

PHYSICS 400

APPLICATIONS OF MATHEMATICS IN PHYSICAL SCIENCES

FALL 2020 / ON-LINE WRITTEN LECTURE NARRATIVES / No In-Person Meetings

(Formerly Watanabe Hall 114 / MWF, 11:30 am - 12:20 pm)

Monday, August 24 – Friday, December 18

Last Day of Instruction: Thursday, December 10

Instructor

Dr. Chester Vause

Professor, Department of Physics & Astronomy

Watanabe Hall 434, 808-956-2989, cvause@hawaii.edu

Prerequisites

Math 244 or 253A, and Math 311 or 307

Textbook (Required)

Mathematical Methods for Physicists (7th edition), G. Arfken, H. Weber, and F. Harris (Academic Press, 2013)

Textbook Chapters

Selected topics in textbook chapters:

3	Vector Analysis
2, 5, 6	Determinants and Matrices, Linear Algebra / Vector Spaces
1, 11	Calculus of Complex Variables
20	Integral Transforms
8, 12, 19	Sturm-Liouville Theory-Orthogonal Functions / Series
15, 18	Special Functions

Omitted sections in chapters may be announced as needed. Selected topics in other chapters may be included, time permitting.

Student Learning Outcomes

Among the student learning outcomes of this course are the abilities to:

- Use complex variables, analytic function theory, and contour integration in the solution of mathematical problems applied to physics
- Apply vector calculus in the formalism of physical theories
- Formulate general linear equations in terms of matrix algebra and the eigenvalue problem as applied in physics
- Understand the general mathematical formulation of orthogonal functions resulting from ordinary differential equations used in physics and the relationship to linear algebraic vector spaces

Homework Assignments

Suggested problems will be assigned. These will NOT be graded (see attached hand-out).

Exams

Exams are TAKE-HOME EXAMS. The schedule is below, and is subject to change. Instructions will be given on the exam cover page. Basically, one uses the textbook, lectures notes, your own personal notes, and a calculator. No other sources of material are allowed. By taking these exams, you are abiding to the conditions set forth. The exams will be sent as a pdf file. It is preferable that your finished exam be scanned and returned to the instructor as a pdf file. If this is not possible, paper copy may be delivered to the instructors office, as will be noted in the specific exam directions.

Exam 1 Given: Monday, September 28, 2020 Due: Friday, October 2, 2020
Exam 2 Given: Monday, November 9, 2020 Due: Friday, November 13, 2020
Final Exam NO FINAL EXAM

Each Exam is based on material covered since the previous Exam. Each Exam is worth 50% of the final grade total score:

$$\text{TOTAL SCORE}(\%) = 50\% * (\text{EX1}(\%) + \text{EX2}(\%))$$

Grade Scale

Letter grade is determined from the total score according to the following scale:

A- (86%-90%)	A (91%-95%)	A+ (96%-100%)
B- (61%-70%)	B (71%-80%)	B+ (81%-85%)
C- (31%-40%)	C (41%-50%)	C+ (51%-60%)
	F (0%-20%)	D (21%-30%)

NO INCOMPLETE GRADE GIVEN

NOTICE

The written lecture narratives are the intellectual property of the instructor, and are for your personal use only. It is not to be shared or distributed to any one in any form, in any media.