MTH 333, Calculus III  
Department of Mathematics and Statistics

Professor: Dr. Jeremy Becnel  
Class Times & Place:  9-9:50 MWF, Math 359  
11:00-12:15 T, Math 359

Office: 322 Mathematics building  
Office Phone: 936.468.1582  
Office Hours: (or by appointment)

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Description: This course extends many of the ideas from one-dimensional calculus into higher dimensions. In particular, this course studies the mathematical concepts of vectors, vector operations, and vector functions; multivariate functions, partial derivatives, gradients, and multiple integrals; integration in vector fields, Greens, Stokes, and the Divergence (Gauss') theorems.


Course Requirements:
- Three in-class exams (If a student must miss an exam due to an excused absence, special arrangements should be made in advance.)
- Weekly Quizzes: given during the lab period on topics from the previous week.
- Project(s)
- Explorations/Activities
- A comprehensive final exam (Final Exam Schedule)
- Class attendance and participation: Students are expected to attend all class meetings, arriving on time.

Communication: Check your university email regularly, as you may be sent reminders, assignments, or announcements.

Homework: There are suggested problems for each section on the schedule. Homework is for your benefit and should be done daily. You should spend 9-12 hours per week on homework.

Quizzes: Each lab period there will be a short quiz. Questions are based on VR Lessons and suggested homework problems from the previous week.

Projects: One or more group or individual projects may be assigned to reinforce concepts from class.

Activities/Explorations: There will be several explorations that assigned periodically throughout the semester to further explore topics covered in class.

Grading Policy: 50% Exams  
20% Quizzes, Activities, Explorations  
20% Comprehensive Final Exam  
10% Project(s)

Grading Scale: 90% - 100%: A  
80% - 90%: B  
70% - 80%: C  
60% - 70%: D  
Below 60%: F
Course Outline:

- Parametric Equations, Polar Coordinates, and Conic Sections
  - Parametric Equations
  - Arc Length
  - Polar Coordinates
  - Area and Arc Length in Polar Coordinates
  - Conic Sections
- Vector Geometry
  - Vectors in the Plane
  - Vectors in Three Dimensions
  - Dot Product and the Angle Between Two Vectors
  - The Cross Product
  - Planes in 3-Space
  - A Survey of Quadric Surfaces
  - Cylindrical and Spherical Coordinates
- Calculus of Vector-Valued Functions
  - Vector-Valued Functions
  - Calculus of Vector-Valued Functions
  - Arc Length
  - Curvature
  - Motion in 3-Space
- Differentiation in Several Variables
  - Functions of Two or More Variables
  - Limits and Continuity in Several Variables
  - Partial Derivatives
  - Differentiability and Tangent Planes
  - The Gradient and Directional Derivatives
  - The Chain Rule
  - Optimization in Several Variables
  - Lagrange Multipliers: Optimizing with a Constraint
- Multiple Integration
  - Integration in Two Variables
  - Double Integrals over More General Regions
  - Triple Integrals
  - Integration in Polar, Cylindrical and Spherical Coordinates
  - Applications of Multiple Integrals
  - Change of Variables
- Line And Surface Integrals
  - Vector Fields
  - Line Integrals
  - Conservative Vector Fields
  - Parametrized Surfaces and Surface integrals
  - Surface integrals of Vector Fields
- Fundamental Theorems of Vector Analysis
  - Green’s Theorem
  - Stokes’ Theorem
  - Divergence Theorem
**Department syllabus:** Please read the official Department of Mathematics & Statistics syllabus for MTH 333 at [http://www2.sfasu.edu/math/courses/syllabi/mth333syllabus.pdf](http://www2.sfasu.edu/math/courses/syllabi/mth333syllabus.pdf).

**Attendance Policy:** Students are expected to attend all class meetings, arriving on time. If you are absent, you are responsible for determining what you missed and for being prepared for class when you return. Do not come to my office expecting me to teach you the lesson you missed.

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.

**AARC:** The Academic Assistance and Resource Center (AARC) located on the first floor of the Steen Library offers several types of academic assistance. All services are FREE. See the AARC web pages for more information [http://libweb.sfasu.edu/aarc](http://libweb.sfasu.edu/aarc).

**Academic Integrity (Policy A-9.1)**

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

**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) the falsification or invention of any information, including citations, on an assigned exercise; 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 are (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 an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](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 coursework 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 http://www.sfasu.edu/policies/student_conduct_code.asp). 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.

**Student Learning Outcomes (SLO):** At the end of MTH 333, a student who has studied and learned the material should be able to:
1. Perform and interpret the standard vector operations. [PLO: 2]
2. Calculate and interpret the arc length, unit tangent vector, curvature, and principal unit normal of vector-valued functions parameterized either by time or arc length. [PLO: 2]
3. Demonstrate an understanding of the connection between the gradient of a multivariate function, directional derivatives, and tangent planes. [PLO: 1]
4. Set up, manipulate, transform, and interpret multiple integrals to solve mathematical and real-world problems. [PLO: 2, 4]
5. Calculate line integrals in vector fields and relate these integrals to the notions of circulation and flux. [PLO: 2, 4]
6. Use Green’s Theorem to connect the flux of a vector field to its divergence and the circulation to the curl. [PLO: 1, 2]
7. Calculate surface integrals and relate them to real-world applications. [PLO: 2, 4]
8. Generalize Green’s Theorem in the plane to Stokes’ Theorem and the Divergence Theorem on surfaces. [PLO: 1, 2]

**Program Learning Outcomes (PLO):** Students graduating from SFASU with a B.S. Degree and a major in mathematics will:
1. Demonstrate comprehension of core mathematical concepts. [Concepts] (notion of theorem, mathematical proof, logical argument)
2. Execute mathematical procedures accurately, appropriately, and efficiently. [Skills] (calculus, algebra, routine, nonroutine, applied)
3. Demonstrate competence in using various mathematical tools, including technology, to formulate, represent, and solve problems. [Problem Solving] (calculus tools, algebra tools, applied tools, nonstandard problem solving)