

**Instructor:** Dr. Bao-An Li  
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**Office Hours:** TR 1:30-4:00pm or by appointment  
**Text:** *Mathematical Methods for Physicists, G.B. Arfken et al. (any version)*

**Description:** Physics 517: Principles of *Mathematical Physics, 3 credit hours*

Covers mathematical methods used in classical and modern physics and in the engineering sciences. Prepare students with necessary math skills to be successful in graduate level physics courses. This course will concentrate on the application of mathematical concepts and methods. Topics include vectors and curvilinear coordinates, tensor analysis, matrices and linear algebra, operators and eigenvalues, boundary value problems, Fourier and Laplace transforms, partial differential equations of physics, Green's functions, and variational methods. Emphasis is placed on problem solving.

**Student Learning Outcomes:**

**Objective 1:** Students will demonstrate that they understand the concept and have learned the basic skills in using vector analysis, power series and complex numbers in solving physics problems

**Objective 2:** Students will demonstrate that they understand the concept and have learned the basic skills in using linear algebra, vector calculus and tensor analysis in solving physics problems

**Objective 3:** Students will demonstrate that they understand the concept and have learned the basic skills in solving differential equations, using functions of complex variables and the calculus of variations in solving physics problems

Three exams will be given during the semester, the exact time will be announced in the class at least one week in advance

Exam 1: Vector calculus, vector analysis in curved coordinate systems, tensor analysis, determinants and matrices

Exam 2: Complex algebra, functions of a complex variable

Exam 3: Applied differential equations and calculus of variations

**Grading:**

|            |     |
|------------|-----|
| Home works | 40% |
| Exams      | 60% |

### **Grade Scale:**

|              |    |   |
|--------------|----|---|
| 90 and above | -- | A |
| 80 to 90     | -- | B |
| 70 to 80     | -- | C |
| 60 to 70     | -- | D |
| below 60     | -- | F |

### **Homework:**

Homework will be assigned regularly and it may be discussed in class. The homework counts 40% towards the final grade.

### **Exams:**

All exams will be given equal weight, and all will have an in-class component. At the instructor's discretion, a take-home component may also be assigned in order to test the students on more difficult or time-consuming problems. **Students must do their own work on any take-home components of exams.**

### **Cheating, Plagiarism, and other Breaches of Academic Conduct:**

Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the "Code of Student Conduct" section of the *Student's Guidebook*.

### **Classroom Behavior:**

Disorderly conduct which interferes with the normal classroom atmosphere will not be tolerated. The classroom instructor is the judge of such behavior and may instruct a disorderly student to leave the room with an unexcused absence or, in more serious situations, a student may be removed from the class with a failing grade. **All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. (See Student's Guide Handbook, Policies and Procedures, Conduct)**

### **Attendance and Tardiness:**

***Students are expected to be on-time and present for all class meetings.*** Excused absences can be arranged prior to the class period being missed for appropriate activities as determined by the instructor. If an **emergency** results in an absence, the student should contact the instructor **as soon as possible** informing the instructor of the emergency and inquiring about ways to make up the missed class. The instructor will make judgments on how to handle the situation. Possible reasons for an excused absence are listed in the *Student's Guidebook* under class attendance policy. A student who is tardy at the time roll is called may be marked absent. Attendance records will be maintained.

**ADA Eligible Students:**

ADA eligible students should make arrangements with the instructor in the first week of the semester about special arrangements needed for classroom or testing facilities and procedures to accommodate the disability.

**Evaluation of Instruction:**

Students will be given opportunities to evaluate instruction near the end of the semester. The physics department utilizes a scantron-graded questionnaire with statements regarding various elements of instruction and in addition utilizes an open-ended form where students can make comments on all elements of the classroom. These comments are given to the instructor and department head soon after the grades are recorded. If students have concerns about the classroom experience during the semester they should inform the instructor of those concerns and failing a satisfactory response may, as a last resort, contact the physics department head with those concerns.