

# 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](mailto: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

**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.

Monday	Tuesday	Wednesday	Thursday	Friday
	9:30 – 11a 1:30 – 2:30p		9:30 – 11a 1:30 – 2:30p	9 – 12 p (Mfg/ET, Rm. 101)
<i>or by appointment</i>				
At the times with this designation, I will be in my office to help you. You <b>do not</b> 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.

**Critical Dates:**

Sept 3	Labor Day	Nov 12	WEB Pre-registration for Spring 2019
Oct 12	FALL Break	Nov 9	Advising Day for Math, Computer Science, & Engineering majors only
Nov 15	Last day to drop	Final Exam	
Nov 21- 23	Thanksgiving	Dec 11 (8 – 10 a, Tuesday)	

**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!

**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 and, if possible, 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 accordance to campus policy, no tobacco products are to be 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.

**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
	Linear Algebra
	NONE
	Calculus II
	Integration by Parts
	Integration by Partial Fractions
	Integration by Change of Variable
	Integration by Trig Substitution
	Taylor Series

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

**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.)

**Diversity Statement:** 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 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.

### **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 [lclevanger@southplainscollege.edu](mailto:lclevanger@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](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.

**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.

<b>Course Outline</b>			
This schedule is tentative and subjective to change. Changes will be announced in class.			
Week	Date	Supplements	Topics and Sections Covered
1	8/28, Tues	1	Introduction, Definitions, solutions, and Elimination of const. Families
	8/30, Thurs	2	Separation of Variables
2	9/4, Tues	3	Homogenous Coefficients
	9/6, Thurs	4	Exact Equations
3	9/11, Tues	5, 6	Linear equations, 1 <sup>st</sup> Order and All types
	9/13, Thurs	7	Bernoulli Equations Substitutions Suggested by the equation
4	9/18, Tues	8	Applications
	9/20, Thurs	8	Applications contd.
5	9/25, Tues	9	<i>Linear Differential. Equations</i> <i>Linear Independence &amp; the Wronskian</i>
	9/27, Thurs	10	<i>Differential Operators; Distinct Roots (Linear equations w/ constant coefficients)</i>
6	10/2, Tues		Test 1
	10/4, Thurs	11, 12	Repeated Roots; Complex Roots (Linear equations w/ constant coefficients)
7	10/9, Tues	13	Undetermined Coefficients (Non-Homogenous)
	10/11, Thurs	13	Undetermined Coefficients (Non-Homogenous) contd.
8	10/16, Tues	14	Variation of Parameters
	10/18, Thurs	15	Applications (Vibrations)
9	10/23, Tues	16	<i>Laplace Transforms</i> <i>Inverse Laplace Transforms</i>
	10/25, Thurs	16.5, 17	<i>Inverse Laplace Transforms</i> <i>I.V.P.'s (Initial Value Problem)</i>
10	10/30, Tues		Test 2
	11/1, Thurs	17.5, 18	I.V.P.'s; Discontinuous R. H. S.
11	11/6, Tues	18.5	Discontinuous R. H. S. System linear equations by algebra
	11/8, Thurs	M	Review Matrix algebra
	11/9, Fri		SPC Math, CS, & Engineering Advising Day
12	11/13, Tues	19	Eigen values & vectors Distinct Roots
	11/15, Thurs	20	Complex Roots Repeated Roots
			<i>Intro to Engineering Projects</i>
13	11/20, Tues	21	<i>Non-homogeneous Systems</i>
	11/22, Thurs		<i>Thanksgiving</i>
14	11/27, Tues		Test 3
	11/29, Thurs	22	Solution by Power Series Recursion formula
15	12/4, Tues	22	Solution by Power Series contd. Recursion formula
	12/6, Thurs	22	Solution at $x = 0$ Solution at $x = a$
Finals	12/11, Tues		Section 001   <b>FINAL EXAM: 8 – 10 a</b>

MATH 2320 (3:3:0)  
DIFFERENTIAL EQUATIONS

MATHEMATICS DEPARTMENT

Division of Arts & Sciences

*South Plains College*

FALL 2018

Shirley Davis