Pomona College
Department of Mathematics

Math 67. Vector Calculus

Fall 2019

Course Outline

Time and Place:	MWF 11:00 am - 11:50 am Millikan 2393
Instructor:	Dr. Adolfo J. Rumbos
Office:	Andrew 2287
Phone / e-mail:	ext. 18713 / arumbos@pomona.edu
Office Hours:	TuTh 9:00 am - 10:00 am, or by appointment
Course Notes:	*http://pages.pomona.edu/~ajr04747/*
Prerequisites:	Math 60 (Linear Algebra) or equivalent course.

Course Description. The main goal of this course is the development of differential and integral calculus ideas, which students learned in a single-variable calculus courses, in dimensions higher than 1. The main objects of study are functions from n-dimensional Euclidean space to m-dimensional Euclidean space (also known as **Vector Fields**) and their differentiability and integrability properties. We will also be concerned with the study of subsets of Euclidean space on which those functions act. The culmination of the course will be the multivariable version of the **Fundamental Theorem of Calculus** (also known as the generalized **Stokes' Theorem**). In the process leading to Stokes' Theorem, the machinery of **differentiable manifolds** and **differential forms** will be introduced.

The specific topics to be covered are listed in the attached **Tentative Schedule of Lectures and Examinations**.

Assigned Readings and Problems. Readings and problem sets will be assigned at every lecture. Homework assignments will be collected on an alternate basis. Students are strongly encouraged to work on every assigned problem. **Late homework assignments will not be graded**.

Grading Policy. Grades will be based on the homework, two 50-minute examinations, plus a comprehensive final examination. The grades will be computed as follows:

homework	20%
Two 50-minute exams	50%
final examination	30%

Final Examination.

Time: Monday, December 16, 2019 9:00 am
Place: Millikan 2393

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Tentative Schedule of Lectures and Examinations

Date		Topic
W	Sep. 4	*n*-Dimensional Euclidean Space
F	Sep. 6	Spans, lines and planes
M	Sep. 9	Dot product and Euclidean norm
W	Sep. 11	Orthogonality and projections
F	Sep. 13	The cross product
M	Sep. 16	Functions on Euclidean space
W	Sep. 18	Open subsets of Euclidean space
F	Sep. 20	Continuous functions
M	Sep. 23	Continuous functions (continued)
W	Sep. 25	Limits and continuity
F	Sep. 27	Differentiability
M	Sep. 30	The derivative map
W	Oct. 2	The derivative map (continued)
F	Oct. 4	Sufficient conditions for differentiability
M	Oct. 7	Sufficient conditions for differentiability (continued)
W	Oct. 9	Derivatives of compositions
F	Oct. 11	Derivatives of compositions (continued)
M	Oct. 14	Review
W	Oct. 16	**Exam 1**
F	Oct. 18	Path integrals
M	Oct. 21	*Fall Recess*
W	Oct. 23	Path integrals (continued)
F	Oct. 25	Line integrals
M	Oct. 28	Gradient fields
W	Oct. 30	Flux across plane curves
F	Nov. 1	Differential forms
M	Nov. 4	Calculus of differential forms
W	Nov. 6	Calculus of differential forms (continued)
F	Nov. 8	Evaluating 2-forms: Double integrals
M	Nov. 11	Green's Theorem
W	Nov. 13	Fundamental Theorem of Calculus in two dimensions
F	Nov. 15	Change of variables Theorem
M	Nov. 18	Change of variables Theorem (continued)
W	Nov. 20	Triple integrals
F	Nov. 22	Surface integrals

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Date		**Topic**
M	Nov. 25	Surface integrals (continued)
W	Nov. 27	*Thanksgiving Recess*
F	Nov. 29	*Thanksgiving Recess*
M	Dec. 2	Stokes' Theorem
W	Dec. 4	Review
F	Dec. 6	**Exam 2**
M	Dec. 9	Review
W	Dec. 11	Review
M	Dec. 16	**Final Examination**