

South Plains College

MATH 2320 – Differential Equations HYBRID

Section 001, M W 1 – 2:15pm

Math Bldg., Rm. 105

This syllabus is tentative and subject to change at any given time in the semester. Updates will be time-stamped.

Instructor: Miss S. Davis

Office: 103 MATH Bldg.

Phone: (806) 716 – 2699

E-mail address:

sdavis@SouthPlainsCollege.edu

Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
1 – 2		2:15 – 3p (F2F)	2:15 – 3:30p (V)	10:30 – 11:30a Face-to-Face (F2F) or Virtual (V) (The type will be posted on Blackboard)
<i>or by appointment</i>				
At these designated times, I will be available either physically in my office or virtual to help you. You do not need an appointment for the physical office hours. When you come by, I may be assisting another student, but please wait patiently, and I will attend to you eventually. For the virtual office hours, appointments are required to eliminate confusion of students from mixed classes. Please use YouCanBook.Me located on Blackboard.				

Any questions or comments should be sent using **Blackboard email** not your SPC email. SPC email will be used as a secondary communication tool. Since Blackboard is limited in its ability to handle math symbols easily, I will reply to your math questions in pdf, or by video through **Blackboard Collaborate** or Zoom, or another form using an attachment in **SPC email**.

Response Times

I will do my best to respond to your email within the primary office hours availability zone posted on Blackboard. If the emails are overwhelming in volume then please allow me 24 hours = 1 business day of receipt Monday through Thursday throughout the regular business day Monday through Thursday to respond to your email. If I do not respond within 24 hours please email again.

Messaging/Announcements: **Blackboard email** and postings will be used as our primary virtual means of communication. **SPC Email will be used as a secondary communication instrument.** Your course will be contained within Blackboard. The instructor will post general announcements in Blackboard usually accompanied with email to your SPC email address. Blackboard messaging and postings on the course homepage in Blackboard are a primary method of communicating in this class online.

You must check Blackboard homepage on a regular basis preferably daily.

Text: None

Supplies: **Computer access, one flash drive**, large 3-ring notebook binder, dividers, notebook paper, hole punch, stapler, a staple puller, pencils, erasers, a ruler, scientific calculator (preferably a TI-85 or higher).

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: Lectures, effort, and Q&A are the most important activities for success in this course. Attendance will be monitored through in-class Q&A and online video lectures. Maintaining a time management schedule for the online video lectures is crucial to avoid lagging in this class. Records of your attendance are maintained throughout the semester through in-class Q&A and your video lecture attendance. Excessive absences whether in-class Q&A and/or video lectures consist of 5 cumulative videos (days). You are expected to actively participate in the in-class weekly Q&A sessions.

Withdrawal: If you wish to withdraw yourself from this class for any reason, you must initiate the appropriate steps on your own. There is a *How to Drop* tab on my **DE Blackboard** page but I have set with a couple of precautionary steps for your benefit.

Online Essentials:

- 1) Internet access
 - Working, reliable internet access with the ability to view videos via Blackboard or YouTube.
- 2) Computer
 - Method to scan homework. You may be expected to scan your homework and turn your homework (counting as the Notebook grade) in to instructor if the semester converges to complete online.
 - Method of scanning handwritten work to submit. The free app CamScan is available. It is very user friendly and the scans are usually clear. You can scan a group of pages called a “batch”. If you have another suggestion then please feel free to contact me.
- 3) Webcam
 - An online video conference program may be used as a tool to monitor tests if the semester converges to complete online. This online video conferencing requires students to have a webcam. If the computer you will be using does not have a webcam, you will need to use a computer that has one, or purchase one.
- 4) **Blackboard**
 - The online course management system that will be used for this course.
 - A wealth of information is provided to you for this class in the **DE Blackboard**. All the information for this class will exist on Blackboard including but not limited to syllabus (updated), homework assignments, worksheets supplements, videos, previous semester student evaluations, etc., but additional material involves COVID material, Classroom Conduct, Technological & Equipment info & assistance, Tutoring opportunities, and miscellaneous administrative information. 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.

Login at <http://southplainscollege.blackboard.com> . The user name and password should be the same as the MySPC and SPC email.
User name: first initial, last name, and last 4 digits of the Student ID
Password: Original Campus Connect Pin No. (found on SPC acceptance letter)
 - Technical Support: Student support is available by emailing blackboard@southplainscollege.edu or calling 716-2180. When emailing a request for help, include your full name, course(s) enrolled in, name of instructor(s) and a phone number where you can be reached. There are Blackboard video tutorials available at <http://ondemand.blackboard.com/students.htm>.
- 5) Calculator
 - You will need a scientific calculator for this course.
 - Recommended: TI-89 Titanium or TI-92.
 - Acceptable: TI-83, TI-83+, TI-84, TI-84+, or TI-84+ Silver Edition but many others are also acceptable.
 - Any other graphing calculator, you will need to read you manual to determine how to make the processes work.
 - The TI graphing calculator model is not allowed in this class: TI-Nspire.
 - Cell phones and similar devices may NOT be used as calculators and no sharing of calculators is allowed.
 - If you have any questions about your calculator, check with the instructor immediately.
- 6) Other Resources
 - You are expected to keep up with the schedule set forth by the due dates of the video lectures, homework assignments, and the exams. If you need help, please ASK! Here are some other good resources online:
 - Your instructor is your first and BEST resource for any help!!!!
 - Free online math videos at www.khanacademy.org, www.patrickjmt.com, www.mathtv.com, & MIT Opencourseware (last resort).
- 7) Troubleshooting
 - Computer Issues
 - If your personal computer becomes "disabled", then video deadlines can be altered.

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

Q&A assessment: You will be asked to work a problem or two from your homework supplements during the Q&A sessions where your participation will serve as a quiz grade. The number of quizzes you will incur is initially undetermined (unknown number at this moment).

Notebook assessment: 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.

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. If you happen to miss an exam, a grade of 0 will be administered, and under the **H.E.R.** (Honest Effort Rule), this missed exam of grade 0 will not be replaced by the final exam even if the final exam is greater.

Methods of Learning Assessment:

✦ **Handwritten notes for video lectures.** This helps both of us to be diligent in keeping your skills on pace.

Notebook: Homework, quizzes, tests, and other useful material should be kept in a notebook in which the notebook will be used as a reference and study guide. The following material will be placed in the notebook in the order listed:

1. Cover sheet including Name, Class, and Semester
2. Syllabus
3. Assignment sheet
4. Notes
5. Work
6. Quizzes
7. Tests
8. Miscellaneous

*To print all the material for your notebook, please visit the SUPPLEMENTARY category then the Notebook Material tab in the **DE Blackboard** page. All printed material needs to be read at least once during the term of this course.*

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 video is watched as is possible. In your all possible effort, try not to get behind on the homework!

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

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 =
$$\frac{\text{Quiz Avg} + \text{Notebook score} + \text{Test 1} + \text{Test 2} + \text{Test 3} + \text{Final Exam score}}{6}$$

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.

Critical Dates:

Sept 7	Labor Day	Nov 6	WEB Pre-registration for Spring 2021
Oct 16	FALL Break	Nov ??	Advising Day for Math, Computer Science, & Engineering majors only
Nov 19	Last day to drop		Final Exam
Nov 25- 27	Thanksgiving	Dec 9	(10:15 – 12:15p, Wednesday)

Student Responsibilities:

- Be familiar with the Blackboard for this class.
- Be aware of announcements made in Blackboard that is usually accompanied with an email to your SPC email address.
- Read and know the syllabus.
- Ask questions when necessary.
- Work homework problems early enough to seek help if needed.
- Form study groups online and/or in-person. Be extremely careful with the later suggestion.
- **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 Integrity: The attempt of any student to present as his or her own any work which he or she has not honestly performed is regarded by the faculty and administration as a serious offense and renders the offender liable to serious consequences, possibly suspension. For more detail, see “Academic Integrity” and “Student Conduct” in the South Plains College General Catalog.

You are expected to work alone on all quizzes and tests. You are not allowed to use any electronic device other than your calculator during a quiz or test. If you choose to cheat, you will be withdrawn immediately from this class with a grade of "F."

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.

COVID Statement: It is the policy of South Plains College for the Fall 2020 semester that as a condition of on-campus enrollment, all students are required to engage in safe behaviors to avoid the spread of COVID-19 in the SPC community. Such behaviors specifically include the requirement that all students properly wear CDC-compliant face coverings while in SPC buildings including in classrooms, labs, hallways, and restrooms. Failure to comply with this policy may result in dismissal from the current class session. If the student refuses to leave the classroom or lab after being dismissed, the student may be referred to the Dean of Students on the Levelland campus or the Dean/Director of external centers for Student Code of Conduct Violation.

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.

Course Outline			
This schedule is tentative and subjective to change. Changes will be announced in class.			
Week	Date	Supplements	Topics and Sections Covered
1	8/24, Mon	1	Introduction, Definitions, solutions, and Elimination of const. Families
	8/26, Wed	2	Separation of Variables
2	8/31, Mon	3	Homogenous Coefficients
	9/2, Wed	4	Exact Equations
3	9/7, Mon		<i>Labor Day</i>
	9/9, Wed	5, 6	Linear equations, 1 st Order and All types
4	9/14, Mon	7	Bernoulli Equations Substitutions Suggested by the equation
	9/16, Wed	8	Applications
5	9/21, Mon	8	Applications contd.
	9/23, Wed	9	<i>Linear Differential. Equations</i> <i>Linear Independence & the Wronskian</i>
6	9/28, Mon		Test 1
	9/30, Wed	10	<i>Differential Operators; Distinct Roots (Linear equations w/ constant coefficients)</i>
7	10/5, Mon	11, 12	Repeated Roots; Complex Roots (Linear equations w/ constant coefficients)
	10/7, Wed	13	Undetermined Coefficients (Non-Homogenous)
8	10/12, Mon	13	Undetermined Coefficients (Non-Homogenous) contd.
	10/14, Wed	14	Variation of Parameters
9	10/19, Mon	15	Applications (Vibrations)
	10/21, Wed	16	<i>Laplace Transforms</i> <i>Inverse Laplace Transforms</i>
10	10/26, Mon		Test 2
	10/28, Wed	16.5, 17	<i>Inverse Laplace Transforms</i> <i>I.V.P.'s (Initial Value Problem)</i>
11	11/2, Mon	17.5, 18	I.V.P.'s; Discontinuous R. H. S.
	11/4, Wed	18.5	Discontinuous R. H. S. System linear equations by algebra
			SPC Math, CS, & Engineering Advising Day
12	11/9, Mon	M	Review Matrix algebra
	11/11, Wed	19	Eigen values & vectors Distinct Roots
			<i>Intro to Engineering Projects</i>
13	11/16, Mon	20	Complex Roots Repeated Roots
	11/18, Wed	21	Non-homogeneous Systems
14	11/23, Mon		Test 3
	11/25, Wed		<i>Thanksgiving</i>
15	11/30, Mon	22	Solution by Power Series contd. Recursion formula
	12/2, Wed	22	Solution at $x = 0$ Solution at $x = a$
Finals	12/9, Wed		Section 001 <i>FINAL EXAM: 10:15 – 12:15p</i>

South Plains College
Common Course Syllabus: MATH 2320
Revised August 2020

Department: Mathematics, Engineering, and Computer Science

Discipline: Mathematics

Course Number: MATH 2318

Course Title: Differential Equations

Available Formats: conventional/flex

Campuses: Levelland

Course Description: Ordinary differential equations, including linear equations, systems of equations, equations with variable coefficients, existence and uniqueness of solutions, series solutions, singular points, transform methods, and boundary value problems; application of differential equations to real-world problems.

Prerequisite: Successful completion with a grade of 'C' or better in MATH 2414.

Credit: 3 **Lecture:** 3 **Lab:** 0

Textbook: None

Supplies: Please see the instructor's course information sheet for specific supplies.

This course partially satisfies a Core Curriculum Requirement: None

Core Curriculum Objectives addressed:

- **Communications skills**—to include effective written, oral and visual communication
- **Critical thinking skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- **Empirical and quantitative competency skills**—to manipulate and analyze numerical data or observable facts resulting in informed conclusions

Student Learning Outcomes: Upon completion of this course and receiving a passing grade, the student will be able to:

1. Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.
2. Solve ordinary differential equations and systems of equations using:
 - a. Direct integration
 - b. Separation of variables
 - c. Reduction of order
 - d. Methods of undetermined coefficients and variation of parameters
 - e. Series solutions
 - f. Operator methods for finding particular solutions
 - g. Laplace transform methods
3. Determine particular solutions to differential equations with given boundary conditions or initial conditions.
4. Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.

Student Learning Outcomes Assessment: A pre- and post-test questions will be used to determine the extent of improvement that the students have gained during the semester

Course Evaluation: There will be departmental final exam questions given by all instructors.

Attendance/Student Engagement Policy: Attendance and effort are the most important activities for success in this course. The instructor maintains records of the student's engagement throughout the semester. The student will be allowed to miss twenty percent (20%) of class assignments for the semester, **for any reason**. Should this number be exceeded, the instructor has the right to drop the student with a grade of F or an X, depending on the instructor's discretion.

Plagiarism violations include, but are not limited to, the following:

1. Turning in a paper that has been purchased, borrowed, or downloaded from another student, an online term paper site, or a mail order term paper mill;
2. Cutting and pasting together information from books, articles, other papers, or online sites without providing proper documentation;
3. Using direct quotations (three or more words) from a source without showing them to be direct quotations and citing them; or
4. Missing in-text citations.

Cheating violations include, but are not limited to, the following:

1. Obtaining an examination by stealing or collusion;
2. Discovering the content of an examination before it is given;
3. Using an unauthorized source of information (notes, textbook, text messaging, internet, apps) during an examination, quiz, or homework assignment;
4. Entering an office or building to obtain an unfair advantage;
5. Taking an examination for another;
6. Altering grade records;
7. Copying another's work during an examination or on a homework assignment;
8. Rewriting another student's work in Peer Editing so that the writing is no longer the original student's;
9. Taking pictures of a test, test answers, or someone else's paper.

COVID Syllabus Statement: Should be provided by the Vice-President of Student Services over email.

Student Code of Conduct Policy: Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, aggressive, or demeaning. Student conduct that disrupts the learning process or is deemed disrespectful or threatening shall not be tolerated and may lead to disciplinary action and/or removal from class.

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 Disability 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 Disability Services Office. For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Reese Center (Building 8) 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

Nondiscrimination Policy: South Plains College does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities. The following person has been designated to handle inquiries regarding the non-discrimination policies: Vice President for Student Affairs, South Plains College, 1401 College Avenue, Box 5, Levelland, TX 79336. Phone number 806-716-2360.

Title IX Pregnancy Accommodations Statement: If you are pregnant, or have given birth within six months, Under Title IX you have a right to reasonable accommodations to help continue your education. To [activate](#) accommodations you must submit a Title IX pregnancy accommodations request, along with specific medical documentation, to the Director of Health and Wellness. Once approved, notification will be sent to the student and instructors. It is the student's responsibility to work with the instructor to arrange accommodations. Contact the Director of Health and Wellness at 806-716-2362 or [email cgilster@southplainscollege.edu](mailto:cgilster@southplainscollege.edu) for assistance.

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 and Frequently Asked Questions, please refer to the Campus Carry page at: <http://www.southplainscollege.edu/campuscarry.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.

SPC Bookstore Price Match Guarantee Policy: If you find a lower price on a textbook, the South Plains College bookstore will match that price. The difference will be given to the student on a bookstore gift certificate! The gift certificate can be spent on anything in the store.

If students have already purchased textbooks and then find a better price later, the South Plains College bookstore will price match through the first week of the semester. The student must have a copy of the receipt and the book has to be in stock at the competition at the time of the price match.

The South Plains College bookstore will happily price match BN.com & books on Amazon noted as *ships from and sold by Amazon.com*. Online marketplaces such as *Other Sellers* on Amazon, Amazon's Warehouse Deals, *fulfilled by Amazon*, BN.com Marketplace, and peer-to-peer pricing are not eligible. They will price match the exact textbook, in the same edition and format, including all accompanying materials, like workbooks and CDs.

A textbook is only eligible for price match if it is in stock on a competitor's website at time of the price match request. Additional membership discounts and offers cannot be applied to the student's refund.

Price matching is only available on in-store purchases. Digital books, access codes sold via publisher sites, rentals and special orders are not eligible. Only one price match per title per customer is allowed.

Note: The instructor reserves the right to modify the course syllabus and policies, as well as notify students of any changes, at any point during the semester.

MATH 2320 (3:3:0)
DIFFERENTIAL EQUATIONS

MATHEMATICS DEPARTMENT

Division of Arts & Sciences

South Plains College

FALL 2020

Shirley Davis