South Plains College

MATH 2320 – Differential Equations (DE)
HYBRID/Flex
Section 001, M W 1 – 2:15 pm
Math Bldg., Rm. 105

I. Instructor Info
A. Instructor: Miss S. Davis
  1.) **Office:** 103 MATH Bldg.
  2.) **Phone:** (806) 894 – 9611 ext. 2699
  3.) **E-mail address:**
    sdavis@SouthPlainsCollege.edu

    a.) Any questions or comments should be sent using **Blackboard email** (i.e., Course Messages) not your SPC email. SPC email will be used as a secondary communication tool.

    b.) **Response Times**
I will do my best to respond to your email within the primary office hour availability zone posted on Blackboard. If the emails are overwhelming in volume then please allow me 72 hours = 3 business days of receipt Monday through Thursday throughout the regular business day Monday through Thursday to respond to your email. If I do not respond within 72 hours please email again. Response times are dependent on whether my proposed method of emailing is respectively followed. In other words, if you decline to follow my instructions for emailing me through Blackboard and email me through my SPC email account then response times could take weeks.

  4.) **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 since student emails can be overwhelmed by administrative emails.** Your course will be contained within Blackboard. The instructor will post general announcements in Blackboard.

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

Office Hours:

Monday	Tuesday	Wednesday	Thursday	Friday
10:30 – 11a (F2F/V)	10:45 – 11:45a 2:30 – 4p (F2F/V)	5 – 5:30p 6:45 – 7:15p (F2F)	10:45 – 11:45a 2:30 – 3:30p (F2F/V)	9:30 – 11:30a (F2F/V)

or by appointment
F2F = face-to-face   *V = virtual*

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 MS Bookings located in DE Blackboard, *Schedule Virtual Appointment,* under the category, INSTRUCTOR INFO.

II. Course Info
A. Course Description: Ordinary differential equations including topics: linear and non-linear differential equations with constant & variable coefficients, existence and uniqueness of solutions, solutions using Laplace transforms, systems of differential equations, singular points, power series solutions, and applications including boundary value problems.

B. Text: None

C. Supplies: Computer access, Computer laptop (recommended), 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).

D. Purpose: Math 2320 is offered to satisfy degree requirements for pre-engineering students planning to transfer to schools in Texas.

E. Prerequisites: Successful completion with a grade of 'C' or better in MATH 2414 (Calculus II) and, strategically, MATH 2318 (Linear Algebra)

III. Attendance Policy
A. Attendance: Lectures, effort, and Q&A are the most important activities for success in this course. Records of your attendance are maintained throughout the semester. Maintaining a time management schedule for the online video lectures and homework is crucial to avoid lagging in this class. The student is expected to attend at least eighty percent (80%) of the total class meetings and submit at least eighty percent (80%) of the total class assignments to have the best chance of success. 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. If the student fails to meet these minimum requirements, the instructor may remove the student from the class with an X, upon their discretion, to help the student from harming their GPA. If the student cannot receive an X, the instructor will assign an F.

B. 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 *Student Initiated Withdrawal* folder in the **DE Blackboard** (**DE Bb**) course but I have set it with a couple of precautionary steps for your benefit.

IV. Equipment
A. Online Essentials:
1.) Internet access
- ➤ Working, reliable internet access with the ability to view videos via Blackboard or YouTube and participating in online conferences via Zoom.

2.) Computer (laptop highly recommended)
- ➤ *Method to scan homework/tests.* You may be expected to scan your homework/tests and turn your homework (counting as the Notebook grade) in to the instructor under **verified extenuating circumstances** (refer to VII. F.) of this syllabus).
- ➤ *Method(s) 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. Practice makes perfect in terms of time duration and thoroughness for these methods.

3.) Webcam
- ➤ An online video conference program will be used as a tool to attend live lectures online through Blackboard and to monitor work activity under **verified extenuating circumstances**. Thus, online video conferencing requires students to have a webcam. If class must be attended virtually (Zoom, Blackboard Collaborate, etc.) due to **verified extenuating circumstances** then video and audio must be operable and executed during the entire class session for attendance or any other matter of credit.

4.) **Blackboard (Bb)**
- ➤ 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 Bb**. All the information for this class will exist on Blackboard including but not limited to syllabus & compendium, homework assignments, worksheets supplements, videos, & etc., but additional material involves COVID material, Classroom Conduct, Technological & Equipment info & assistance, Tutoring opportunities, previous semester student evaluations, and miscellaneous administrative information. Please be responsible to log in to Blackboard and visit **DE Bb** 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. (located on SPC acceptance letter)

- ➤ *Technical Support:* Student support is available by emailing blackboard@southplainscollege.edu or calling 716-2962. 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.
- ➤ *Blackboard Tutorials.* Blackboard video tutorials are available at http://ondemand.blackboard.com/students.htm.
- ➤ *Blackboard App.* A free Blackboard App is highly suggested and recommended and can be downloaded in the APP store specific to your cell phone and can be found on **DE Bb**.

5.) Calculator
- ➤ You will need a scientific calculator for this course.
- ➤ Recommended: TI-89 Titanium (for STEM majors) 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.

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.

7.) Troubleshooting
- ➤ Computer Issues
  - • If your personal computer becomes "disabled", then you will need to seek an alternate computer source.

V. Coursework Policies

A. <mark>**Assignment Policy:**</mark> Homework will be assigned for each class meeting. <u>You are expected to work all problems assigned in each assignment and to seek help when you do not understand.</u> You are responsible for keeping up to date and prepared. <u>Homework is to be completed and be kept in a notebook that must accompany you to each (f2f) class session.</u> The following procedure will be used on all the homework:

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

   (1.) problem

      work for problem

         | **answer** |

   (5.) problem

      work for problem

         | **answer** |

B. <mark>**Assessments:**</mark> There will be quizzes administered over various topics such as online Blackboard assignments, review of previous subject material, and course material worksheet. The number of quizzes for the semester is undetermined but only a portion will count as the quiz grade.

For the time being, the notebook will be physically submitted the day of each exam and graded. <u>No late notebooks will be allowed</u>. If physical submission of the notebook becomes problematic due to **verified extenuating circumstances** then an alternate approach will be considered for the notebook submission and grade. The notebook average will count as a test grade.

C. <mark>**Tests:**</mark> There will be three tests (final exam exclusive) and a comprehensive final exam. Exams will be f2f unless there exist **verified extenuating circumstances** in which the exams will be conducted online through Zoom meetings. Zoom invitations will be delivered through Blackboard via announcements and/or Bb email on or before exam days.

If the final exam score is greater than any non-zero major exam score then the final exam score replaces the major exam score. In other words, the major exam score will be deleted, and the final exam score will count two times (an exception is the Honest Effort Rule (**H.E.R.**) policy). See your OUTLINE for the approximate date for each test.

   1.) **Make-up Policy:** There is no automatic provision for making up exams. Only under **verified extenuating circumstances** (e.g., death in the family, hospitalization, +COVID test) will make-up exams be inevitable. These situations will be dealt with on a trial-by-trial basis. If at all possible, the instructor should be notified prior to missing an exam.

D. <mark>**Lectures:**</mark> Class will begin promptly as scheduled. You should be in your seat and ready to go at this time.

E. <mark>**Grading Policy:**</mark> Your final grade will be based solely on major exam scores, quiz average, notebook score (homework average), and a comprehensive final.

   1.) <mark>**Grading Score:**</mark> $\text{Final score} = \dfrac{\text{Test 1} + \text{Test 2} + \text{Test 3} + \text{Quiz Average} + \text{Notebook Score} + \text{Final Exam score}}{6}$

   2.) <mark>***NOTE*:**</mark> If the final exam score is greater than the least non-zero major exam score (excluding the Notebook score & Quiz average) 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.

   3.) <mark>**Borderline Grades:**</mark> These grades will be evaluated with regard to attendance and mature conduct in class.

   4.) <mark>**Blackboard Gradebook:**</mark> Your grades will be accessible in **DE Bb** Gradebook. However, I consider Bb Gradebook the UNOFFICIAL grade because, at any time, it may not contain all your grades for the course. For your final score in this course, you will obtain at the end of the semester <mark>**through Texan Connect &/or Colleague.**</mark>

F. 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 if possible. With your greatest effort, try not to get behind on the homework! Refer to the "How to Study" sheet for further detailed studying suggestions.

1.)

> Differential Equations is a time-consuming class. In terms of difficulty, the theory can be challenging but the greatest opponent in this class is the time factor required of the methods to solve the math problems. You will find yourself re-evaluating your time allotment and study skills throughout this course. Please allow for both of these at the beginning and throughout the remainder of the semester.

2.) **Methods of Learning Assessment:**

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

3.) **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:

    a.) Cover sheet including Name, Class, and Semester

    b.) Syllabus

    c.) Assignment sheet

    d.) Notes

    e.) Work

    f.) Quizzes

    g.) Tests

    h.) Miscellaneous

      (1.) *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.*

4.) **Tutoring:** Free tutoring is available in the Math-Engineering building (room M116) and online. For the Math-Engineering building tutor, please remember to sign in when you seek help from a tutor. For free online tutoring, please refer to **DE Bb**.

5.) **Video Tapes:** Videos are available online through Blackboard. 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

VI. Critical Dates:

Jan 17	MLK, Jr.	April 8	**WEB Pre-registration for Summer, Spring Interim, & Fall 2022**
March 14 – 18	SPRING Break		
April 15	Easter		**Final Exams**
April 28	Last Day to Drop	May 11	*(10:15 – 12:15p, Wednesday)*

VII. Responsibilities & Consequences

A. Student Responsibilities:

1.) Attend class, be aware of announcements made in class and on Blackboard, and ask questions when necessary.

2.) Work homework problems early enough to seek help if needed.

3.) Form (virtual) study groups.

4.) Work extra problems as required to understand each topic.

5.) Students are NOT required to wear a face mask while in SPC campus buildings or in outside areas (refer to X. A. of this syllabus). However, it is recommended.

6.) All students are encouraged to implement good hygiene measures such as washing hands regularly, using hand sanitizer, and covering coughs/sneezes. Hand sanitizing stations are available across all SPC locations.

7.) ****_Cell phones, laptops, and pagers during class!_ ****

    a.) Cell phones and laptops are required to use in class in order to upload class work documents.

      (1.) If the instructor determines that activation of a cell phone, pager, PDA, or laptop irrespectively interrupts the lecture or classroom discussion or impedes the progress of any student then the instructor will ask the student to leave either temporarily or permanently.

      (2.) **No technologic devices such as cell phones, PDA's, etc. are to be used during tests or in-class quizzes but, at the instructor's discretion, may be used at the completion of tests and/or in-class quizzes. If due to technological disruption, the instructor may grant permission for a student(s) to use such devices for a test or in-class quiz.**

8.) **Follow the classroom policy, no food or drink allowed in the classroom if posted (located in DE Blackboard, under SUPPLEMENTARY category and tab, _Notebook Material_).**

9.) **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.**

10.) **You will obtain your final grade for the class through Texan Connect &/or Colleague.**

B. Cell Phone Policy: All students will, during each class period and for its duration, place and keep their cell phone in its deactivated state, 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 unless the cell phone is used as a laptop function. 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.

C. 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.

    1.) 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."

D. 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.

E. 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. (Refer to page 9 of the syllabus for specific details of the definitions of cheating and plagiarizing.)

F. Verified Extenuating Circumstances. If you happen to incur a sickness, contagious or not, and/or a family member incurs a sickness.

VIII. Questions:

A. 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.)

IX. 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 written, the type of differential equation encountered (First Order, Higher Order, a system of DE then Separation of Variables, Homogeneous, Exact, Bernoulli, Undetermined Coefficients, Variations of Parameters, etc.), comment on the type of solution expected (form and general or particular), 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 the equations with initial conditions or given boundary 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 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, proposing methods of solution that require differential equations, finding a suitable differential equation with initial conditions, and then finding the solution for that equation.

X. SPC Policies & Procedures

A. COVID Statement: Consistent with the latest CDC recommendations, it is the policy of South Plains College for the Spring 2022 semester that as a condition of on-campus enrollment, all students, faculty, & staff who have a known exposure or have tested positive should wear a mask for 10 days and should seek a COVID-19 test on day five after exposure. If at any time you test positive for COVID-19 &/or develop symptoms, you should immediately self-isolate and seek a COVID-19 test. Please immediately notify your instructor, supervisor, and the Health Services, DeEtte Edens, BSN, RN, Associate Director of Health and Wellness, at (806) 716-2376 or *dedens@southplainscollege.edu* (This Health Services info can also be accessed on the **DE Blackboard** course located under the SERVICES category in *Student Health Services* tab).

(This information and more regarding COVID is located on the **DE Blackboard** course in the tab, *COVID Information*). 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 or class but should wear a mask for five additional days. If you are still symptomatic, please contact DeEtte Edens.

B. 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.

C. 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.

D. 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.

E. 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 lcleavinger@southplainscollege.edu or go by the Health and Wellness Center. You can schedule an appointment with a counselor by calling 716-2529.

F. 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 for assistance.

G. 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	1/17, Mon		*MLK, Jr.*
	1/19, Wed	1	Introduction, Definitions, & Solutions and Elimination of const. Families
2	1/24, Mon	2	Separation of Variables
	1/26, Wed	3	Homogenous Coefficients
3	1/31, Mon	4	Exact Equations
	2/2, Wed	5, 6	Linear equations, 1st Order and All types
4	2/7, Mon	7	Bernoulli Equations Substitutions Suggested by the equation
	2/9, Wed	8	Applications
5	2/14, Mon	8	Applications contd.
	2/16, Wed	9	*Linear Independence & the Wronskian*
6	2/21, Mon		Test 1
	2/23, Wed	10	Differential Operators; Distinct Roots (Linear equations w/ constant coefficients)
7	2/28, Mon	11, 12	Repeated Roots; Complex Roots (Linear equations w/ constant coefficients)
	3/2, Wed	13	Higher Order Culmination Undetermined Coefficients (Non-Homogenous)
8	3/7, Mon	13, π	Undetermined Coefficients (Non-Homogenous) contd.
	3/9, Wed	14	Variation of Parameters
	3/14 - 3/18		*Spring Break*
9	3/21, Mon	15	Applications (Vibrations)
	3/23, Wed	16, 16.5	*Laplace Transforms* *Inverse Laplace Transforms*
10	3/28, Mon		Test 2
	3/30, Wed	17	Inverse Laplace Transforms (with Transformations)
11	4/4, Mon	17.5	I.V.P.'s (Initial Value Problem)
	4/6, Wed	18	Discontinuous R. H. S.
12	4/11, Mon	18.5 M	Discontinuous R. H. S. Review Matrix algebra – (*on your own*)
	4/13, Wed	19	Eigen values & vectors – Distinct Roots
	4/15, Fri		*EASTER*
13	4/18, Mon	20	Complex Roots Repeated Roots
	4/20, Wed	21	Non-homogeneous Systems
14	4/25, Mon	22	*Solution by Power Series – Recursion Formula*
	4/27, Wed		Test 3
15	5/2, Mon	22	Solution by Power Series – Solution at x = 0
	5/4, Wed	22	Solution by Power Series – Solution at x = a
Finals	**5/11, Thurs**		**10:15 – 12:15p**

MATH 2320 (3:3:0)

DIFFERENTIAL EQUATIONS

MATHEMATICS DEPARTMENT

Division of Arts & Sciences

South Plains College

SPRING 2022

Shirley Davis