



## PHYS 2426 – Advanced Physics II

Course Syllabus: Fall 2022

---

“Northeast Texas Community College exists to provide responsible, exemplary learning opportunities.”

### Mark Ellermann II

Instructor of Physics

B.S. in Physics and Mathematics, Texas A&M – Commerce

M.S. in Physics, Texas A&M – Commerce

**Office:** MS117

**Phone:** (903) 434-8297

**Email:** mellermann@ntcc.edu

| Office Hours | Monday                      | Tuesday     | Wednesday                   | Thursday          | Friday            |
|--------------|-----------------------------|-------------|-----------------------------|-------------------|-------------------|
|              | 8:30 – 11:00<br>1:30 – 5:00 | 4:30 – 5:00 | 8:30 – 11:00<br>4:30 – 5:30 | By<br>Appointment | By<br>Appointment |

*The information contained in this syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.*

**Catalog Course Description (include prerequisites):** 4 credit hours.

Lecture/Lab/Clinical: Three hours of lecture and three hours of lab each week.

Prerequisite: [PHYS 2425](#) (completed) and [MATH 2414](#) (completed).

This is a calculus-based physics course intended for students majoring in computer science, engineering, mathematics, physics, or related fields of study. Topics include charge, electric fields, magnetic fields, electric potential, current, capacitance, resistance, electromotive force, simple DC and AC circuits, induction, electromagnetic waves, propagation of light and geometric optics.

**Required Textbook(s):** Physics for Scientists and Engineers, 10<sup>th</sup> Ed.

**Publisher:** Cengage

**ISBN Number:** 978-1-337-55327-8

### Recommended Reading(s):

*The Cartoon Guide to Physics*, by Larry Gonick and Art Huffman

\*\* This book will not be referenced in class, but can serve as a convenient, alternate explanation for difficult concepts.

**Student Learning Outcomes:**

Upon successful completion of this course, students will:

- 2426.1) Articulate the fundamental concepts of electricity and electromagnetism, including electrostatic potential energy, electrostatic potential, potential difference, magnetic field, induction, and Maxwell's Laws.
  - 2426.2) State the general nature of electrical forces and electrical charges, and their relationship to electrical current.
  - 2426.3) Solve problems involving the inter-relationship of electrical charges, electrical forces, and electrical fields.
  - 2426.4) Apply Kirchhoff's Laws to analysis of circuits with potential sources, capacitance, and resistance, including parallel and series capacitance and resistance.
  - 2426.5) Calculate the force on a charged particle between the plates of a parallel-plate capacitor.
  - 2426.6) Apply Ohm's Law to the solution of problems.
  - 2426.7) Describe the effects of static charge on nearby materials in terms of Coulomb's Law.
  - 2426.8) Use Faraday's and Lenz's Laws to find the electromotive forces.
  - 2426.9) Describe the components of a wave and relate those components to mechanical vibrations, sound, and decibel level.
  - 2426.10) Articulate the principles of reflection, refraction, diffraction, interference, and superposition of waves.
  - 2426.11) Solve real-world problems involving optics, lenses, and mirrors.
- 
- 2426L.1) Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner and evaluate the accuracy of physical measurements and potential sources of error in measurements.
  - 2426L.2) Conduct basic laboratory experiments involving electricity and magnetism.
  - 2426L.3) Relate physical observations and measurements involving electricity and magnetism to theoretical principles.

**Core Curriculum Purpose and Objectives:**

Through the core curriculum, students will gain a foundation of knowledge of human cultures and the physical and natural world; develop principles of personal and social responsibility for living in a diverse world; and advance intellectual and practical skills that are essential for all learning.

Courses in the foundation area of mathematics focus on quantitative literacy in logic, patterns, and relationships. In addition, these courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.

## College Student Learning Outcomes:

### Critical Thinking Skills

**CT.1** Students will demonstrate the ability to 1) analyze complex issues, 2) synthesize information, and 3) evaluate the logic, validity, and relevance of data.

### Communication Skills

**CS.1** Students will effectively develop, interpret and express ideas through written communication.

### Empirical and Quantitative Skills

**EQS.1** Students will manipulate numerical data or observable facts by organizing and converting relevant information into mathematical or empirical form

**EQS.2** Students will analyze numerical data or observable facts by processing information with correct calculations, explicit notations, and appropriate technology.

**EQS.3** Students will draw informed conclusions from numerical data or observable facts that are accurate, complete, and relevant to the investigation.

### Teamwork

**TW.2** Students will work with others to support and accomplish a shared goal.

### **SCANS Skills:**

N/A

### **Course Outline:**

Chapter 22 – Electric Fields

Chapter 23 – Continuous Charge Distributions  
and Gauss's Law

Chapter 24 – Electric Potential

Chapter 25 – Capacitance and Dielectrics

Chapter 26 – Current and Resistance

Chapter 27 – Direct-Current Circuits

Chapter 28 – Magnetic Fields

Chapter 29 – Sources of Magnetic Field

Chapter 30 – Faraday's Law

Chapter 15 – Mechanical Waves

Chapter 16 – Sound and Hearing

Chapter 33 – The Nature and Propagation of  
Light

Chapter 34 – Geometric Optics

Chapter 35 – Interference

Chapter 36 – Diffraction

**Evaluation/Grading Policy:**

|             |      |
|-------------|------|
| Homework:   | 15%  |
| Labs:       | 25%  |
| Test 1:     | 10%  |
| Test 2:     | 10%  |
| Test 3:     | 10%  |
| Test 4:     | 10%  |
| Final Exam: | 20%  |
| <br>        |      |
| Total:      | 100% |

**Tests/Exams:**

|   |                |
|---|----------------|
| TEST 1 (Electrostatics) : Chapters 22-25  | 9/26           |
| TEST 2 (DC Circuits) : Chapters 26-27   | 10/10          |
| TEST 3 (Magnets and Electromagnetism): Chapters 28-30                               | 10/31          |
| TEST 4 (Waves) : Chapters 15, 16, 33  | 11/14          |
| FINAL EXAM Chapters 21-29, 15, 16, 33-36<br>Final will be comprehensive, plus Light | 12/6 @ 8:00 am |

**Lab Policies**

1. All students are expected to report to lab on time, prepared to begin.
2. You will have one practical exam in lab that will require a full lab write-up.
3. Labs not requiring a report will still require proof of completion, typically a sheet showing recorded data from the lab activities.
4. Students are expected to remain in the lab classroom for the full lab time. You are encouraged to experiment on your own. However, given the sensitive nature of most of the equipment, you are required to ask the instructor for permission before trying anything off the books.

**Student Responsibilities/Expectations:**

Meeting course deadlines are the responsibility of the student. Any assignment not submitted by the due date will receive a grade of "0".

**NTCC Academic Honesty Statement:**

"Students are expected to complete course work in an honest manner, using their intellects and resources designated as allowable by the course instructor. Students are responsible for addressing questions about allowable resources with the course instructor. NTCC upholds the highest standards of academic integrity. This course will follow the NTCC Academic Honesty policy stated in the Student Handbook."

**Academic Ethics**

The college expects all students to engage in academic pursuits in a manner that is beyond reproach. Students are expected to maintain complete honesty and integrity in their academic pursuit. Academic dishonesty such as cheating, plagiarism, and collusion is unacceptable and may result in disciplinary action. Refer to the student handbook for more information on this subject.

**ADA Statement:**

It is the policy of NTCC to provide reasonable accommodations for qualified individuals who are students with disabilities. This College will adhere to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to request accommodations. An appointment can be made with Shannin Garrett, Academic Advisor/Coordinator of Special Populations located in the College Connection. She can be reached at 903-434-8218. For more information and to obtain a copy of the Request for Accommodations, please refer to the [NTCC website – Special Populations](#).

**Family Educational Rights And Privacy Act (FERPA):**

The Family Educational Rights and Privacy Act (FERPA) is a federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. FERPA gives parents certain rights with respect to their children's educational records. These rights transfer to the student when he or she attends a school beyond the high school level. Students to whom the rights have transferred are considered "eligible students." In essence, a parent has no legal right to obtain information concerning the child's college records without the written consent of the student. In compliance with FERPA, information classified as "directory information" may be released to the general public without the written consent of the student unless the student makes a request in writing. Directory information is defined as: the student's name, permanent address and/or local address, telephone listing, dates of attendance, most recent previous education institution attended, other information including major, field of study, degrees, awards received, and participation in officially recognized activities/sports.