

South Plains College

MATH 2320 – Differential Equations

Section 001, T R 8 – 9:15 am

Math Bldg., Rm. 105

Instructor: Miss S. Davis

Office Hours:

Office: 103 MATH Bldg.

Phone: (806) 716 – 2699

E-mail address: sdavis@SouthPlainsCollege.edu

Text: None

Supplies: Scientific calculator (preferably a TI-85 or higher), (at least a **2.5 in ring**) notebook, hole puncher, stapler, & a staple puller.

Purpose: Math 2320 is offered to satisfy degree requirements for pre-engineering students planning to transfer to schools in Texas. Topics included are: linear differential equations and applications; solutions using Laplace transforms; systems of differential equations; power series solutions; non-linear equations.

Prerequisites: MATH 2414 (Calculus II) and strategically, MATH 2318 (Linear Algebra)

Attendance: Attendance and effort are the most important activities for success in this course. Records of your attendance are maintained throughout the semester. If your lack of attendance (i.e., excessive absences) is determined by the instructor to put you at risk of failing the course, you may be dropped from the class with a F as a final grade. Excessive absences consist of two consecutive weeks or 4 cumulative days. If you unfortunately happen to incur an absence, please contact the instructor either by phone or email and refer to the website to get and attempt the assignment before the next class. Please read the “Drops and Withdrawals” policies in the current South Plains College catalog.

Assignment Policy: Homework will be assigned each class meeting. You are expected to work all problems assigned in each assignment and to seek help when you do not understand. You are responsible for keeping up to date and prepared. Homework is to be completed and kept in a notebook that must accompany you to each class session. Refer to Blackboard for all the procedures to be used in this class. The following procedure will be used on all the homework:

Homework #1: Separations of Fractions worksheet
problems 1, 5, 8, 10, and 15 - 20

(1.) problem

work for problem

answer

(5.) problem

work for problem

answer

Blackboard: A wealth of information is provided to you regarding to this class on **Blackboard**. Syllabus (updated), homework assignments, worksheets (supplements), videos, previous semester student evaluations, etc. Please be responsible to log in to Blackboard and visit Differential Equations Blackboard page and peruse through it to become familiar with all the items.

Assessments: The notebook will be graded during each exam in which no late notebooks will be allowed. The notebook will count as a test grade.

Tests: There will be three tests (final exam exclusive) and a comprehensive final exam. See your OUTLINE for the approximate date for each test.

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|--------------|-------------|------------|-------------|
| 8 – 8:30a | 9:30 – 11a | 10:35 – 11a | 9:30 – 11a | 10 – 11:30a |
| 12:45 – 1:15p | 1:30 – 2:30p | | | |
| 7 – 8p, Reese | | | | |
| <i>or by appointment</i> | | | | |
| At the times with this designation, I will be in my office to help you. You do not need an appointment to come see me at these times. When you come, I will be doing something else, but I will stop and help you. I am available at other times, but please give me a courteous call before coming to make sure I am there. | | | | |

Make-up Policy: There is no automatic provision for making up exams. Only under extreme circumstances (e.g., death in the family or hospitalization) will make-up exams be given, and these circumstances must be documented. If at all possible, the instructor should be notified prior to missing an exam.

Lectures: Class will begin promptly as scheduled. You should be in your seat and ready to go at this time.

Grading Policy: Your final grade will be based solely on major exam scores, homework (notebook), and a comprehensive final. There will be 3 major tests given during the semester. See your OUTLINE for the approximate date for each test. A comprehensive final examination will be given at the end of the semester.

Grading Score: Final score = $\frac{\text{Test 1} + \text{Test 2} + \text{Test 3} + \text{Homework score} + \text{Final Exam score}}{5}$

NOTE: If the final exam score is greater than the least non-zero major exam score (excluding the Homework [Notebook] score) then the final exam score replaces the least non-zero major exam score. In other words, the major exam score will be deleted and the final exam score will count two times.

Borderline Grades: These grades will be evaluated with regard to attendance and mature conduct in class.

STUDY: You should normally spend approximately 2-3 hours outside of class in study for each hour of lecture. Some material will require more time than other material. Also, your mathematical background is a major factor in the time spent completing the homework. Try to study the assigned lesson as soon after the class meets as is possible. In your all possible effort, try not to get behind on the homework!

Tutoring: Free tutoring is available in the Math-Engineering building (room M116). Please remember to sign in when you seek help from a tutor.

Video Tapes: Videos for many of the review topics in this course are available online by the SPC Math. Department through Blackboard. The web address is as follows (<http://southplainscollege.blackboard.com>). For username and password, please use *mvideos*.

| Tape | Topic |
|------|-----------------------------------|
| | Calculus II |
| | Integration by Parts |
| | Integration by Partial Fractions |
| | Integration by Change of Variable |
| | Integration by Trig Substitution |
| | Taylor Series |

Critical Dates:

| | | | |
|------------|------------------|--------|--|
| Sept 2 | Labor Day | Nov 11 | WEB Pre-registration for Spring 2020 |
| Oct 11 | FALL Break | Nov 8 | Advising Day for Math, Computer Science, & Engineering majors only |
| Nov 14 | Last day to drop | | Final Exam |
| Nov 27- 29 | Thanksgiving | Dec 10 | 8 – 10 a, Tuesday |

Student Responsibilities:

- Attend class, be aware of announcements made in class, and ask questions when necessary.
- Work homework problems early enough to seek help if needed.
- Form study groups.
- Work extra problems as required to understand each topic.
- ****Please, turn off cell phones and pagers during class! ****
 - If the instructor determines that activation of a cell phone, pager, PDA, or laptop interrupts the lecture or classroom discussion or impedes the progress of any student then the instructor may ask the student to leave the class temporarily or permanently.
 - No technologic devices such as cell phones, PDA's, etc. are to be used during tests or in-class quizzes.
- Follow the classroom policy, no food or drink allowed in the classroom if posted.
- In addition to the No Food or Drink classroom policy and in accordance to campus policy, no tobacco products are to be permitted and consumed in class.
- You will obtain your final grade for the class through TexanConnect/MySPC and MyColleague.

Cell Phone Policy: All students will, during each class period and for its duration, place and keep their cell phone, provided that they are at the present time in possession of said device, face-down in the right-hand corner and on the top surface of their desk. If a student's cell phone activates and/or the student engages in text messaging during class at anytime during the semester, the student, by the instructor's discretion, could be permanently dismissed from the class for the remainder of the semester. If a student's cell is activated during class and/or the student engages in text messaging determined by the instructor, and **the student chose not to place their phone on top of their desk as mentioned above** then the student will be dismissed from the class by the instructor permanently.

Academic Misconduct: Complete honesty is required from students in all facets of course work including homework assignments, tests, and the final exam. See the South Plains College Catalog for more detail.

Sanctions for Cheating or Plagiarizing: A grade of "F" in the course will be assigned to any student caught cheating or plagiarizing; additional sanctions may also be considered. Students are responsible for understanding the meanings of the words cheating and plagiarizing.

Questions: I invite all your questions **except** the following:

1. I wasn't able to make it to class. Did I miss anything? (Yes.)
2. Is this going to be on the test? (Perhaps, not directly, but if the ideas were not important, I would not be discussing them in class.)
3. Do you have the tests graded? (I put forth my best effort to have the tests graded so as to return them the next class session, however, there are times due to uncontrollable factors that this may not be possible.)

Objectives: Upon completion of this course and obtaining a passing grade, the student will have mastered at least 70% of the course objectives. The course objectives provide that the student be able to:

- a.) Identify, both orally and in writing, the type of differential equation encountered, comment on the type of solution expected, and pursue its general solution using an appropriate technique. These methods will include the use of power series and numerical methods.
- b.) Find the particular solution for equations with initial conditions by using several methods, among which will be the use of Laplace transforms.
- c.) Find the solution for a system of linear differential equations using several methods, among which will be the use of matrix algebra.
- d.) Analyze practical problems from various other disciplines, proposing methods of solution that require differential equations, finding a suitable differential equation with initial conditions, and then finding the solution for that equation.

Diversity: In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world, and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

Disability Statement: Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Special Services Office, preferably, early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Special Services Coordinator. For more information, call or visit the Special Services Office in the Student Services Building, 894-9611 ext. 2529.

Confidentiality: As a faculty member, I am deeply invested in the well-being of each student I teach. I am here to assist you with your work in this course. If you come to me with other non-course-related concerns, I will do my best to help.

It is important for you to know that all faculty members are mandated reporters of any incidents of sexual misconduct. That means that I cannot keep information about sexual misconduct confidential if you share that information with me. Dr. Lynne Cleavinger, the Director of Health & Wellness, can advise you confidentially as can any counselor in the Health & Wellness Center. They can also help you access other resources on campus and in the local community. You can reach Dr. Cleavinger at 716-2563 or lclevinger@southplainscollege.edu or go by the Health and Wellness Center. You can schedule an appointment with a counselor by calling 716-2529.

Sexual Misconduct

It is important for you to know that all faculty members are mandated reporters of any incidents of sexual misconduct. That means that I cannot keep information about sexual misconduct confidential if you share that information with me. Dr. Lynne Cleavinger, the Director of Health & Wellness, can advise you confidentially as can any counselor in the Health & Wellness Center. They can also help you access other resources on campus and in the local community. You can reach Dr. Cleavinger at 716-2563 or lclevinger@southplainscollege.edu or go by the Health and Wellness Center. You can schedule an appointment with a counselor by calling 716-2529.

Campus Concealed Carry: Campus Concealed Carry - Texas Senate Bill - 11 (Government Code 411.2031, et al.) authorizes the carrying of a concealed handgun in South Plains College buildings only by persons who have been issued and are in possession of a Texas License to Carry a Handgun. Qualified law enforcement officers or those who are otherwise authorized to carry a concealed handgun in the State of Texas are also permitted to do so. Pursuant to Penal Code (PC) 46.035 and South Plains College policy, license holders may not carry a concealed handgun in restricted locations. For a list of locations, please refer to the SPC policy at: (http://www.southplainscollege.edu/human_resources/policy_procedure/hhc.php) Pursuant to PC 46.035, the open carrying of handguns is prohibited on all South Plains College campuses. Report violations to the College Police Department at 806-716-2396 or 9-1-1.

| Course Outline | | | |
|--|--------------|-------------|---|
| This schedule is tentative and subjective to change. Changes will be announced in class. | | | |
| Week | Date | Supplements | Topics and Sections Covered |
| 1 | 8/27, Tues | 1 | Introduction, Definitions, solutions, and Elimination of const. Families |
| | 8/29, Thurs | 2 | Separation of Variables |
| 2 | 9/2, Mon | | <i>Labor Day</i> |
| | 9/3, Tues | 3 | Homogenous Coefficients |
| | 9/5, Thurs | 4 | Exact Equations |
| 3 | 9/10, Tues | 5, 6 | Linear equations, 1 st Order and All types |
| | 9/12, Thurs | 7 | Bernoulli Equations Substitutions Suggested by the equation |
| 4 | 9/17, Tues | 8 | Applications |
| | 9/19, Thurs | 8 | Applications contd. |
| 5 | 9/24, Tues | 9 | <i>Linear Differential. Equations</i> <i>Linear Independence & the Wronskian</i> |
| | 9/26, Thurs | 10 | <i>Differential Operators; Distinct Roots (Linear equations w/ constant coefficients)</i> |
| 6 | 10/1, Tues | | Test 1 |
| | 10/3, Thurs | 11, 12 | Repeated Roots; Complex Roots (Linear equations w/ constant coefficients) |
| 7 | 10/8, Tues | 13 | Undetermined Coefficients (Non-Homogenous) |
| | 10/10, Thurs | 13 | Undetermined Coefficients (Non-Homogenous) contd. |
| 8 | 10/15, Tues | 14 | Variation of Parameters |
| | 10/17, Thurs | 15 | Applications (Vibrations) |
| 9 | 10/22, Tues | 16 | <i>Laplace Transforms</i> <i>Inverse Laplace Transforms</i> |
| | 10/24, Thurs | 16.5, 17 | <i>Inverse Laplace Transforms</i> <i>I.V.P.'s (Initial Value Problem)</i> |
| 10 | 10/29, Tues | | Test 2 |
| | 10/31, Thurs | 17.5, 18 | I.V.P.'s; Discontinuous R. H. S. |
| 11 | 11/5, Tues | 18.5 | Discontinuous R. H. S. System linear equations by algebra |
| | 11/7, Thurs | M | Review Matrix algebra |
| | 11/8, Fri | | SPC Math, CS, & Engineering Advising Day |
| 12 | 11/12, Tues | 19 | Eigen values & vectors Distinct Roots |
| | 11/14, Thurs | 20 | Complex Roots Repeated Roots |
| | | | <i>Intro to Engineering Projects</i> |
| 13 | 11/19, Tues | 21 | Non-homogeneous Systems |
| | 11/21, Thurs | 22 | <i>Solution by Power Series</i> <i>Recursion formula</i> |
| 14 | 11/26, Tues | | Test 3 |
| | 11/28, Thurs | | <i>Thanksgiving</i> |
| 15 | 12/3, Tues | 22 | Solution by Power Series contd. Recursion formula |
| | 12/5, Thurs | 22 | Solution at $x = 0$ Solution at $x = a$ |
| Finals | 12/10, Tues | | Section 001 <i>FINAL EXAM: 8 – 10 a</i> |

MATH 2320 (3:3:0)
DIFFERENTIAL EQUATIONS

MATHEMATICS DEPARTMENT

Division of Arts & Sciences

South Plains College

FALL 2019

Shirley Davis