SYLLABUS

DATE OF LAST REVIEW: 09/2019

CIP CODE: 24.0101

SEMESTER: Departmental Syllabus

COURSE TITLE: Calculus and Analytic Geometry I

COURSE NUMBER: MATH0122

CREDIT HOURS: 5

INSTRUCTOR: Departmental Syllabus

OFFICE LOCATION: Departmental Syllabus

OFFICE HOURS: Departmental Syllabus

TELEPHONE: Departmental Syllabus

EMAIL: Departmental Syllabus
KCKCC-issued email accounts are the official means for electronically communicating with our students.

PREREQUISITES: Students need to meet the correct placement measure for this course, or have completed MATH0105/106 College Algebra (w/wo review) and MATH0112 Trigonometry **or** MATH0108 Pre-Calculus Mathematics with a grade of "C" or better.

KRSN Course MAT 2010
This course is approved by the Kansas Board of Regents for System Wide Transfer (SWT) among all Kansas public postsecondary institutions offering an equivalent course. 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. A list of courses available at each institution is located at https://kansasregents.org/academic_affairs/transfer-articulation.

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore http://www.kckccbookstore.com for the required text for your particular class.

COURSE DESCRIPTION: Calculus I is designed for students in mathematics, hard sciences, and engineering. Content includes limits and their properties, differentiation and its applications, integration, and calculus of exponential and logarithmic functions. Students will be expected to

use appropriate technology as one tool to achieve competency in Calculus I.

METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

COURSE OUTLINE:

I. Limits
   - A. Point
   - B. Infinity
   - C. Continuity
   - D. Intermediate-Value Theorem
   - E. Differentiability
   - F. Derivative of a function

II. Differentiation

I. Powers, exponents, and sums
II. Products and quotients
III. Chain rule
IV. Exponential, logarithmic, and trigonometric functions
V. Hyperbolic and inverse trigonometric functions
VI. Implicit differentiation
VII. Velocity, acceleration, and other rates of change.
VIII. Equation of a line

III. Applications of Differentiation
   - A. Critical points
   - B. Mean –Value Theorem
   - C. Behavior
   - D. Inflection points
   - E. Concavity
   - F. Sketch graphs
   - G. Interpret graphs
   - H. Optimization techniques and related rate problems
   - I. Newton's Method
   - J. Change

IV. Integrals
   - A. Riemann sums and integrals
   - B. Limit of Riemann sum
   - C. Definite
   - D. Algebraic, exponential, and trigonometric functions
   - E. Fundamental Theorem of Calculus

F. Mean-Value Theorem
G. Indefinite
H. Integration by substitution
I. Numerical

V. Applications of Integrals
A. Logarithmic and trigonometric functions
B. Bases other than "e"

EXPECTED LEARNER OUTCOMES:

I. Using Limits, including the evaluation of limits, use of limits, and the limiting process.
II. Finding Derivatives
III. Using Derivatives, including curve sketching and applications of derivatives.
IV. Finding Integrals

COURSE COMPETENCIES:
Upon successful completion of the course:

The student will be able to use limits, including evaluations of limits, use of limits and the limiting process.

1. Use the definition of a limit to verify a value for the limit of a function.
2. Evaluate the limit of a function at a point both algebraically and graphically
3. Evaluate the limit of a function at infinity both algebraically and graphically
4. Use the limit to determine the continuity of a function.
5. Apply the Intermediate-Value Theorem
6. Use the limit to determine differentiability of a function.
7. Use the limiting process to find the derivative of a function.

The student will be able to find derivatives

1. Find derivatives involving powers, exponents, and sums.
2. Find derivatives involving products and quotients.
3. Find derivatives involving the chain rule.
4. Find derivatives involving exponential, logarithmic, and trigonometric functions.
5. Find derivatives involving implicit differentiation.

The student will be able to use derivatives, including curve sketching and applications of derivatives.

1. Use the first derivative to find critical points.
2. Apply the Mean-Value Theorem for derivatives.
3. Determine the behavior of a function using the first derivative.
4. Use the second derivative to find inflection points.
5. Determine the concavity of a function using the second derivative.

6. Sketch the graph of the function using information gathered from the first and second derivatives.
7. Interpret graphs of functions.
8. Use the derivative to find velocity, acceleration, and other rates of change.
9. Use the derivative to find the equation of a line tangent to a curve at a given point.
10. Use optimization techniques in areas such as economics, the life sciences, the physical sciences, and geometry.
11. Solve related rates problems.
12. Use Newton's Method.
13. Use differentials to estimate change.

The student will be able to find integrals.

1. Find area using Riemann sums and integrals.
2. Express the limit of a Riemann sum as a definite integral.
3. Evaluate the definite integral using geometry.
4. Integrate algebraic, exponential, and trigonometric functions.
5. Evaluate definite integrals using the Fundamental Theorem of Calculus.
6. Apply the Mean-Value Theorem for integrals.
7. Integrate indefinite integrals.
8. Integrate using substitution.
9. Approximate integrals using Simpson's Rule and the Trapezoidal Rule

ASSESSMENT OF LEARNER OUTCOMES: Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

SPECIAL NOTES:
Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome any time.

Kansas City Kansas Community College is committed to an appreciation of diversity with respect for the differences among the diverse groups comprising our students, faculty, and staff that is free of bigotry and discrimination. Kansas City Kansas Community College is committed to providing a multicultural education and environment that reflects and respects diversity and that seeks to increase understanding.

Kansas City Kansas Community College offers equal educational opportunity to all students as well as serving as an equal opportunity employer for all personnel. Various laws, including Title IX of the Educational Amendments of 1972, require the college's policy on non-discrimination be administered without regard to race, color, age, sex, religion, national origin, physical handicap, or veteran status and that such policy be made known.

Kansas City Kansas Community College complies with the Americans with Disabilities Act. If you need accommodations due to a documented disability, please contact the disabilities services office at (913) 288 -7664.

All enrolled students at Kansas City Kansas Community College are subject to follow all rules, conditions, policies and procedures as described in both the Student Code of Conduct as well as the Student Handbook. All Students are expected to review both of these documents and to understand their responsibilities with regard to academic conduct and policies. The Student Code of Conduct and the Student Handbook can be found on the KCKCC website.