



## Department of Mathematics and Statistics

### MATH 3301 – Concepts of Calculus Course Syllabus

**Course Description:** Limiting processes and other concepts of calculus. Includes analysis of numerical approaches to problem solving using technology and appropriate software with historical and grades 4-8 classroom connections. Students will be required to have a graphing calculator.

**Credit hours:** 3

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 courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

**Course Prerequisites and Corequisites:** MTH 300

**Course outline:**

- |  | <u>Approximate time spent</u> |
|--|-------------------------------|
| <ul style="list-style-type: none"><li>• <b>Relations, Functions, and Concepts of Infinity</b></li></ul>  | 50%                           |
| <ul style="list-style-type: none"><li>○ Numerical techniques applied to arithmetic and geometric sequences and series</li><li>○ Patterns in growth and decay</li><li>○ Iterative and recursive processes</li><li>○ Summation and product notation: applications to programming using loops</li><li>○ Computer simulation: random number generator</li><li>○ Numerical and graphical techniques for solving equations<ul style="list-style-type: none"><li>▪ Graphing systems</li><li>▪ Intermediate Value Theorem</li><li>▪ Bisection</li></ul></li><li>○ Historical and classroom connections</li></ul>   |                               |
| <ul style="list-style-type: none"><li>• <b>Other Concepts of Calculus</b></li></ul>  | 50%                           |
| <ul style="list-style-type: none"><li>○ Introduction to limit concepts: numerical and theoretical approaches<ul style="list-style-type: none"><li>▪ Convergence and divergence</li><li>▪ Sequences of partial sums: patterns, conjectures, and proof by induction</li></ul></li><li>○ Introduction to derivative concepts: numerical and theoretical approaches<ul style="list-style-type: none"><li>▪ Functions and rates of change</li><li>▪ Fitting curves to derivative data</li><li>▪ Connections to Pascal's Triangle and Binomial Theorem</li></ul></li><li>○ Introduction to integral concepts: numerical and theoretical approaches<ul style="list-style-type: none"><li>▪ Rectangular and Monte Carlo approximations</li><li>▪ Area between curves</li></ul></li><li>○ Fundamental Theorem of Calculus</li></ul> |                               |

- Historical and classroom connections

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**Student Learning Outcomes (SLO):** At the end of MATH 301, a student who has studied and learned the material should be able to:

1. Find limits, derivatives, and integrals using numerical and graphical techniques. [SBEC: II, III]
2. Use proper notation for derivatives and integrals. [SBEC: II, III]
3. Find derivatives and antiderivatives of polynomial functions using the power function rule. [SBEC: II, III]
4. Demonstrate an understanding of the connection between limits and asymptotic behavior in functions. [SBEC: II, III]
5. Use the Fundamental Theorem of Calculus to evaluate definite integrals. [SBEC: III]
6. Communicate orally and in written form an understanding of the connections among geometric, graphic, numeric, and algebraic solutions to problems. [SBEC: V]
7. Demonstrate an understanding of the connections between limits, derivatives, and integrals. [SBEC: II, III]
8. Use calculus concepts to answer questions about rates of change, areas, volumes, and properties of functions and their graphs. [SBEC: II, III]
9. Relate the concepts of limit, rate of change, and area under a curve as conceptual foundations of calculus to middle school mathematics. [SBEC: II]
10. Use spreadsheets and graphing calculators to perform simulations, solve problems, and support understanding of calculus concepts. [SBEC: III, V]
11. Apply principles of logic, iteration and recursion, and algorithmic thinking to write graphing calculator programs to solve a variety of problems numerically. [SBEC: I, V]
12. Demonstrate an understanding of the historical development of calculus and technology and the ensuing societal impacts. [SBEC: VI]

*There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and/or a service course.*

### **Texas State Board for Educator Certification (SBEC): Mathematics Standards**

*Standard I. Number Concepts:* The mathematics teacher understands and uses numbers, number systems and their structure, operations and algorithms, quantitative reasoning, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

*Standard II. Patterns and Algebra:* The mathematics teacher understands and uses patterns, relations, functions, algebraic reasoning, analysis, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

*Standard III. Geometry and Measurement:* The mathematics teacher understands and uses geometry, spatial reasoning, measurement concepts and principles, and technology appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in order to prepare students to use mathematics.

*Standard V. Mathematical Processes:* The mathematics teacher understands and uses mathematical processes to reason mathematically, to solve mathematical problems, to make mathematical connections within and outside of mathematics, and to communicate mathematically.

*Standard VI. Mathematical Perspectives:* The mathematics teacher understands the historical development of mathematical ideas, the interrelationship between society and mathematics, the structure of mathematics, and the evolving nature of mathematics and mathematical knowledge.

### **Academic Integrity**

[The Code of Student Conduct and Academic Integrity](#) outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.

Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one's self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one's own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one's own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

#### **Withheld Grades Semester Grades (SFA Policy 5.5)**

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. For additional information, go to <https://www.sfasu.edu/policies/course-grades-5.5.pdf>.

#### **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>.

#### **Student Wellness and Well-Being**

SFA values students' overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students' mental health and wellness. Many of these resources are free, and all of them are confidential.

#### **On-campus Resources:**

**The Dean of Students Office** (Rusk Building, 3<sup>rd</sup> floor lobby)

[www.sfasu.edu/deanofstudents](http://www.sfasu.edu/deanofstudents)

936.468.7249

[dos@sfasu.edu](mailto:dos@sfasu.edu)

**SFA Human Services Counseling Clinic** Human Services, Room 202

[www.sfasu.edu/humanservices/139.asp](http://www.sfasu.edu/humanservices/139.asp)

936.468.1041

**The Health and Wellness Hub “The Hub”**

Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

[www.sfasu.edu/thehub](http://www.sfasu.edu/thehub)

936.468.4008

[thehub@sfasu.edu](mailto:thehub@sfasu.edu)

**Crisis Resources:**

- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- Crisis Text Line: Text HELLO to 741-741

**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 10.4](#)). 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.

*Date of document: 08/23/2023*