SYLLABUS

DATE OF LAST REVIEW: 09/2019

CIP CODE: 15.1201

SEMESTER: Departmental Syllabus

COURSE TITLE: Applied Calculus I

COURSE NUMBER: ENGR-0204

CREDIT HOURS: 3

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.

PREREQUISITE(S): ENGR -0104 Applied Math I or MATH0108 Pre-Calc

REQUIRED TEXT AND MATERIALS:
Please check with the KCKCC bookstore, http://www.kckccbookstore.com/, for the required texts for your particular class. TI-83 or 84 Calculator.

COURSE DESCRIPTION:
This course is designed for Electronic students in particular, to teach them application of calculus in Electronics. Students will learn Limits, Graphic Differentiation, Derivatives, Maxima, Minima, Hyperbolic Function, Partial Derivatives, Integration, Maclaurin Series and Fourier Series. Students will learn Fourier Analysis and Laplace transform, will perform laboratory experiments and do calculations using Laplace transforms.

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. Vectors and Phasors - The Mathematics of Phasors -
        A. Fundamentals of Alternating Currents
        B.   Scalars and Vectors
        C. Complex Plane
        D. Real and Imaginary Numbers
        E. Complex Numbers
        F. Phasors
        G. Transforming Complex Number Forms
        H. Resolving Systems of Phasors and Vectors
        I.   Addition and Subtraction of Phasor Quantities
        J.   Multiplication of Phasor Quantities
        K. Division of Phasor Quantities
        L. Power and Roots of Phasor Quantities
        M. Alternating Current Terminology
        N. Resistance
        O. Inductance and Inductive Reactance
        P. Capacitance and Capacitive Reactance
        Q. Voltage Phasor for Series Circuits
        R. Current Phasor for Parallel Circuits
II. Alternating- Current Circuits Sinusoidal Alternating Current
        A. Impedance of Series AC Circuits
        B. Solving Series of AC Circuits
        C. Admittance Concepts
        D. Admittance of Parallel AC Circuits
        E. Time and Displacement
        F. Power and Power Factor
        G. Instantaneous Equations and the EI Phasor Diagram
III. Additional Trigonometric and Exponential Mathematical Analysis
        A. Auxiliary Trigonometric Functions
        B. Graphs of the Auxiliary Trigonometric Functions
        C. Trigonometric Identities
        D. Hyperbolic Functions
        E. Graphing the Hyperbolic Functions
        F. Hyperbolic Identities
        G. Inverse hyperbolic Functions
        H. Domain and Range
        I.   Discontinuities
        J.   Functions of Large Numbers
        K. Asymptotes
IV. Fundamental Concepts
        A. Introduction
        B. Functions
        C. Average Rates
        D. Average Rates Applied

E. Limits
        F. Exact Rates
        G. Graphic Differentiation
V. Basic Operations
        A. Derivatives
        B. Derivatives Applied
        C. Differentials
        D. Higher Derivatives
        E. Maxima and Minima
        F. Integrals
        G. Integrals Applied
        H. Definite Integrals
VI. Additional Functions
        A. Trigonometric Functions
        B. Logarithmic and Exponential Functions
        C. Hyperbolic Functions
VII. Further Operations
        A. Partial Derivatives
        B. Integration Techniques
        C. Double Integrals
VIII. Infinite Series
        A. Maclaurin Series
        B. Taylor Series
        C. Fourier Series
IX. Differential Equations
        A. Introduction to Differential Equations
        B. Certain Curves and Surfaces
        C. Certain Results from Trigonometry
        D. Determinants

TERM PROJECT
1. Students will solve and design a given mathematical problem for technology or engineering.
2. Students will be provided with computer aid and simulation.

EXPECTED LEARNER OUTCOMES:
A. Upon completion of the course the student will have an enhanced understanding of the fundamental Algebraic Concepts.
B. Upon completion of the course the student will be able to explain the Fundamentals of calculus
C. Upon completion of the course the student will be able to apply Calculus to Electronic problems
D. Upon completion of the course the student will be able to apply Calculus to trigonometric and logarithmic problems.

COURSE COMPETENCIES:

Upon completion of the course the student will have an enhanced understanding of the Fundamental Algebraic Concepts.

1.   The student will be able to apply the concept of angles of any magnitude
2.   The student will be able to graph circular and inverse circular functions
3.   The student will be able to apply the law of sines and the law of cosines to non-right triangles
4.   The student will be able to derive polar coordinates
5.   The student will be able to convert between rectangular and polar coordinates
6.   The student will be able to describe the differences between scalars and vectors
7.   The student will be able to display the graph of a complex plan
8.   The student will be able to explain the differences between real and imaginary numbers
9.   The student will be able to apply the concept of phasors to problem solving
10. The student will be able to transform complex numbers
11. The student will be able to resolve systems of phasors and vectors
12. The student will be able to demonstrate addition and subtraction of phasors
13. The student will be able to demonstrate multiplication and division of phasors
14. The student will be able to demonstrate taking powers and roots of phasors
15. The student will be able to recall alternating-current terminology
16. The student will be able to demonstrate resistance, inductance, inductive reactance, capacitance, capacitive reactance
17. The student will be able to calculate voltage phasors for series circuits
18. The student will be able to calculate current phasors for parallel circuits
19. The student will be able to calculate impedance of series AC circuits
20. The student will be able to solve series AC circuits
21. The student will be able to explain the concept of admittance
22. The student will be able to calculate admittance of parallel AC circuits
23. The student will be able to explain time and displacement concepts
24. The student will be able to calculate power and power factors
25. The student will be able to apply instantaneous equations and the El phasor diagram
26. The student will be able to demonstrate the use of auxiliary trigonometric functions
27. The student will be able to apply trigonometric, hyperbolic identities

Upon completion of the course the student will be able to explain the Fundamentals of Calculus
28. The student will be able to demonstrate the concept of domain and range
29. The student will be able to apply the basics of functions to mathematical solutions
30. The student will be able to calculate average rates
31. The student will be able to apply the concept of limits and exact rates
32. The student will be able to demonstrate derivatives, differentials, integrals

Upon completion of the course the student will be able to apply Calculus to Electronic problems
33. The student will be able to use derivatives to solve voltage problems
34. The student will be able to use derivatives to solve current problems
35. The student will be able to use derivatives to solve power problems
36. The student will be able to use derivatives to solve flux problems

Upon completion of the course the student will be able to apply Calculus to trigonometric and logarithmic problems.
37. The student will be able to solve trigonometric derivatives.
38. The student will be able to solve logarithmic derivatives.
39. The student will be able to solve trigonometric differentials.
40. The student will be able to solve logarithmic differentials.

ASSESSMENT OF LEARNER OUTCOMES:
Assessment methods may include, but are not limited to, the following: Homework, Assignments, Quizzes, Class Participation, Chapter Tests, and Final Exam. The grading scale and the process for calculating the course grades are to be determined by the individual instructors. This information will be included in each instructor's syllabus.

SPECIAL NOTES:
This syllabus is subject to change at the discretion of the instructor. 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.