SEWARD COUNTY COMMUNITY COLLEGE
COURSE SYLLABUS

I. TITLE OF COURSE: MA2605 - Analytic Geometry and Calculus I

II. COURSE DESCRIPTION: 5 credit hours credit hours

5 credit hours of lecture credit hours of lecture and 0 credit hours of lab per week credit hours of lab per week.

Calculus is the study of variables and functions with emphasis on the changing, dynamic properties of relationships that can be described mathematically. This course is to provide students majoring in mathematics, science, computer programming, engineering, and many non-science fields an opportunity to begin a study of analysis. The tools of calculus including differentiation and integration of functions are studied and used in geometric and various applied problems.

Pre-requisite:
MA1173 and MA1183 - College Algebra and Trigonometry or their equivalent, or a satisfactory ACCUPLACER score and consent of the instructor.

III. PROGRAM AND/OR DEPARTMENT MISSION STATEMENT:

The Mathematics Department at Seward County Community College will enhance a student's ability to think critically using mathematical principles, ideas, and concepts in order to function in a society with ever-changing technology.

IV. TEXTBOOK AND MATERIALS:

1. Roland E. Larson, Robert P. Hostetler, and Bruce H. Edwards. Calculus, 12th Edition, Brooks/Cole, 2023
2. Texas Instruments 83, 83 Plus, 84 or 84 Plus Graphing Calculator

V. SCCC OUTCOMES:

II. Communicate ideas clearly and proficiently in writing, appropriately adjusting content and arrangement for varying audiences, purposes, and situations.
IV. Demonstrate mathematical skills using a variety of techniques and technologies.
V. Demonstrate the ability to think critically by gathering facts, generating insights, analyzing data, and evaluating information
IX. Exhibit workplace skills that include respect for others, teamwork competence, attendance/punctuality, decision making, conflict resolution, truthfulness/honesty, positive attitude, judgment, and responsibility

VI. COURSE OUTCOMES:

Expected learning outcomes of this course are in alignment with the learning objectives established by the Statewide Core Competencies.

1. To evaluate the limit of a function using the definition of a limit, at a point both algebraically and graphically, and at infinity both algebraically and graphically.
2. To use limits to determine the continuity of a function, to apply the Intermediate Value Theorem, and to determine the differentiability of a function.
3. To use the limiting process to find the derivative of a function.
4. To find derivatives involving powers, exponents, sums, products, quotients, the chain rule, exponential, logarithmic, and trigonometric functions, and implicit differentiation.
5. To use derivatives to find critical points, apply the Mean-Value Theorem, determine the behavior of a function using the first derivative, find inflection points, determine concavity of a function, sketch the graph of a function using information gathered from the first and second derivatives, and interpret graphs of functions.
6. To apply derivatives to find velocity, acceleration, and other rates of change, find the equation of a line tangent to a curve at a given point, use optimization techniques in areas such as economics, the life sciences, the physical sciences, and geometry, solve related rates problems, use Newton's Method, and use differentials to estimate change.
7. To find areas using Riemann sums and integrals, express the limit of a Riemann sum as a definite integral, evaluate the definite integral using geometry, integrate algebraic, exponential, and trigonometric functions, evaluate definite integrals using the Fundamental Theorem of Calculus, apply the Mean-Value Theorem for integrals, integrate indefinite integrals, integrate by substitution, and approximate integrals using Simpson's Rule and the Trapezoidal Rule.

VII. COURSE OUTLINE:

1. Review of real numbers, inequalities and absolute values. Elementary analytical geometric properties covered briefly.
2. Functions review as a basis for further study of limits and continuity. Limits developed with limit theorems applied to functions.
3. The derivative defined as a limit. Development of the derivative of algebraic, exponential and logarithmic functions. Differentiation techniques including, the product and quotient rules, composite function differentiation, implicit function differentiation, the chain rule and its ramifications. Second order derivatives and derivatives or higher order and their applications.
4. Applications of the derivative to related rate problems, curve analysis (maximum and minimum of f(x), increasing and decreasing f(x), concavity, etc.), other applications of maximizing and minimizing. Rolle's Theorem and the Mean Value Theorem are presented.
5. Integration is developed: antiderivatives as indefinite integrals. Summation of partitioned areas lead to the definite integral and the Fundamental Theorem of Calculus.
6. The differentiation and integration of logarithmic, exponential, and hyperbolic functions.

7. A study of the inverses of the trigonometric and hyperbolic functions, derivatives and integrals.

VIII. INSTRUCTIONAL METHODS:

1. Lecture. The presentation of new theory is followed by illustrative examples. This will be done using the calculator and\or computer software when necessary.
2. Assignments. A study of the text and the working of selected problems in the text and the laboratory guide are required in order to involve the student and assure his understanding sufficiently to use skills as required for future work.
3. Whiteboard drill. This is used to reinforce concepts and check on the student's understanding.
4. Class discussion. Questions may be initiated by either the teacher or students at any time during class sessions.
5. Demonstrations. Computer models, visual aids, etc., are used to convey and clarify ideas when needed.
6. Examinations. Tests and quizzes are used frequently to help summarize concepts and emphasize important skills.
7. Individual help. Each student is encouraged to come to the instructor for help if he or she has difficulty. Office hours are posted.

IX. INSTRUCTIONAL AND RESOURCE MATERIALS:

1. Textbook--the basic classroom material.
2. Supplemental texts and library mathematics reference books.
3. Supplemental material prepared by the instructor.
4. Whiteboard
5. SMART Podium
6. Computer projector and laptop computer used for computer demonstrations and lecture.
7. Demonstrative equipment, charts, posters and models.

X. METHODS OF ASSESSMENT:

SCCC Outcome #2 will be assessed and measured by a writing assignment graded by the institutional rubric.
SCCC Outcome #4 will be assessed and measure by class participation, quizzes and tests.
SCCC Outcome #5 will be assessed and measured by assignments, tests and non-tradition problem solving activities.
SCCC Outcome #9 will be assessed through prompt submission of assignments.

XI. ADA STATEMENT:

Under the Americans with Disabilities Act, Seward County Community College will make reasonable accommodations for students with documented disabilities. If you need support or assistance because of a disability, you may be eligible for academic accommodations. Students should identify themselves to the Dean of Students at 620-417-1106 or go to the Student Success Center in the Hobble Academic building, room A149.

XII. CORE OUTCOMES PROJECT:

The learning outcomes and competencies detailed in this course outline or syllabus meet, or exceed the learning outcomes and competencies specified by the Kansas Core Outcomes Groups project for this course as approved by the Kansas Board of Regents
KRSN: MAT2010

Syllabus Reviewed: 05/17/22