MATH 1C Course Outline as of Fall 2021

CATALOG INFORMATION

Dept and Nbr: MATH 1C Title: CALCULUS 3
Full Title: Calculus, Third Course
Last Reviewed: 9/14/2020

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	4.00	Lecture Scheduled	4.00	17.5	Lecture Scheduled	70.00
Minimum	4.00	Lab Scheduled	0	8	Lab Scheduled	0
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 140.00 Total Student Learning Hours: 210.00

Title 5 Category:	AA Degree Applicable
Grading:	Grade Only
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
Multivariable calculus including partial differentiation and multiple integration, vector analysis including vector fields, line integrals, surface integrals, and the theorems of Green, Gauss and Stokes.

Prerequisites/Corequisites:
Course Completion of MATH 1B

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Multivariable calculus including partial differentiation and multiple integration, vector analysis including vector fields, line integrals, surface integrals, and the theorems of Green, Gauss and Stokes. (Grade Only)
Prerequisites/Corequisites: Course Completion of MATH 1B
Recommended:
Limits on Enrollment:

Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**			Effective:	Inactive:
	B	Communication and Analytical Thinking		Fall 2010	
	MC	Math Competency			
CSU GE:	**Transfer Area**			Effective:	Inactive:
IGETC:	**Transfer Area**			Effective:	Inactive:
CSU Transfer:	Transferable	Effective:	Fall 2010	Inactive:	
UC Transfer:	Transferable	Effective:	Fall 2010	Inactive:	

CID:
CID Descriptor: MATH 230 Multivariable Calculus
SRJC Equivalent Course(s): MATH1B AND MATH1C

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. State and apply basic definitions, properties and theorems of multivariable calculus.
2. Compute and apply derivatives and multiple integrals of functions of two or more variables.
3. Compute and apply vector fields, line integrals, and surface integrals.
4. Use technology to analyze multivariable functions.

Objectives:
At the conclusion of this course, the student should be able to:
1. Interpret graphs in rectangular, cylindrical and spherical coordinate systems.
2. Determine a limit of a multivariable function at a point.
3. Determine whether or not a multivariable function is continuous at a point.
4. Determine the differentiability of a multivariable function at a point.
5. Compute partial derivatives including higher order derivatives, directional derivatives and gradients of functions of two or more variables.
6. Find tangent planes to surfaces.
7. Find extrema and saddle points of two-variable functions using the second derivative test.
8. Find extrema of constrained multivariable functions using the closed bounded set method and Lagrange multipliers.
9. Apply chain rules to multivariable and vector functions.
10. Compute double integrals in rectangular and polar coordinate systems.
11. Compute triple integrals in rectangular, cylindrical, and spherical coordinate systems.
12. Apply multiple integration to find area, surface area, volume, mass, center of mass and moments of inertia.
13. Evaluate integrals using change of variables.
14. Compute line integrals and surface integrals of scalar functions and over vector fields.

15. Apply independence of path, Green's Theorem, Gauss' Theorem (Divergence Theorem), and Stokes' Theorem.
16. Use a Computer Algebra System (CAS) to solve problems in multivariable calculus.
17. Use computer graphing technology to plot graphs relevant to multivariable calculus.

Topics and Scope:

I. Functions of Several Variables
- A. Surfaces, level curves, contour maps
- B. Introduction to cylindrical and spherical coordinates
- C. Limits and continuity
- D. Partial derivatives
- E. Chain rules
- F. Directional derivatives and gradients
- G. Tangent planes and differentiability
- H. Local and absolute extrema of two-variable functions
  1. Second derivative test
  2. Closed bounded set method
  3. Lagrange multipliers

II. Multiple Integration
- A. Double integrals over general regions
  1. Rectangular coordinates
  2. Polar coordinates
- B. Triple integrals over general regions
  1. Rectangular coordinates
  2. Cylindrical coordinates
  3. Spherical coordinates
- C. Applications
  1. Area in plane
  2. Surface area
  3. Volume
  4. Mass
  5. Center of mass and moments of inertia
- D. Change of variables

III. Vector Analysis
- A. Vector fields, potential functions, gradient fields
- B. Curl and divergence
- C. Line integrals of scalar functions and over vector fields
- D. Conservative vector fields, independence of path and the Fundamental Theorem of Line Integrals
- E. Surface Integrals of scalar functions and over vector fields
- F. Applications of line and surface integrals
  1. Work
  2. Circulation
  3. Flux
  4. Surface area
- G. Green's Theorem, Stokes' Theorem and Gauss' Theorem (Divergence Theorem)

IV. Technology
- A. Solving problems in multivariable calculus with a CAS.

B. Producing plots relevant to multivariable calculus using computer graphing technology.

Assignment:

1. Daily reading outside of class (20-50 pages per week)
2. Problem set assignments from required text(s) or supplementary materials chosen by the instructor (1-6 per week)
3. Quizzes (0-4 per week)
4. Exams (2-7 per term)
5. Final Exam
6. Projects (for example, computer explorations or modeling activities, 0-10 per term)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

None, This is a degree applicable course but assessment tools based on writing are not included because problem solving assessments are more appropriate for this course.	Writing 0 - 0%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Problem set assigments	Problem solving 5 - 20%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, exams, final exam	Exams 70 - 95%

Other: Includes any assessment tools that do not logically fit into the above categories.

Projects	Other Category 0 - 10%

Representative Textbooks and Materials:
Calculus: Early Transcendentals. 8th ed. Stewart, James. Cengage Learning. 2016 (classic)