



**Syllabus (two pages):**  
**PHYS 317 - Mathematical Methods for Physics and Engineering 2014**  
**Class: TR, 1:00 pm – 2:15 pm, Science Building, Room 116**

**Instructor:** Dr. Carlos A. Bertulani, Office Science Bldg-140, Phone 886-5882  
**Office hours:** MW 12:30 - 1:45 pm  
**e-mail:** carlos.bertulani@tamuc.edu

**Textbook:** **Mathematical Methods in the Physical Sciences**, Mary L. Boas  
Wiley; 3 edition (2005) ISBN-13: 978-0471198260.

**Catalog Description:** Mathematical techniques from the following areas: infinite series; integral transforming; applications of complex variables; vectors, matrices. Prerequisites: Math 192, Corequisite Math 314 or 315, or consent of instructor. 3.000 Credit hours - 3.000 Lecture hours

**Examination** There will be 2 tests, plus a comprehensive final covering all course material. The tests will consist of questions selected from problems at the end of each chapter of the textbook. Each test counts toward 30% of the final score. The comprehensive final will be 40% of the final score.

**Pre-requisites** This course requires a basic knowledge of mathematics, namely, algebra and calculus from introductory mathematics courses.

**Grades:** 90% or above on final average is an "A", 80-89% = "B", etc.

## Goals and Learning Outcomes for this Course

This course is mathematical methods of physics, without which one is absolutely unable to understand modern science and engineering. It covers the topics such as ordinary differential equations, Fourier series, partial differentiation, linear algebra, and complex variables. The course also develops a good knowledge in physics.

**Goal 1:** Students will understand the discipline-specific knowledge in thermodynamics and statistics, covering the subjects:

- |   |   |
|---|---|
| <b>1. Infinite series, power series</b> | <b>5. Multiple integrals</b>              |
| <b>2. Complex numbers</b>               | <b>6. Vector analysis</b>                 |
| <b>3. Linear algebra</b>                | <b>7. Fourier series and transforms</b>   |
| <b>4. Partial differentiation</b>       | <b>8. Ordinary differential equations</b> |

**Objective 1:** Students will know the concepts of mathematical methods of physics and demonstrate a proficiency in the fundamental concepts in this area of science.

**Objective 2:** Students will be able to explain concepts of advanced mathematical concepts and show a working knowledge of a broad array of physical phenomena that are based upon fundamental concepts of physics and engineering.

**Goal 2:** Students will have strong mathematical reasoning and problem solving skills and apply these skills to the solution of theoretical and applied problems.

*Objective 1:* Students will be able to solve problems using their knowledge and skills in modern science. They will use critical thinking skills to formulate and solve quantitative problems in physics and engineering.

*Objective 2:* This course will offer a curriculum emphasizing physical science to produce professionals capable of applying broad theoretical insight to solution of practical problems.

### **Assessment**

The following measures will be used to assess the success of this course in achieving the above objectives:

***Student Work:*** exams.

- The course will have 2 midterm tests, plus a comprehensive final covering all course material.
- The total grade will consist of written exams.

A typical exam question is shown below. Expect 5 of similar questions in each midterm exam, and 8 in the final exam.

Test the following series for convergence:  $\sum_{n=0}^{\infty} \left( \frac{2+i}{3-4i} \right)^{2n}$

***Student Perception Survey:*** to determine whether students believe that they have achieved the objectives of the physics program.

- This survey will be developed in the Fall of 2014, and administered to students at the end of the semester.
- The Physics and Astronomy department utilizes an online questionnaire provided via the MyLeo TamuC system with statements regarding various elements of instruction. 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.

### **Students with Disabilities**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact the Office of Student Disability Resources and Services.