

PERALTA COMMUNITY COLLEGE DISTRICT COURSE OUTLINE

COLLEGE: Laney College TERM COURSE TO BE OFFERED: Fall/Spring

ORIGINATOR: Calvin Rouse DATE: Updated 11/00

DIVISION/DEPARTMENT: Division IV/Mathematics

1. REQUESTED CREDIT CLASSIFICATION (check one):
 Degree Credit Non-Degree Credit Non-Credit
 Community Service (Fee-Based) Not-for-Credit (Contract Ed.)
2. DEPARTMENT/COURSE NUMBER: Mathematics 3C
3. COURSE TITLE: Calculus III
4. COURSE: NEW REVISION TOP No: 1701.00
5. UNITS: 5 HRS/WK LEC: 5 HRS/WK LAB:
6. COURSE LENGTH: SEMESTER: X SHORT-TERM: Short-Term No. of Weeks:
Short-Term No. of Lecture Hrs: Short-Term No. of Lab Hrs:
7. NO. OF TIMES OFFERED AS SELECTED TOPIC: Average Enrollment:
8. JUSTIFICATION FOR COURSE:
Satisfies the General Education Analytical Thinking requirement for Associate Degrees.
Provides foundation for more advanced study in mathematics and related fields, such as Physics.
Satisfies the Quantitative Reasoning component required for transfer to UC, CSU, and some independent four-year institutions.
Acceptable for credit: CSU, UC.
9. COURSE/CATALOG DESCRIPTION:
Partial differentiation, Jacobians, transformations, multiple integrals, theorems of Green and Stokes, differential forms, vectors and vector functions, geometric coordinates and vector calculus.
10. OTHER CATALOG INFORMATION:
 - a. Modular: Yes No If yes, how many modules:
 - b. Open entry/open exit: Yes No
 - c. Grading policy: (1) Credit/no credit (2) Letter grade only X
(3) Both letter grade or credit/no credit
 - d. Eligible for credit by exam: Yes No
 - e. Repeatable according to state guidelines: Yes No X
If yes, number of allowable repeats:
 - f. Required for degree/certificate: Yes No
If yes, specify degree/certificate:
 - g. Part of a sequence of courses: Yes No
 - h. Are there prerequisites/corequisites/recommended preparation for this course? Yes No If yes, pages 5 and 6 must be completed.

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11. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS): (Objectives must define the exit skills required of students and include criteria identified in Items 12, 14, and 15 - critical thinking, essay writing, problem solving, written/verbal communications, computational skills, working with others, workplace needs, SCANS competencies, all aspects of the industry, etc.) (See SCANS/All Aspects of Industry Worksheet.)

Upon completion of this course, the student will demonstrate:

1. Satisfactory competency in the following skill areas:
 - a. Performing algebraic operations on vectors.
 - b. Applying vector operations to various types of problems involving lines and planes.
 - c. Computing and applying partial derivatives.
 - d. Computing multiple integrals.
 - e. Applying multiple integrals.
2. Satisfactory understanding of the concepts which provide the foundation for the skills outlined above in order to continue work in mathematics and to apply these principles to related fields.
3. The ability to think logically through assessing given information, exploring alternative approaches, and arriving at conclusions based on evidence and the application of applicable concepts.

12. COURSE CONTENT: (List major topics in sequence; address objectives listed in #11 above. **Degree applicable courses must be taught at college level; see definition.** List percent of time spent on each topic. Also, differentiate content of each level, when levels are assigned.)

1. Algebraic operations on vectors:
 - a. Algebra of vectors.
 - b. Vectors in \mathbb{R}^3
 - c. Dot product of two vectors.
 - d. Cross product of two vectors.
 - e. Lines and planes.
2. Partial derivatives:
 - a. Graphs of equations.
 - b. Functions and level curves.
 - c. Partial derivatives.
 - d. The differential
 - e. The chain rule
 - f. The directional derivative and the gradient.
 - g. Critical points and extrema.
3. Definite integral over plane and solid regions:
 - a. Double integrals in rectangular coordinates.
 - b. Double integrals in polar coordinates.
 - c. Triple integrals in rectangular coordinates.
 - d. Triple integrals in cylindrical coordinates.
 - e. Triple integrals in spherical coordinates.
 - f. Coordinate transformation and the Jacobian.

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12. COURSE CONTENT: (CONTINUED)

4. The derivative of a vector function:
 - a. Properties of the derivative of a vector function.
 - b. Tangent planes
 - c. Acceleration vectors
 - d. The unit vectors T and N.
5. Green's Theorem, the divergence Theorem, Stokes' Theorem:
 - a. vector and scalar fields
 - b. Line integrals
 - c. Conservative vector fields
 - d. Green's theorem
 - e. Surface integrals
 - f. The divergence theorem
 - g. Stoke's theorem

13. METHODS OF INSTRUCTION: (List methods used to present course content.)

1. Lecture, introducing the major concepts, theory and applications.
2. Class discussion, including question and answer sessions, and skill demonstrations which emphasize alternative approaches and their underlying rationale.

14. ASSIGNMENTS: 10 hours/week. (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)

1. Problem sets, including problems equivalent in content and level of difficulty to those covered in the lectures; additional problems that introduce supplemental concepts and formulas requiring the synthesizing of various concepts.
2. Quizzes and/or examinations

ASSIGNMENTS ARE: (Check one. See definition of college level.)

- College level
 Not college level

15. STUDENT ASSESSMENT (Grades are based on): (Check as many boxes as are applicable. **Note: For degree credit, AT LEAST ONE of the first three boxes must be checked.** If "ESSAY" is not checked, please explain why here.)

- ESSAY** (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)
- COMPUTATION SKILLS**
- NON-COMPUTATIONAL PROBLEM SOLVING** (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)
- SKILL DEMONSTRATION**
- MULTIPLE CHOICE**
- OTHER** (Describe.)

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16. TEXTS, READINGS, AND MATERIALS:

- A. List representative sources, texts, and other materials: (List author, title, publisher, edition, and date of publication.)

Larson, Calculus, 6th ed., HM, 1998.

- B. Additional Resources:

1. Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new course.

Are print materials adequate? Yes X No

Are nonprint materials adequate? Yes X No

Are services adequate? Yes X No

Specific materials and/or services needed have been identified and discussed. Comments by librarian:

Librarian (Signature)

Date

2. Other Resources: Identify types, location, and availability of other resources and materials required for this course.

- C. Readings listed in A and B above are: (Check one. See definition of college level.)
[X] Primarily college level.
[] NOT primarily college level.

17. Designate occupational code (check **ONE** only):

- ____ A: Apprenticeship course
____ B: Advanced occupational
____ C: Clearly occupational
____ D: Possibly occupational (preparatory; introductory)
____ E: Non-occupational liberal arts or course in an occupational department recommended for non-majors)

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18. PREREQUISITES, COREQUISITES, AND ADVISORIES ON ENROLLMENT: (Any entry here requires completion of page 6 also. List specific Peralta course(s) by department and course number. The limit in the Peralta District is 4 "AND" and 4 "OR" statements for each prerequisite or corequisite.)

Prerequisites:

_____ MATH 003B or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____

Corequisites:

_____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____
AND: _____ or _____ or _____ or _____

Recommended Preparation:

Program Requirement: Is program acceptance required: Yes ___ No ___

Limit on program enrollment: Yes ___ No ___ Maximum enrollment: _____

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NOTE: Complete a **SEPARATE** page 6 for **EACH** prerequisite or corequisite or recommended preparation (number the pages as 6a, 6b, 6c, etc.).

19. This page applies to a: Prerequisite Corequisite
 Recommended Preparation

List the specific prerequisite or corequisite: Mathematics 3B
List the specific recommended preparation:

20. Are subject course and pre/corequisite: Sequential Adjunctive
(If checked, omit responses to Items #22 and #23 below.)

21. **ENTRY SKILLS:** (In the following space, list the course content/entry skills required of the pre/corequisite or recommended preparation, i.e., list what the student needs to learn in the pre/corequisite or recommended preparation course that constitutes the entry skills of the subject course of this outline.)

22. **CSU/UC CAMPUSES:** (Identify in the table below three CSU/UC campuses which require an equivalent pre/corequisite for a course equivalent to the subject course of this outline. Also state in the table the corresponding course department and numbers for the identified campuses. This is one way to validate a pre/corequisite, but it is not the only way and therefore it is not mandatory to complete this table.)

	CSU/UC Campus	Course Dept/No.	Pre/Corequisite No.
1	CSU, Chico	MATH 7C	MATH 7B
2	CSU, Humboldt	MATH 210	MATH 110
3	UC, Berkeley	MATH 50B	MATH 50A

23. **COMMUNICATIONS, COMPUTATIONAL, NON-SEQUENTIAL PRE/COREQUISITE:** (In the following space, explain how the need for the pre/corequisite was validated.)