

**PHYSICS 400**  
**APPLICATIONS OF MATHEMATICS IN PHYSICAL SCIENCES**  
FALL 2017 / Watanabe Hall 114 / MWF, 11:30 AM - 12:20 PM  
Monday, August 21 – Friday, December 15  
Last Day of Instruction: Thursday, December 7

**Instructor**

Dr. Chester Vause  
Professor, Department of Physics & Astronomy  
Watanabe Hall 434, 808-956-2989, [cvause@hawaii.edu](mailto:cvause@hawaii.edu)  
Office Hours: See instructor after class to make an appointment.

**Prerequisites**

Math 244 or 253A, and Math 311 or 307

**Textbook (Required)**

Mathematical Methods for Physicists (7<sup>th</sup> 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 to be announced in class. 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:

- (a) Use complex variables, analytic function theory, and contour integration in the solution of mathematical problems applied to physics
- (b) Apply vector calculus in the formalism of physical theories
- (c) Formulate general linear equations in terms of matrix algebra and the eigenvalue problem as applied in physics
- (d) 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.

## Exams

Exams are closed-book, two student-generated note pages per new material (2 for Exam 1, 4 for Exam 2, 6 for Exam 3, 8 for Final Exam), and scientific calculator, only. No internet devices or electronic storage media. Exam dates are:

|            |  |
|------------|--|
| Exam 1     | Friday September 22, 2017                |
| Exam 2     | Friday October 20, 2017                  |
| Exam 3     | Friday November 17, 2017                 |
| Final Exam | Friday December 15, 2017, 12:00PM-2:00PM |

Each Exam (including the Final Exam) is based on material covered since the previous Exam. Each Exam is worth 25% of the final grade total score:

$$\text{TOTAL SCORE}(\%) = 25\%(\text{EX1}(\%) + \text{EX2}(\%) + \text{EX3}(\%) + \text{FNL}(\%))$$

## 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

Be prepared to take the tests in-class as assigned. This is not negotiable. If you have time conflicts, decide if this course is your first priority. I do not “work around” student’s personal plans (travel and otherwise) and schedules.

This course is a lecture format. If you come to class, plan to stay. Excessive coming and going will not be tolerated. If you are late, enter quietly through the back door. Do not disturb the class.

No electronic recording and no electronic storage of any kind of lectures and lecture board writing.

No internet devices (electronic smart phones, pads/tablets, computers, etc.). Turn off your wireless telephones, etc., and PUT THESE AWAY. Do not attend to these during class (no texting, etc.) as such behavior is distracting to the instructor and your classmates.