Calculus III

Advanced topics in calculus, including vectors and vector-valued functions, partial differentiation, Lagrange multipliers, multiple integrals, and Jacobians; application of the line integral, including Green's Theorem, the Divergence Theorem, and Stokes' Theorem.

Competencies

1. To demonstrate competency in the geometry of 3-space, the student should be able to:
    i. Find equations of lines and planes in 3-space.
    ii. Identify and sketch surfaces in 3-space.
2. To demonstrate competency in vector analysis, the student should be able to:
    i. Compute limits, derivatives, and integrals of vector-valued functions.
    ii. Use vector-valued functions to analyze projectile motion.
    iii. Find tangent and normal vectors on a plane or space curve.
    iv. Find curvature at a point on a plane or space curve.
3. To demonstrate competency in functions of several variables, the student should be able to:
    i. Understand the notion of a function of two variables
    ii. Sketch the graph of a function of two variables
    iii. Sketch level curves for a function of two variables
    iv. Understand the concept of limit and continuity of a function of several variables.
4. To demonstrate competency in partial derivatives, the student should be able to:
    i. Find partial derivatives of a function of several variables.
    ii. Find the equation of a tangent plane to a surface.
    iii. Find extrema of a function of two variables.
    iv. Use Lagrange Multipliers to solve constrained optimization problems.
5. To demonstrate competency in multiple integrals, the student should be able to:
    i. Evaluate double and triple integrals.
    ii. Find the area under a curve by double integral
    iii. Find volume using double and triple integrals.
    iv. Find the area of a surface using double integrals.
    v. Use Jacobians to change variables in a double integral.
6. To demonstrate competency in line integrals, the student should be able to:
    i. Evaluate a line integral along a curve.
    ii. Use Green's Theorem to evaluate a line integral.
    iii. Use Stokes' Theorem to evaluate a surface integral.
    iv. Use the Divergence Theorem to evaluate a surface integral.

Campus Resources for Students

Weatherford:
The Academic Support Center is a free public tutoring service provided by the college, offered in LART- LL Room 2, 817-598-6278

Video tapes

Computer assisted instruction

Instructor's office hours

Course Learning Objectives

Upon successful completion of this course, students will:

1. Perform calculus on vector-values functions, including derivatives, integrals, curvature, displacement, velocity, and acceleration.

2. Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals.
3. Find extrema and tangent planes.
4. Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
5. Apply the computationl and conceptual principles of calculus to the solutions or real-world problems.

Required Textbooks
Calculus, Larson, Hostetler, and Edwards, Brooks/Cole, 10th ed., 2014.

Required Supplies

Scientific calculator, paper, pencil, and notebook.
Evaluation Standards

These course objectives and student learning outcomes will be assessed through the administration of a minimum of 3 in-class exams (65%), quizzes/homework (10%), and a comprehensive, departmental final exam (25%).

Disabilities

ADA Statement:

Any student with a documented disability (e.g. learning, psychiatric, vision, hearing, etc.) may contact the Office on the Weatherford College Weatherford Campus to request reasonable accommodations. *Phone:* 817-598-6350 *Office Location:* Office Number 118 in the Student Services Building, upper floor. *Physical Address:* Weatherford College 225 College Park Drive Weatherford, TX.

Academic Integrity
Academic Integrity is fundamental to the educational mission of Weatherford College, and the College expects its students to maintain high standards of personal and scholarly conduct. Academic dishonesty of any kind will not be tolerated. Academic dishonesty includes, but is not limited to, cheating on an examination or other academic work, plagiarism, collusion, and the abuse of resource materials including unauthorized use of Generative AI. Departments may adopt discipline specific guidelines on Generative AI usage approved by the instructional dean. Any student who is demonstrated to have engaged in any of these activities will be subject to immediate disciplinary action in accordance with institutional procedures.