STEPHEN F. AUSTIN STATE UNIVERSITY

Department of Mathematics and Statistics

MTE 568 – Topics in Advanced Calculus
Course Syllabus

Course Description: Infinite series, sequences, power series, partial derivatives, multi-variable calculus using appropriate technology.

Credit Hours: 3

Course Prerequisites: MTE 567 or the equivalent and graduate standing.

Course Outline: Approximate time spent

- Sequences and series 30%
  - Sequences – convergence and divergence
  - Series – tests for convergence
  - Series approximations with Taylor polynomials
- Functions of many variables 30%
  - Definitions, domain/range, surfaces, level curves
  - Continuity
  - Limits
- Derivatives and integrals of multivariate functions 30%
  - Partial derivatives/implicit differentiation
  - Chain rule
  - Iterated integrals
  - Monte Carlo Method
- Connections to the secondary classroom 10%

Student Learning Outcomes (SLO): At the end of MTE 568, successful students will be able to:

1. Determine whether or not a sequence converges or diverges. [PLO 1,2]
2. Determine what tests to apply to evaluate whether or not a series converges or diverges. [PLO 1,2,3]
3. Approximate series using Taylor polynomials and determine the associated radius of convergence when applicable. [PLO 1,2]
4. Define functions of many variables and determine the associated domain/range. [PLO 1,2,5]
5. Determine the continuity of multivariate functions. [PLO 1,2]
6. Calculate limits of multivariate functions. [PLO 1,2]
7. Connect partial differentiation to the chain rule. [PLO 1,2,3,4]
8. Evaluate double and triple integrals. [PLO 1,2]
9. Explain how the Monte Carlo Method can be used to approximate an integral. [PLO 1,2]
10. Connect the content of MTE 568 to the secondary mathematics classroom. [PLO 1,2,3,4,5,6]

Program Learning Outcomes (PLO): Students graduating from SFASU with an M.S. degree and a major in school mathematics teaching will demonstrate:

1. Conceptual understanding and procedural fluency necessary for teaching the core areas of school mathematics (number/operation (N&O), patterns/algebra (P&A), geometry/measurement (G&M), and probability/statistics (P&S)). [*Concepts & Skills*]
2. Competences in using various mathematical tools (including technology) to formulate, represent, and solve problems. (N&O tools, P&A tools, G&M tools, and P&S tools applied to basic and multi-step computational and application problems) [*Problem Solving*]
3. The ability to use mathematical reasoning to develop conjectures, design sound arguments, and analyze student thinking. (pattern recognition/conjecture development, examples/non-examples, deductive/inductive reasoning, argument analysis) [*Critical Thinking*]
4. An understanding of the development and connectedness of mathematical ideas – historically, between content areas, and across grade levels. [*Connections*]
5. Effective communication of mathematical ideas in oral, visual, and written forms. [*Communication*]
6. Leadership skills in facilitating collaboration, mentoring teachers, making appropriate instructional decisions, and delivering professional development. [*Leadership*]