MATH A280H: CALCULUS 3 HONORS

Item	Value
Curriculum Committee Approval Date	02/23/2022
Top Code	170100 - Mathematics, General
Units	6 Total Units
Hours	108 Total Hours (Lecture Hours 108)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• OC Comm/Analytical Thinking - AA (OA2)
Associate Science Local General Education (GE)	• OCC Comm/AnalyticalThinking-AS (OAS2) • OCC Mathematics (OMTH)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 2A Math Concepts (2A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 2A Math Concepts (2A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B4 Math/Quant.Reasoning (B4)

Course Description

MATH A280 in a regular section with an additional one hour per week of honors material. Multivariable calculus including vectors, vector-valued functions, functions of several variables, partial derivatives, multiple integrals, calculus of vector fields, Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Selected introductory topics in differential geometry will be discussed in the honors-specific portion of this course. Enrollment Limitation: MATH A280; students who complete MATH A280H may not enroll in or receive credit for MATH A280. PREREQUISITE: MATH A185, MATH A185H or MATH A182H. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Apply vector algebra to describe lines and planes.
2. Graph and analyze space curves and common surfaces.
3. Setup and solve multiple integrals, line integrals and surface integrals over various domains.
4. State and apply Green’s Theorem, Stokes’s Theorem and the Divergence Theorem.
5. Find partial derivatives and gradients and use them in applications.

Course Objectives

- 1. Apply vectors and vector algebra.
- 2. Determine equations of lines and planes, including tangent planes.
- 3. Determine vector derivatives.
- 4. Find the limit of a function at a point.
- 5. Determine partial derivatives.
- 6. Determine differentiability.
- 7. Find local extrema and saddlepoints.
- 8. Solve constraint problems using Lagrange multipliers.
- 9. Compute arc length.
- 10. Determine and use multiple integrals.
- 11. Determine and use line integrals.
- 12. Determine and use surface integrals.
- 13. Use Greens Theorem.
- 14. Use the Divergence Theorem.
- 15. Use Stokess Theorem.
- 16. Calculate gradient, divergence and curl.

Lecture Content

It is imperative that instructors cover all topics in the outline. The instructor may determine the order of topics. The department encourages the instructor to incorporate the graphing calculator wherever it is appropriate. Vector and Vector Algebra Define basic concepts including different coordinate systems for three dimensions Discuss vector operations and their properties in two and three dimensions Compute and apply dot and cross products, triple products and projections of vectors Find equations of lines and planes Vector Functions Apply vector functions and space curves, their derivatives and integrals Determine limits and continuity for vector valued functions Solve applications of velocity and acceleration Determine arc length and curvature, tangent, normal and binomial vectors Partial Derivatives Define real valued functions of several variables, level curves and surfaces Define limits and continuity and their properties for spacial domains Find partial derivatives, differentiability and higher-order derivatives Apply the chain rule Find tangent planes Find and apply gradients and directional derivatives Determine local and global extrema and saddlepoints Use Lagrange multipliers to find extrema Multiple Integrals Define and apply double and triple integrals Apply multiple integrals to polar, cylindrical and spherical coordinates Apply multiple integration to calculate quantities such as area, volume, center of mass or moments of inertia Apply change of variables Vector Calculus Evaluate line integrals and apply the Fundamental Theorem Prove and apply Greens Theorem Find divergence and curl of vector fi elds Calculate surface area Integrate real-valued functions and vector fields over surfaces (including parametrically defined surfaces) and apply to flux and circulation Prove and apply the Divergence Theorem and solve applications Prove and apply Stokess Theorem and solve applications Additional Topics 1. Frenet equations2. Jacobian matrices3. First and second fundamental forms

Method(s) of Instruction

- Lecture (02)

Instructional Techniques

Lecture, discussion, written homework.

Reading Assignments
As assigned from text. 1 hour.

Writing Assignments
Tests include writing definitions and comparisons. 1 - 2 hour

Out-of-class Assignments
As assigned by instructor. 8 hour.

Demonstration of Critical Thinking
Tests include writing definitions and comparisons, comprehensive final.

Required Writing, Problem Solving, Skills Demonstration
Tests include writing definitions and comparisons. Written assignments and exams, comprehensive final, lecture, discussion, written homework.

Eligible Disciplines
Mathematics: Masters degree in mathematics or applied mathematics OR bachelors degree in either of the above AND masters degree in statistics, physics, or mathematics education OR the equivalent. Masters degree required.

Textbooks Resources
1. Required Stewart, James. Calculus, Early Transcendentals , 9th ed. Cengage Publishing, 2019

Other Resources
1. Other appropriate textbook as chosen by faculty.