://www.depts.ttu.edu/ttpd/ *(To report criminal activity that occurs on or near Texas Tech campus*.)

Important Dates:
Wednesday, January 12 – Classes begin
January 18 - Last day to add a course.
January 28 - Last Day to Drop a Course without penalty.
April 27 - Last Day to Drop a Course.
March 12-20 - Spring vacation.
Monday, April 18 – No Classes
April 28 - May 4 – Period of no examinations.
Tuesday, May 3 - Last Day of classes.
Saturday, May 7, 1:30 p.m. to 4:00 p.m. Final Exam.
Wednesday, May 11 at noon   - Grades Due for Graduating Students via Raiderlink.
Monday, May 16 at 5:00 p.m.   - Final Grades Due via Raiderlink.

_____

STUDENT EVALUATION:

- Final examination – comprehensive, course wide exam written by the instructor.

_____

- ◆ **Saturday, May 7, 1:30 p.m.-4:00 p.m**.   **FINAL EXAMINATION**   **160 pts (25%)**
  This exam is scheduled before the semester begins.
  Students should **eliminate any conflicts NOW.**
- **IN-CLASS EXAMS:** February 17, April 7   **2×100 = 200 pts (30%)**
  Each exam consists of 10-12 problems
- 15-min **QUIZZES**:   **6×20 = 120 pts (18%)**
  Each 15-minute quiz consists of 2 problems**:   2×10 = 20 pts**
- 5-min **QUIZZES**:
  There will be several 5-minute quizzes (usually first 5 minutes of a class),   total = **30 pts (5%)**
  where students will be asked to write a particular formula/definition/theorem/etc.
- **HOMEWORK**:   I will collect homework seven times – approximately every
  fourth class and I will grade 8-10 problems of these homework assignments.
  Each homework is worth 20 pts: **7×20 = 140 pts (22%)**

_____

- **MAXIMAL TOTAL:**   **650 pts (100%)**

GRADING PROCEDURE:

A   -   **90 - 100%**
B   -   **80 - 89%**
C   -   **70 -79%**
D   -   **60 - 69%**
F   -   **≤ 59%**

Course Calendar

Date	Textbook	Tentative Lecture Topics
Jan. 13	Section 1.1	Definitions and terminology.
Jan. 18	Section 1.2	Initial-value problems.
Jan. 20	Section 2.1	Solution curves without solution.
Jan. 25 **Q1**	Section 2.2	Separable equations.
Jan. 27	Section 2.3	Linear equations.
Feb. 1	Section 2.4	Exact equations.
Feb. 3	Sections 2.5	Solutions by substitutions.
Feb. 8 **Q2**	Section 2.6	Numerical method.
Feb. 10	Section 2.7	Linear models.
Feb. 15	Section 2.8	Nonlinear models.
Feb. 17	**Lecture Exam #1**	**covered Sections 1.1 – 2.8.**
Feb. 22	Section 3.1	Theory of linear equations.
Feb. 24	Section 3.2	Reduction of order.
Mar. 1 **Q3**	Section 3.3	Homogeneous linear equations with constant coeff.
Mar. 3	Section 3.4	Undetermined coefficients.
Mar. 8	Section 3.5	Variation of parameters.
Mar. 10	Section 3.6	Cauchy-Euler equation.
Mar. 22 **Q4**	Section 3.8	Linear models: Initial-value problems.
Mar. 24	Section 4.1	Definition of the Laplace transform.
Mar. 29	Section 4.2	The inverse transform and transform of derivatives.
Mar. 31 **Q5**	Section 4.3	Translation theorems.
Apr. 5	Review for Exam #2.	
Apr. 7	**Lecture Exam #2,**	**covered Sections 3.1 – 4.3.**
Apr. 12	Section 4.4	Additional operational properties.
Apr. 14	Section 4.5	The Dirac delta function.
Apr. 19	Section 5.1	Solutions about ordinary points.
Apr. 21 **Q6**	Section 5.2	Solutions about singular points.
Apr. 26	Section 5.3	Special functions.
Apr. 28	Review of the course.	
May 3	Review of the course.	
May 7	**Saturday**	**1:30 p.m. – 4:00 p.m. FINAL EXAM**

Tentative Homework Assignments

Section	Assignment
HW1	
1.1	2,4,8,10,12,16,20,22,26,32
1.2	4,8,10,12,16,20,26,30,40
2.1	2,4,8,12,14,20,22,26,28
HW2	
2.2	2,6,8,16,18,20,24,26
2.3	2,6,10,14,16,20,22,26,28,30
2.4	2,4,8,10,14,18,22,24,28,30,32
HW3	
2.5	2,4,8,12,14,16,18,22,24,30
2.6	2,4,6,10
2.7	2,4,6,10,12, 22,24,30
2.8	2,6,12,16
HW4	
3.1	2,4,10,14,16,20,24,26,32,34
3.2	2,4,8,12,16,18,20
3.3	4,6,10,16,20,26,32,36,38,42
HW5	
3.4	2,4,8,12,22,28,30,38,38
3.5	2,4,8,16,20,22
3.6	2,6,10,16,20,26,32,36
HW6	
4.1	2,4,6,10,16,18,20,22,26,32,38
4.2	2,4,8,10,16,24,28,32,34,40
4.3	2,4,6,8,12,18,22,24,38,42,56,60
4.4	2,4,10,14,20,28,30,42,48
HW7	
4.5	2,4,6,8,10
5.1	2,4,14,16,18,20,26,30
5.2	2,4,8
5.3	2,4,8,10,14,16