MTE 558.500 • Concepts in Calculus •
Spring 2020 • Syllabus

Instructor and Class Meeting Information

Instructor

- **Name:** Dr. Brian Beavers
- **Department:** Mathematics and Statistics
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- **Office Phone:** 936.468.1433
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- **Personal ZOOM Meeting Room:** sfasu.zoom.us/my/drbeaverssfa
- **Offices:** Math Building 310, STEM Building 310
- **Office Hours:** TBA

Class Meetings

**Class Meetings and Location:** This is an online course. There are no physical class meetings.

**Course Expectations:**

The following is an excerpt from SFA Policy 5.4:

*The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:*

1. **Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;**
2. **At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.**
To this end, all students in online courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of three hours of work for every credit hour associated with this course.

Expected activities to be completed in the time include reviewing course content, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation. Students should check daily for course announcements. In order to effectively participate in course discussions, students should log in and participate in the course at least four days each week, not just during weekends, and preferably daily.

### Required Materials

- No required textbook
- Functional computer with internet connectivity, preferably high-speed, and modern browser (Chrome, Firefox, Edge, Safari)
- Microsoft Office (available from SFA via mySFA and Office 365)
- Microsoft Teams
- Hand-held graphing calculator, such as TI-83 or TI-84.

### Course Description

Algorithmic and numerical approaches to problems in algebra, geometry, number theory, counting techniques, modeling and limiting processes. Students will use a variety of computer software and will be required to have a graphics calculator. Prerequisite: C or higher in MTE 556.

### Learning Objectives

See the [departmental syllabus](#) online.

### Course Introduction

Most of the amazing technology of the modern world has calculus to thank for its creation. Calculus was built on taming some aspects of infinity... a difficult and mind-expanding feat.
In this course, we will take your knowledge of algebra and your skills in rigorous mathematical thinking to see how to get finite results from infinite processes - results that have amazing and far-reaching applications.

In this class, we have a variety of activities: readings, assignments, discussions and projects, both as an individual and in groups, to help you understand the concepts and develop necessary skills. Your course letter grade will be calculated as a weighted average of four tests and the series of assignments.

This course is dependent on technology and making machines do what we need them to do when we need them to do it. If you find a glitch in anything, it is your responsibility to inform me immediately! If it is something that I can fix, I will do so ASAP. Otherwise, I will direct you to other means of help. Only with such advance notification will I consider extending deadlines as a result of technical difficulties.

Getting Started

The first requirement of this course is to complete the "Start Here!" module which basically gives you all the information that you will need to be prepared for this online course. You should regularly consult the timeline in the Getting Started module. This timeline provides a list of all assignments as well as their due dates. I will be updating this as the semester proceeds. Also, be sure to read each News item carefully; I will use the News tool to remind you of upcoming deadlines and make important announcements. You may want to set D2L to alert you outside of D2L when there is a new News item.

The Getting Started module includes all the basic course information such as this syllabus, the departmental course description, an introduction assignment, etc. Note that successful completion of the Getting Started module includes a quiz designed to reinforce the important points in this document and the other materials in the module. **You must receive a perfect score (100%) on the quiz and create a new thread in the Student Introduction Discussion before any other modules will be available to you. You may retake the quiz until you receive the required score.**

About the Content Modules

There are seven modules in this course. The first includes a review of some material from previous courses. The next two provide a review of sequences and series plus some new ideas. In addition, we will define the concept of limit and examine ways to calculate the limit of sequences and series. In the third module, we will use sequences and series to introduce proof by induction. In the fourth module, we will extend the idea of limits to functions. In the final two modules, we will examine the concepts of the derivative and integral - the two main tools of calculus. Each module includes practice problems and Stop & Think exercises. Solutions to these are provided the module. At the end of each module, you will be required to complete a module quiz over the content in the module before moving on to the next
module. These quizzes are designed to assess your proficiency with the content and to help you identify any areas you should explore further. The quizzes are scored in D2L and thus you will have results immediately after submission. Only the first attempt on the module quiz is recorded. The quizzes may be repeated but, since the solutions are revealed once the quiz is submitted for grading, the score on the subsequent attempts will not be recorded. Additional attempts will serve only as a review of the material. In some modules, you will also have assignments that must be submitted via the dropbox tool or discussion assignments that will be posted to the discussion board. Graded assignments will be the bulk of the participation part of your course grade.

The Discussion Board

The discussion board is the location where the you and your classmates will see any discussion assignments and post discussion responses that are to be shared with the whole class. Discussion assignments count toward the class participation portion of your grade. If you click the discussion tool, you will see that there are three items available to you on day one: Student Introductions, Errata Discussion, and Free Discussion.

If you have already completed your student introduction, you should see that introduction posted in the Student Introduction Discussion along with the postings from your classmates. (Be sure to revisit this link so that you can find out who else is in the course with you!) The Free Discussion category is a place where we can talk in general about anything regarding the course. This is a place where you can post a question that you have about the course, whose answer might also serve other students.

In addition, you should see a category entitled "Errata Discussion". Although I have tried to make sure that all information is correct, I am constantly updating and improving the course. In making improvements, it's easy for an error or typo to slip in. For example, if you find a link that is not working, please post that information to the Errata Discussion board including where the link is located in the module. All error captures to this board are greatly appreciated by the designer of the course!

Weekly ZOOM Meetings

The class will have a weekly one-hour meeting at a time to be announced after a survey during the first week of classes. This is an optional meeting, but all students are highly encouraged to attend, either live in the classroom, live in the ZOOM video conferencing tool, or by watching the video recording of the class meeting after the meeting has occurred. This meeting is a chance for you to ask questions and get live help with the content of the course. We will also use this time to extend the class discussion assignments from the discussion tool.
Course Outline

- Modules
- Getting Started
- Module 0: Review
- Module 1: Sequences
  - sequences - definition and notation
  - recursive vs. direct formula notation
  - arithmetic and geometric sequences & formulas
  - using finite differences to find direct formulas
  - using algorithms to approximate roots of polynomials
  - convergence and divergence of sequences
  - limit of a sequence
  - using spreadsheets and other computation software to compute sequence values and estimate limits
- Module 2: Series
  - definition of series
  - sigma notation
  - sequence of partial sums
  - convergence and divergence of series
  - sum of a series
  - geometric series and formulas
  - repeating decimals
  - using spreadsheets and other computation software to compute partial sums and estimate limits
- Module 3: Mathematical Induction Proofs
- Module 4: Limits of Functions
  - definitions concerning limits of functions
  - estimating limits of functions numerically
  - estimating limits of functions using graphs
  - computing exact limits of functions using algebra
- Module 5: Derivatives
  - slopes and rates of change
  - definition of derivative
  - tangent lines and their slopes
  - instantaneous vs. average rates of change
  - interpreting graphs using derivatives
  - estimating derivatives numerically
  - computing derivatives using the rules
- Module 6: Integrals
  - definition of definite and indefinite integrals
  - fundamental theorem of calculus
  - estimating integrals with Riemann sums
computing exact areas using definite integrals
using definite integrals to compute displacement

Grading Policy

Computation of Course Grade

Your course grade will be determined by your performance on graded work in the following categories: (1) assignments (both individual and group), (2) three tests (3) a comprehensive final exam. Your final course grade will be the weighted mean as follows:

- "Participation" - 10%. This is the mean of your scores, equally weighted, on the various assignments that I will collect during the course. Many assignment will be written homework to be turned in to D2L's Dropbox feature. Some will be discussions or quizzes in D2L. All assignments will be detailed in the module and timeline in D2L.
- "Test 1," "Test 2," and "Test 3" - 20% each, and "Final Exam" - 30%. You will be required to complete three tests and a final during this course. For each test, you will be allowed 1.5 hours, and 2 hours for the final exam. These must be completed on the SFA campus at designated times or at an approved testing center.

- Test Dates for Off-Campus Proctored Tests
  - Test 1: February 10-12
  - Test 2: March 2-4
  - Test 3: April 6-8
  - Final Exam: May 4-6
- On Campus Test Dates: 4 - 8 PM
  - Test 1: February 12, room TBA
  - Test 2: March 4, Math Building 101
  - Test 3: April 8, room TBA
  - Final Exam: May 6, Math Building 101

Score Descriptors

Tests, the Final Exam, and your final course letter grade will be graded on the "standard 10-point" scale based on the percentage (rounded to the nearest percent) of total points earned by the student on the exam or on assignments:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>[90%,100%]</td>
</tr>
<tr>
<td>B</td>
<td>[80%,90%)</td>
</tr>
</tbody>
</table>
Assignments counting towards the Participation component will be graded holistically on a 0-10 scale based on completion and performance; the overall Participation course component will be the mean of these scores, converted to a percentage out of 100. The various scores are described below. To summarize, a "passing" score is a 7 or higher and a "failing" score is a 6 or lower. Each score will take execution, communication, and correctness into account. I am using this system so that I can better communicate to you whether you understand the material well enough or not. Your primary goal is to earn a 7 or better on each assignment. In addition, for any group assignments, participation by each group member will be considered.

<table>
<thead>
<tr>
<th>0-5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9 or 10</th>
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<tbody>
<tr>
<td><strong>Failing (&quot;F&quot;)</strong></td>
<td><strong>Deficient (&quot;D&quot;)</strong></td>
<td><strong>Average (&quot;C&quot;)</strong></td>
<td><strong>Good (&quot;B&quot;)</strong></td>
<td><strong>Outstanding (&quot;A&quot;)</strong></td>
</tr>
<tr>
<td>This score means that either you did not complete the assignment, or your mathematics or communication shows serious and fundamental errors. You need to review prerequisite material and the basics of what was being assessed. You must complete every assigned problem in order to score higher than a 5.</td>
<td>This score means that you show some understanding but the flaws in mathematics or communication are not sufficient to be considered passing.</td>
<td>This score means that, overall, you understand the material well enough to pass, but you made several substantial mistakes in mathematics or you communicated poorly.</td>
<td>This score means that, overall, you understand the material well, but made minor mistakes in the mathematics or communication.</td>
<td>These score means that your mathematics and communication are flawless or nearly flawless.</td>
</tr>
</tbody>
</table>

Note that certain mistakes by themselves will automatically drop you to a 6 or lower because they are common but fundamental errors that wreck havoc on the truth of your work or fundamentally change the difficulty level of the task at hand. Also, be sure to think about what your writing communicates to a reader. I grade what you have said, not what you meant to say.
Make-Up, Communication, Academic Dishonesty, and Other Class Policies

- It is your responsibility to be aware of due dates and to have access to a computer and other equipment that can handle the necessary work, and to schedule enough time to complete the assignments. Don't wait until the last minute to start on your assignments; start on them immediately so that you have time to sufficient time to think about them before the deadline.
- Generally, missed assignments cannot be made up except in the case of an extended, but excused, absence (such as a week-long illness).
- Deadlines may be extended at the discretion of the instructor in case of exceptional technical difficulties, but you should make every effort to avoid doing things at the last minute.
- Discussions require time to develop. Please start on discussion assignments immediately so your classmates can have time to consider and respond.
- Please don't hesitate to contact me if you have questions. You may call my office, leave a voice mail with my Google Voice number, text my Google Voice number, use chat in D2L, or e-mail me. I only have five scheduled office hours on campus, but half my duties are technical support for the college, so I can usually easily be found in or around my office, the math building, or the science building during the week. So, schedule a time to meet me in person or online during the week if my office hours don't fit your schedule.
- However, you should hesitate to contact me if the information you are asking about can be found in the syllabus or content in D2L. Check those resources before asking me. Issues needing your immediate attention will be posted as news items.
- You bear some responsibility to help make the class a welcoming learning environment. See the SFA Way, below, as a reminder of how we all can work together to make this class a safe and respectful learning environment. I also pledge to follow the SFA Way.
- You are expected to participate every day and to contribute substantively to each group assignment; your grade on assignments can be affected by nonparticipation.
- Academic dishonesty ("cheating") is a most serious offence, resulting in a grade of 0 on the assignment and being reported to the university. Remember, academic dishonesty is determined by what I consider cheating; what I consider cheating may not be the same as what you consider to be cheating. If you have any questions as to what I consider cheating, it is your responsibility to ask me about it ahead of time. Here are some of the ways I define academic dishonesty for the various components of this class. These are examples and not exhaustive lists of what I consider cheating. See also the official SFA policy later in the syllabus.
  - Overall: Copying or paraphrasing from any source without citation or without explicit permission
• Tests and final exam: Do not use any materials besides those provided at the test or otherwise expressly permitted by the instructor. You will be permitted to use your calculator, a writing instrument, and scratch paper on each test. Water or other drinks are permitted at the discretion of the instructor or testing facility after inspection. You may use any calculator sufficient for your computation needs but you must not program notes into your graphing calculator. You may not talk to anyone else in the class about any specifics on the test unless neither of you have taken the test and until after both you and the other student have taken the test. For those of you testing off campus, your chosen testing center may have more restrictive requirements than me.

• Group assignments: Copying or paraphrasing from any other groups or anyone outside the course. Using projects submitted by students who have previously taken the course is also considered academic dishonesty. Only use the resources allowed in the instructions.

• Individual assignments: Copying or paraphrasing from other students is prohibited. Individual assignments are intended to measure your understanding of the material of the course, not anyone else's. As individual work, it is normal to expect that your work should have some significant differences that indicate your individuality. Just changing a few words or symbols from someone else's work counts as cheating. You work should reflect your true understanding of the material, not just responses parroted or cobbled together from others in class or outside class, including the internet in general. With advance permission, you may work together on some assignments. But if you do so, indicate somewhere in the assignment who you worked with. You should make a deliberate effort to make you work look different from the person you worked with. "We worked together" is not a valid excuse for individual assignments to look the same unless you have explicit permission from me. The Stop & Think and other activities are there for you to discuss with others so you can prepare for the Individual Assignments.

• Make sure you have read this entire syllabus carefully because you are responsible for what lies within it. Ignorance of the rules is not an excuse.

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**Tips For A Successful Math Class**

• Sleep and relax! Well...outside of class, that is. It is hard to do math well with a tired or anxious mind!

• Learn mathematical terminology! It’s hard to think and talk about concepts when you don’t know what the words mean that we’re using. For any math word, be able to give a formal definition, an informal definition, an example that illustrates the concept, and “non-examples” (examples of situations that are close to being right, but not quite).

• Do. The. Homework. All of it. Several times if necessary. Create new problems if you run out of problems to practice.
• Strategize! Take the time to think about how the different types of problems are solved and create a road map in your mind how to get to the solution.
• The quality of the time is as important as the quantity of the time you spend studying. You have to understand the concepts and basic examples before you can master the harder problems. Regularly look back at the big picture when you get stuck on an immediate detail.
• Get help! If you’re alert, know the words, and understand the examples but are still stuck, then get help from me or a tutor.
• Learning math is a lot like learning anything else – sports, music, etc. Some have natural talent, some don’t. At the beginning, you have to drill those basic moves until you can do them almost without thinking in order to overcome your anxiety. Only then can you concentrate on improving your skills and learning more sophisticated moves. I am your coach; I can’t make the moves for you. I can show you the mechanics of the move and explain why the move does what it does, but only you can do it for yourself. You must both practice and reflect on your performance in order to win!
• Find your motivation and hold onto it! It’s hard to do well in something you don’t want to do, and it’s easy to get lost in the drudgery and lose focus. But, math can be very beautiful and enjoyable with a little motivation!

The SFA Way

"...striving for personal excellence in everything that we do."

At Stephen F. Austin State University, our faculty, staff, alumni and students believe in doing things "The SFA Way." We expect the best from ourselves and from each other, and we hold each other accountable when we fail to maintain these standards.

Root Principles

Grounded in the five "Root Principles" below, members of the SFASU community seeks to strive for personal excellence in everything that we do.

The Principle of Respect:

Lumberjacks command respect and treat others with respect ● They are considerate of others and tolerant of differences ● They demonstrate respect for those around them by avoiding the use of offensive or profane language ● They do not threaten or harm anyone and deal peacefully and civilly with conflict.

The Principle of Caring:

Lumberjacks think of the needs of others and seek to improve the quality of life of those around them ● They are compassionate, empathic and kind ● They respond with humility to those they have helped and express gratitude freely to those who help them ● Lumberjacks
prepare themselves to become leaders in their communities and workplaces • They dedicate themselves to excellence in their chosen field of study and to using what they learn in the service of others.

The Principle of Responsibility:

Lumberjacks do what is right • They persevere in times of adversity • Through self-control and self-discipline, they strive to do their best • Lumberjacks challenge each other to exceed expectations • They are active learners both inside and outside of the classroom • They are reliable; they do what they say they will do • Lumberjacks hold themselves accountable for their decisions •

The Principle of Unity:

Lumberjacks are loyal to their friends, family, university, state and country • Lumberjacks stand together against any adversary • They recognize that though we are very different from one another, we are united by the Lumberjack Spirit. Lumberjacks seek to understand the people and world around them • When one lumberjack fails, all fail • When one lumberjack succeeds, all succeed.

The Principle of Integrity:

Lumberjacks have the courage to do what is right, even when it is hard or unpopular • They respond to each situation with steadfast values that are not subject to change based on the actions of others • They seek opportunities to practice effective and ethical leadership • Lumberjacks are honest; they do not deceive, cheat or steal • Lumberjacks stand up for those who cannot stand up for themselves • As lifelong learners, lumberjacks are committed to continuously improving themselves.

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Academic Integrity A-9.1

Abiding by university policy on academic integrity is a responsibility of all university faculty and students. Faculty members must promote the components of academic integrity in their instruction, and course syllabi are required to provide information about penalties for cheating and plagiarism as well as the appeal process.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) falsification or invention of any information, including citations, on an assignment; and/or, (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism include, but are not limited to: (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of
another; (2) submitting a work that has been purchased or otherwise obtained from the Internet or another source; and, (3) incorporating the words or ideas of an author into one's paper or presentation without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp.

Withheld Grades (Semester Grades Policy A-54)

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Acceptable Student Behavior

Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The
instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.