Course Proposal: **Modify Course**

This proposal will change the following elements of the course.
Short Course Title, Course Description, Prerequisites

1. Course prefix and number: **MTE 566**

2. Effective Term/Year: **FALL 2013**

3. CIP CODE/10 digit program code: **13131100 No Change**

4. Short Course Title: **Differential Calculus**

Modified Short Course Title: **Seminar in Calculus**

5. What is the primary reason you are modifying this course?

This modified course description more accurately represents the course content and the function of the course in the proposed consolidated graduate major.

6. Enter course description exactly as it now appears in the general/graduate bulletin.

Limits, continuity, differential calculus of algebraic and trigonometric functions with applications.

Enter modified course description exactly as it will appear in the general/graduate bulletin?

Limits, derivatives, and integrals of various function families including polynomials, logarithms, exponentials, and trigonometric functions. Emphasis will be placed on applications of these concepts with special attention given to the implementation to the high school curricula.

7. Current Prerequisites:

MTE 565 or the equivalent and graduate standing

Modified Course Prerequisites:

MTE 558

8. College: **College of Science and Mathematics**

9. Department Teaching Course: **Mathematics and Statistics**

10a. Instruction Type: **Lecture No Change**

10b. Credit Hours: **No Change**
Current - Maximum: **3** Minimum: **3** Maximum Hours counted toward degree: **3**
Modified- Maximum: Minimum: Maximum Hours counted toward degree:

11a. Second Instruction Type: **ns**

11b. Second Credit Hours:
Current - Maximum: Minimum: Maximum Hours counted toward degree:
Modified- Maximum: Minimum: Maximum Hours counted toward degree:

12. Maximum contact hours each week fall semester: **No Change**
Lecture: **3** Lab: Other:

13. May this course be taken more than one time each semester: **No**

14. Grade Type: **Regular: A-F No Change**

15. Describe the place of the modified course within your current curriculum. Will it be elective or required? Part of a major or a minor? (Enter NA if no change is being made.)

We are proposing a consolidation of existing graduate majors, School Mathematics Teaching: Middle Level and School Mathematics Teaching: Secondary Level, into a single major in School Mathematics Teaching with a 24 credit hour core and emphases in middle or secondary levels. This course is currently required for secondary level emphasis and there is no change in the placement of the course.

16. How does the modified course differ from similar courses being offered at Stephen F. Austin? (Enter NA if no change is being made.) **NA**

17. Syllabus: Course Learning Goals
List course objectives; describe what students who complete the course will know or be able to do. (Enter NA if no change is being made.) **NA**

18. Syllabus: Course Outline
List the topics that the modified course will cover and indicate the approximate proposed amount of time to be devoted to each, either by percent of course time or number of weeks. Please indicate which topics will be required in all sections of the course and which may vary. (Enter NA if no change is being made.) **NA**

19. Syllabus: Modified Textbook/Assigned Reading Materials for course.
See attached syllabus.

20. Any Other Information
Dept. Chair _____ Date: _____

College Curriculum Chair _____ Date: _____

College Dean _____ Date: _____

Grad Dean/Univ Curr Chair _____ Date: _____

STEPHEN F. AUSTIN STATE UNIVERSITY

Department of Mathematics and Statistics

MTE 566 – Seminar in Calculus
Course Syllabus

Course Description: Limits, derivatives, and integrals of various function families including polynomials, logarithms, exponentials, and trigonometric functions. Emphasis will be placed on applications of these concepts with special attention given to the implementation to the high school curricula.

Credit Hours: 3

Course Prerequisites: MTE 558.

Course Outline: Approximate time spent

- Limits — 20%
  - Limit at a point
  - Limit at infinity
  - Vertical and horizontal asymptote connections
  - Sandwich Theorem
  - Continuity
  - Intermediate Value Theorem
- Derivatives — 30%
  - Formal definition
  - Geometric connections (tangent line)
  - Historical connections
  - Derivative rules
  - Derivative theorems (Extreme Value, Rolle's, Mean Value)
  - Implicit differentiation
  - Applications
    - Graphing and graph interpretations
    - Optimization
    - Newton's Method
    - Related Rates
- Integrals — 35%
  - Definition
    - Antiderivatives and indefinite integrals
    - Formal definition of definite integral with connections to Riemann sums
    - Fundamental Theorem of Calculus
    - Geometric connections (area under curve)
  - Integration Techniques
    - U-substitution and basic techniques
    - Integration by parts
    - Partial fraction decomposition
    - Trigonometric substitutions
    - Numerical integration
    - Improper integrals
  - Applications
    - Volumes of surfaces of revolution
    - Arc length
    - Surface area
- Connections to the secondary classroom — 15%

Student Learning Outcomes (SLO): At the end of MTE 566, successful students will be able to:

1. Define and calculate limits algebraically or graphically. [PLO 1,2]
2. Define vertical and horizontal asymptotes using limits. [PLO 1,2]
3. Explain how to recognize continuity algebraically and graphically and make connections between continuity and the Intermediate Value Theorem. [PLO 1,2,4,5]
4. Connect limits to the middle school and secondary mathematics curriculum. [PLO 1,2,3,4,5,6]
5. Define and calculate limits from definition and by applying differentiation rules (including implicit differentiation). [PLO 1,2]
6. Describe the connections between the limit and the derivative. [PLO 1,4]
7. Explain the historical and geometric significance of the derivative. [PLO 1,4]
8. State the Extreme Value, Rolle's, and Mean Value Theorems and explain when and why these theorems would be applied. [PLO 1,3,4,5]
9. Apply derivatives to solve real world problems including curve sketching, optimization, related rates, and Newton's Method problems. [PLO 1,2,3,4]
10. Connect the derivative to the middle school and secondary mathematics curriculum. [PLO 1,2,3,4,5,6]
11. Formally define the definite integral and describe the geometric connections. [PLO 1,2,4,5]
12. Describe how the geometry of the integral applies to secondary mathematics classroom.[PLO 1,2,3,4,5,6]
13. Explain the differences between the definite integral and indefinite integral. [PLO 1,2,5]
14. Recognize when and how to implement various integration techniques to solve integrals. [PLO 1,2,4,5]
15. Describe the connections between the limit, the derivative, and the integral. [PLO 1,4]
16. State the Fundamental Theorem of Calculus and demonstrate proficiency in its application. [PLO 1,3,4,5]
17. Apply integrals to solve real world problems including volumes of surfaces of revolution, arc length, and surface area. [PLO 1,2,3,4]
18. Connect the integral to the middle school and secondary mathematics curriculum. [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. Competency 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*]

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