

**South Texas College
Department of Mathematics**

Calculus Master Syllabus MATH 2413

Chair's Information:

Name of Chair: Dr. Mahmoud Fathelden
Office Location: PCN J-3.1204
Telephone #: (956) 872-3408
FAX #: (956) 872-6413 Math office
E-mail Address: mfathel@southtexascollege.edu

Course Information:

Course Name: Calculus I
Course #: MATH 2413

Course Description:

This course covers functions, limits, continuity, differentiation, anti-derivatives, definite integral and applications.

Prerequisite: MATH 2412 with a grade of "C" or better.

Learning Outcomes:

Exemplary Educational Objectives:

- Apply arithmetic, algebraic, geometric, higher order thinking, and statistical methods to modeling and solving real-life situations;
- Represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically;
- Expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments;
- Use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;
- Interpret mathematical models such as formulas, graphs, tables, and schematics, and draw inferences from them;

- Recognize the limitations of mathematical and statistical models;
- Develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines.

The objective of the Mathematics Component of the Core Curriculum is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solution of real-life problems.

Intellectual Competencies:

A. Critical and Analytical Thinking:

- Demonstrate creative thinking, decision making, problems solving, visualization, and reasoning skills.
- Understand the problem and choose the right method(s) to solve for the unknown(s).
- Applying mathematics to real-life problems, and checking the logic of the solution.
- Recognize problems and devise and implement plan of action.
- Organize and relate symbols, pictures, graphs, objects, and other information.

B. READING:

- Analyze and interpret handouts, the textbook, and/or visual aids used during the semester.

C. WRITING:

- Develop, organize, draft, revise, and edit a research paper on math-related topic. List of the possible topics is attached.

D. SPEAKING: Demonstrate effective oral communication techniques by engaging in discussions and presenting solutions answering questions from the students.

E. LISTENING: Analyze and interpret various forms of spoken communication.

F. Technology: Demonstrate knowledge of using the math computer software that accompanies the math textbook. Students will utilize scientific calculators and mathematics software to solve variety of problems.

Departmental Course Requirements:

- To provide quality academic education.
- Understand the basic terms of limits, rates of change, and continuity.
- Understand and perform derivatives of functions using chain rule, implicit differentiation, and related
- Understand the derivatives to find extreme values of functions, optimization problems, and linearization of functions.
- Understand and use the inverse process to integrate functions, and solve simple differential equations
- Understand and use Riemann sums to perform the integrals, use different methods of integration
- Understand and use of the integration to find the area under the curve of any function
- Prepare students to succeed in other academic fields.
- Prepare students for upper level math-related fields.
- Develop a prepared workforce.

Evaluation:

Evaluation method for exemplary educational objectives:

Data will be collected from Term Project.

Grading Criteria

5 tests @ 100 points each (Lowest score will be dropped) Term Paper 50 points Final Exam 150 points (Mandatory) Total Points... 600 points	A = > 90% (540-600) B = 80%-89% (480-539) C = 70%-79% (420-479) D = 60%-69% (360-419) F = < 60% (<360)
All exams are in-class closed-book exams No Make-ups!	

Required Textbook & Resources:

Calculus – 11th Edition by Weir/Hass/Giordano

Tutors at the Math Learning Centers will be available to help students with their homework. Math computer software with guided examples and real-life application accompany the textbook. Math Video tapes are available at all STC libraries. Students are asked to come to the board to present problems, discuss different techniques, and answer questions from instructor and other students. . The term project will address all the Exemplary Educational Objectives for the math core component. A list of the projects' topics is attached.

Possible topics for term paper and Guidelines:

The use of calculus operations in the following topics:

- Life and physical sciences (Mechanical oscillations, stiffness, Acceleration, Alcohol absorption, center of gravity of irregular objects, electrical energy, population and bacteria growth, ecology, diet and health, memory models, learning curves, stress factors, pollution, predator-prey model, recycling, tree growth, wildlife management and growth, atmosphere pressure, elasticity, circuit analysis, comet orbit, harmonic and non-harmonic motion, effectiveness of medicine, electrical architecture, flying objects, fluid dynamics, forensics, friction, universal gravitational laws, meteorology, Newton's laws of motion planetary motion, radioactive buildup and decay, work application, sound application, and drag, turbine and variation applications)
- Business and Economics (Depreciation, accumulated values and sales, equilibrium point, marginal cost and profit, non-linear optimization, Assembly line production, general break-even analysis, budget variance, inflation, inventory, taxes and wages, nonlinear analysis of investment and trust funds)
- Geometry (Optimization and Constraints applications, Maximizing and minimizing areas, volumes and distances, orbits)
- Miscellaneous (Moments and centers of Mass, spring stretching, encoding analysis, DNA applications, satellite antenna, waves analysis, Mathematics contributions of Riemann, L'Hopital, Fermat, Maclaurin, Cantor, Cauchy, Ramanujan, Hardy, Leibniz, and other Topical or Biographical Papers as approved by the Instructor.

Biographical Paper should contain at least three bibliographical references.

Biographical Presentations should focus upon the mathematical contributions of the individual along with other human-interest information about the individual.

Topical Papers should contain a general mathematical description of the topic.

Demonstrations about the topic are advisable. The presenter should understand the topic thoroughly enough to respond to questions posed by students or the instructor.

Developmental Studies Policy Statement:

- Failure to remain in at least one Developmental Studies course for students who have not met the passing standard on an approved assessment instrument in reading, writing, and/or mathematics may result in the student's withdrawal from ALL college courses.
- All developmental courses including the College Success course will be included in the Semester Grade Point Average (GPA) for all students at STC.
- Students in Developmental Studies will be limited to a maximum of 13 credit hours of course work per semester and 7 credit hours per summer session.
- Students taking 12 or more credit hours per semester who have not met the passing standard on an approved assessment instrument will be required to take two or more developmental courses every semester if they are deficient in more than one academic skill (reading, writing, and mathematics).

ADA Students with Disabilities Statement: Reasonable accommodations may be made that allow disabled students to be successful at STC. Accommodations may be provided for those students who submit the appropriate documentation by an outside/independent professional evaluator or agency. For more information, contact an STC ADA/DSS Counselor office. Students may volunteer to inform the Instructor about their disability and associated classroom limitations, if applicable.
