

Syllabus for Physics 317

Mathematical Physics I

Fall 2002

August 26, 2002

- **Catalog Description:** *Mathematical Physics I*. Three semester hours. Topics include applications of ordinary differential equations, vector calculus, and fourier series to problems in classical mechanics, electricity and magnetism, and wave motion. Matrix methods are applied to eigenvalue problems in rigid body mechanics and vibrating systems with many degrees of freedom. Prerequisite: Math 225.
- **Supplemental Description:** In this case, the Catalog Description is actually quite complete, and further information can be found below under “Goals of the Course”. Students will find Physics 317 easier if they have completed or are concurrently taking Math 315 and Math 335.
- **Textbooks:**
 1. *Mathematical Methods for Physicists: A Concise Introduction*, Tai L. Chow, Cambridge, 2000.
 2. *Theory and Problems of Advanced Mathematics for Engineers and Scientists*, Murray R. Spiegel, Schaum’s Outline Series, McGraw-Hill, 1971.
 3. *Mathematical Handbook of Formulas and Tables*, Second Edition, Murray R. Spiegel and John Liu, Schaum’s Outline Series, McGraw-Hill, 1999.

- **Lecture Time and Place:** TBA, due to meeting time conflict with a math class.

| Instructor | Office | Contact Information |
|-----------------------|-------------------------|---|
| • Dr. Howard Richards | 130 Sci WR 3:30–4:30 | 903-886-5882 Howard_Richards@TAMU-Commerce.edu |

- **Goals of the Course:** Students will be mathematically well-prepared for work in classical mechanics, electrodynamics, and elementary quantum mechanics. Specifically, students will
 - be able to take the gradient of scalar fields, the laplacian of scalar and vector fields, and the divergence and curl of vector fields in rectangular, cylindrical, and spherical coordinates
 - be able to correctly take time derivatives of position in rectangular, cylindrical, and spherical coordinates
 - understand and be able to apply Gauss’s Theorem, Stoke’s Theorem, and Green’s Theorem
 - be able to represent rotations and reflections as the operation of matrices (tensors) on vectors
 - be able to solve simple ordinary differential equations, especially first- and second-order inhomogenous linear differential equations
 - be able to find the eigenvalues and eigenvectors of matrices
 - be able to solve systems of first-order differential equations, including nonhomogenous systems
 - understand the concept of orthogonal functions and be able to calculate Fourier series and integrals
 - understand the use of series of orthogonal functions to solve boundary-value problems in three dimensions

- **Grade Distribution:**

50% Homework
 20% Midterm Exam
 30% Final Exam

- **Grade Scale:**

A : 85% and up

B : 70% to 85%

C : 55% to 70%

D : 40% to 55%

F : below 40%

- **Course Webpage and Schedule:**

The timing of specific lectures, tests, and homework assignments cannot be accurately foreseen at the beginning of the semester, so **an up-to-date list of lectures, tests, and homework assignments will be maintained on the course webpage,**

<http://www.tamu-commerce.edu/coas/physics/phys317/fall102/>.

An attempt will be made to announce the topics of lectures two weeks in advance. The webpage will also contain supplements, links to useful external web pages, and other items useful or necessary to the course. Students should periodically check it for updates.

- **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 judgements on how to handle the situation. Possible reasons for an excused absence are listed in the “Student’s Guidebook” under class attendance policy. Attendance and tardy records will be maintained and either or both may result in deductions from your overall grade.

- **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.

- **Cheating and other Breaches of Academic Conduct:** Students are encouraged to study and work homework problems together. If properly done, this is an excellent method of learning the material. However, students should *not* simply copy each other's homework without understanding it; there is no learning value in rote copying. If a group of students turns in identical work and any of them, upon questioning, shows by a total lack of understanding of the answer he or she has turned in that he or she has simply copied the answer, *all students in that group will receive no credit for the copied work*. 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".
- **Homework Assignments:** All homework assignments are due at the *beginning* of the class on the assigned due date. 10% will be deducted from the score of the assignment for each class meeting the homework is late.
- **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.