SYLLABUS

DATE OF LAST REVIEW: 01/2014
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: First Time Placement: See Mandatory Placement Guidelines. Grade of “C” or higher in MATH0105 College Algebra and MATH0112 Trigonometry or MATH0108 Pre-Calculus Mathematics OR with consent of full-time Pre-Calculus instructor

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC bookstore http://www.kckccbookstore.com for the required text for your particular class. The TI-83 or 84 Series graphing calculator is required.

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
   A. Powers, exponents, and sums
   B. Products and quotients
   C. Chain rule
   D. Exponential, logarithmic, and trigonometric functions
   E. Hyperbolic and inverse trigonometric functions
   F. Implicit differentiation
   G. Velocity, acceleration, and other rates of change.
   H. 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:
A. The student will be able to use and evaluate limits.
B. The student will be able to find derivatives.
C. The student will be able to use derivatives.
D. The student will be able to find integrals.
E. The student will be able to use integrals.

COURSE COMPETENCIES:
Upon successful completion of the course:

*The student will be able to use and evaluate limits.*
1. The student will be able to evaluate the limit of a function at a point both graphically and numerically.
2. The student will be able to evaluate the limit of a function at infinity both graphically and numerically.
3. The student will be able to use the limit to determine the continuity of a function.
4. The student will be able to apply the Intermediate-Value Theorem.
5. The student will be able to determine differentiability of a function.
6. The student will be able to use the definition of a limit to find the derivative of a function.

*The student will be able to find derivatives*
7. The student will be able to use derivatives involving powers, exponents, and sums.
8. The student will be able to find derivatives involving products and quotients.
9. The student will be able to find derivatives involving the chain rule.
10. The student will be able to find derivatives involving exponential, logarithmic, and trigonometric functions.
11. The student will be able to find derivatives involving hyperbolic and inverse trigonometric functions.
12. The student will be able to find derivatives involving implicit differentiation.
13. The student will be able to find velocity, acceleration, and other rates of change.
14. The student will be able to find the equation of a line tangent to a curve at a given point.

*The student will be able to use derivatives.*
15. The student will be able to use the first derivative to find critical points.
16. The student will be able to apply the Mean-Value Theorem for derivatives.
17. The student will be able to determine the behavior of a function using the first derivative.
18. The student will be able to use the second derivative to find inflection points.
19. The student will be able to determine the concavity of a function using the second derivative.
20. The student will be able to sketch the graph of a function using information gathered from the first and second derivatives.
21. The student will be able to interpret graphs of functions.
22. The student will be able to use optimization techniques in economics, the life sciences, the physical sciences, and geometry.
23. The student will be able to solve related rates problems.
24. The student will be able to use Newton’s Method.
25. The student will be able to use differentials to estimate change.

*The student will be able to find integrals.*
26. The student will be able to find area using Riemann sums and integrals.
27. The student will be able to express the limit of a Riemann sum as a definite integral.
28. The student will be able to use evaluate the definite integral using geometry.
29. The student will be able to integrate algebraic, exponential, and trigonometric functions.
30. The student will be able to evaluate definite integrals using the Fundamental Theorem of Calculus.
31. The student will be able to apply the Mean-Value Theorem for integrals.
32. The student will be able to integrate indefinite integrals.
33. The student will be able to integrate using substitution.
34. The student will be able to integrate using numerical techniques.

*The student will be able to use integrals.*
35. The student will be able to evaluate differentiation of logarithmic and trigonometric functions.
36. The student will be able to know bases other than “e” and their applications.

**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 Director of the Academic Resource Center in Room 3354 or call: 913-288-7670.