

SYLLABUS

DATE OF LAST REVIEW: 10/2019

CIP CODE: 24.0101

SEMESTER: Departmental Syllabus

COURSE TITLE: Calculus and Analytic Geometry III

COURSE NUMBER: MATH0224

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.

PREREQUISITE(S): Students need to meet the correct placement measure for this course, or have completed the prerequisite of MATH0123 Calculus and Analytic Geometry II having earned a “C” or better. May be taken concurrently with MATH0227 Differential Equations.

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

COURSE DESCRIPTION: Calculus & Analytic Geometry III is designed for students in mathematics, hard sciences, and engineering. Content includes analytic and solid geometry, vectors, multivariable calculus, multiple integrals, and applications of these topics. Students will be expected to use appropriate technology as one tool to achieve competency in Calculus and Analytic Geometry III. A graphing calculator is required for this course.

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
 - A. Vectors in the plane
 - B. Vectors in space
 - C. Dot product of two vectors
 - D. Cross product of two vectors

- E. Lines and planes in space
 - F. Surfaces in space
 - G. Cylindrical and spherical coordinates area
- II. Vector-Valued Functions
- A. Domain
 - B. Differentiation and integration
 - C. Velocity and acceleration
 - D. Tangent vectors and normal vectors
 - E. Arc length and curvature
- III. Functions of Several Variables
- A. Domain and range
 - B. Limits and continuity
 - C. Partial derivatives
 - D. Differentials
 - E. Chain Rule
 - F. Directional derivatives and gradients
 - G. Tangent planes and normal lines
 - H. Extrema
 - I. Applications
 - J. Lagrange multipliers
- IV. Multiple Integration
- A. Iterated integrals and area
 - B. Double integrals and volume
 - C. Change of variables: polar coordinates
 - D. Center of mass and moments of inertia
 - E. Surface area
 - F. Triple integrals
 - G. Triple integrals in cylindrical and spherical coordinates
 - H. Change of variables: Jacobians
- V. Vector Analysis
- A. Vector fields
 - B. Divergence and curl
 - C. Line integrals
 - D. Green's Theorem
 - E. Surface integrals
 - F. Divergence Theorem
 - G. Stokes' Theorem

EXPECTED LEARNER OUTCOMES:

- A. The student will be able to manipulate vectors.
- B. The student will be able to differentiate and integrate vector-valued functions.
- C. The student will be able to execute calculus operations on functions of several variables and their applications.
- D. The student will be able to evaluate multiple integrals.
- E. The student will be able to utilize and evaluate vector fields, line integrals, and their applications.

COURSE COMPETENCIES:

Upon successful completion of the course:

The student will be able to manipulate vectors.

1. The student will be able to do computations with vectors in the plane.
2. The student will be able to do computations with vectors in space.
3. The student will be able to execute the dot product of two vectors.
4. The student will be able to execute the cross product of two vectors.
5. The student will be able to determine the equations of lines and planes in space.
6. The student will be able to recognize various surfaces in space from their equations.
7. The student will be able to convert rectangular coordinates to cylindrical and spherical coordinates.

The student will be able to differentiate and integrate vector-valued functions.

8. The student will be able to find the domain of vector-valued functions.
9. The student will be able to differentiate and integrate vector-valued functions.
10. The student will be able to find velocity and acceleration vectors.
11. The student will be able to determine unit tangent and normal vectors.
12. The student will be able to find arc length and determine curvature of a curve in space.

The student will be able to execute calculus operations on functions of several variables and their applications.

13. The student will be able to describe the domain and range.
14. The student will be able to find the limits of functions of several variables in order to discuss their continuity.
15. The student will be able to find partial derivatives.
16. The student will be able to find differentials and use differentials to approximate quantities.
17. The student will be able to execute the chain rule.
18. The student will be able to find gradient vectors and directional derivatives.
19. The student will be able to find the equations of tangent planes and normal lines to a surface.
20. The student will be able to determine relative maxima, minima, or saddle points for functions of several variables.
21. The student will be able to find extrema of functions of two variables in application problems.
22. The student will be able to use Lagrange multipliers to find extrema.

The student will be able to evaluate multiple integrals.

23. The student will be able to evaluate iterated integrals to find area of regions.
24. The student will be able to find volume of solids using double integrals.
25. The student will be able to evaluate double integrals in polar coordinates.
26. The student will be able to find the mass, center of mass, and moments of inertia using double integrals.
27. The student will be able to use double integrals to find surface area.
28. The student will be able to evaluate triple integrals to find volume.
29. The student will be able to evaluate triple integrals in cylindrical and spherical coordinates.
30. The student will be able to execute a change of variables for double integrals using Jacobian.

The student will be able to utilize and evaluate vector fields, line integrals, and their applications.

31. The student will be able to illustrate a given vector field.
32. The student will be able to calculate the divergence and curl of a vector field.
33. The student will be able to evaluate line integrals.
34. The student will be able to use Green's Theorem.
35. The student will be able to evaluate surface integrals.
36. The student will be able to use the Divergence Theorem.
37. The student will be able to use Stokes's Theorem.

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.