

## Applied Physics (SCIT 1418)



**Credit:** 4 semester credit hours (3 hours lecture, 2 hours lab)

**Prerequisite:** MATH 1332

### Course Description

Introduction to physics for industrial applications including vectors, motion, mechanics, simple machines, matter, heat, and thermodynamics.

### Required Textbook and Materials

1. *Applied Physics* by Dale Ewen, Neill Schurter and P. Erik Gundersen, 9th edition. Pearson Prentice Hall Publishers.
  - a. ISBN number 13:9780135157336.
2. Three ring binder.
3. Tabbed dividers.
4. Scientific calculator.
5. Pens or pencils.

### Course Objectives

Upon completion of this course, the student will be able to:

1. Define the basic terminology as related to applied physics (SCANS: F1.4, F2.3, F11.2)
2. Use appropriate measuring devices to analyze systems (SCANS: C3.5, C5.5, C6.5, C15.4, C18.5, C20.2)
3. Apply the relationships of length, mass, and time (SCANS: F1.2, F2.3, F3.4, F5.3, F8.2, F9.4)
4. Demonstrate problem-solving techniques related to physics principles including: vectors, motion, mechanics, simple machines, matter, heat, and thermodynamics (SCANS: F2.1, F3.5, F8.3, F10.3, F11.3, F12.5, C5.4, C6.4, C7.4)
5. Demonstrate laboratory skills related to physics principles. (SCANS: F1.4, F2.4, F3.5, F5.4, F6.4, F8.4, F9.5, F10.4, F11.4, F12.4, F13.4, F15.5, F16.3, F17.4, C1.4, C3.4, C4.1, C5.4, C6.5, C7.4, C8.1, C9.5, C10.1, C13.2, C14.5, C16.3, C18.5, C19.5, C20.4)

### SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991 the Commission announced its findings in *What Work Requires in Schools*. In its

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research, the Commission determined that “workplace know-how” consists of two elements: foundation skills and workplace competencies.

**Course Outline**

- A. Math for Physics Review
  - 1. Standards of Measure
    - a. British system
    - b. Metric system
  - 2. Scientific Notation
  - 3. Significant figures and Accuracy
  - 4. Precision
  - 5. Conversions
    - a. British-British
    - b. Metric-Metric
    - c. Metric-British
  - 6. Area and Volume
  - 7. Calculations with Significant Digits
  - 8. Basic Algebraic Calculations
  - 9. Problem Solving Method
- B. Force and Motion
  - 1. Force
  - 2. Newton’s Laws of Motion
    - a. Law of Inertia
    - b. Law of Acceleration
      - 1. Friction
      - 2. Gravity and Weight
    - c. Law of Action and Reaction
- C. Momentum
  - 1. Momentum
  - 2. Impulse
  - 3. Collisions
    - a. Elastic Collisions
    - b. Inelastic Collisions
- D. Basic Right Triangle Trigonometry
  - 1. Right Triangles
  - 2. Trigonometric Functions
    - a. Sine
    - b. Cosine
    - c. Tangent
  - 3. Using Trigonometric Functions
    - a. Determine an Unknown Side
    - b. Determine an Unknown Angle
- E. Vectors
  - 1. Vectors and Scalars
  - 2. Components of a Vector
  - 3. Addition of Vectors
- F. Concurrent and Parallel Forces
  - 1. Forces in Two Dimensions
  - 2. Concurrent Forces in Equilibrium
  - 3. Torque
  - 4. Parallel Forces
  - 5. Center of Gravity
- G. Simple Machines
  - 1. Machines and Energy Transfer
  - 2. Lever
  - 3. Wheel and Axle
  - 4. Pulley
  - 5. Inclined Plane
  - 6. Screw
  - 7. Wedge
  - 8. Compound Machines
- H. Transferring Rotational Motion
  - 1. Gears
  - 2. Pulleys Connected With a Belt
- I. Matter
  - 1. Properties of Matter
  - 2. Properties of Solids
  - 3. Properties of Liquids
  - 4. Properties of Gases
  - 5. Density and Specific Gravity
- J. Fluids
  - 1. Hydrostatic Pressure
  - 2. Pascal’s Principle
  - 3. Air Pressure
  - 4. Buoyancy
  - 5. Fluid Flow
- K. Temperature and Heat Transfer
  - 1. Temperature
  - 2. Heat
  - 3. Heat Transfer
  - 4. Specific Heat
  - 5. Calorimetry
  - 6. Change of Phase
- L. Gas Laws
  - 1. Charles’ Law
  - 2. Boyle’s Law
  - 3. Gay-Lussac’s Law
  - 4. Combined Gas Law

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**Grade Scale**

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

**Course Evaluation**

Final grades will be calculated according to the following criteria:

- |                                     |     |
|-------------------------------------|-----|
| 1. 3-4 Unit Tests, Binder           | 50% |
| 2. Comprehensive Final Exam         | 20% |
| 3. Homework and Class Participation | 10% |
| 4. Laboratory                       | 20% |

**Course Requirements**

1. Semester binder containing all handouts, homework, tests, and labs.
2. Laboratory projects.
3. Chapter homework.
4. Unit Tests
5. Comprehensive Final Exam

**Course Policies**

1. Each unit has assigned homework problems. All homework is due on the testing day for that unit and must be turned in inside a binder containing dividers as assigned by the instructor. All calculations must be shown to receive credit. Completing only odd problems and skipping even problems will result in a grade of ZERO (0).
2. Makeup work, including labs and exams, may only be made up at the instructor's discretion. It is the responsibility of the student to contact the instructor as soon as possible to arrange for makeup work. All makeup work must be completed within one week of the original due date.
3. There is a 20 point penalty for work turned in less than one week late. There is a 50 point penalty for work turned in more than one week late, but less than two weeks late. Work turned in more than two weeks late will not be accepted.
4. Students will not be automatically dropped from the class due to poor attendance or grades. Discontinuing class attendance without properly submitting a drop request will result in a failing grade (F).
5. Students are expected to stay for the full duration of the lab period or until all data is taken, calculations are performed and the lab assignment is turned in. Reports are to be neat and complete. **DO NOT USE RED INK.** Corrections should be

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made by a single line through the incorrect data and the correction entered next to the old data. Calculations may be done in pencil, but data should be recorded in ink.

6. Safety rules must be abided by at all times. Any student who continually breaks the safety rules will be removed from the class to insure the safety of the other students in the class.
7. All beepers and cell phones need to be turned off unless prior approval has been given by instructor to have them set to vibrate. (Permission will only be given in emergency situations.)
8. Children are **not allowed** in either the lecture class or laboratory at any time.
9. **No** food, drinks, or use of tobacco products in class.
10. Attendance in class is vital to understanding physics. If an absence is unavoidable, arrange with the instructor to attend another session of the class. If you are absent, it is your responsibility to obtain copies of at least two other student's notes and rewrite them in your notebook. If you need further assistance, please set up an appointment with the instructor for a tutoring session. Excessive unexcused absences (per instructor's discretion) will result in a ten point deduction from the final semester grade. Attendance in lab is mandatory. Missed labs may be made up within one week without penalty at the instructor's discretion. Labs not made up within two weeks will result in a grade of zero (0). A lab that is one day to one week late will incur a 20 point penalty. A lab that is more than one week, but less than two weeks late will incur a 50 point penalty. At the end of the semester, three missed labs (grades of 0) will result in an automatic failing grade (F) for the course.

### **Disabilities Statement**

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

### **Course Schedule**

<b>Week of</b>	<b>Topic</b>	<b>Reference</b>
Week 1	Chapter 1:The Physics Tool Kit	pp. 1-49
Week 2	Chapter 2:Problem Solving Chapter 5:Force	pp. 50-67 pp. 128-147
Week 3	Chapter 5:Force, continued	pp. 128-147
Week 4	Chapter 6:Momentum	pp. 148-167

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<b>Week of</b>	<b>Topic</b>	<b>Reference</b>
Week 5	Test 1:Chapters 1,2,5,6 Appendix A.5:Right Triangle Trigonometry	pp. 667-673, 685-687
Week 6	Chapter 3:Vectors	pp. 68-97
Week 7	Chapter 7:Concurrent and Parallel Forces	pp. 168-203
Week 8	Chapter 7:Concurrent and Parallel Forces Test 2:Appendix A.5, Chapters 3,7	pp. 168-203
Week 9	Chapter 10:Simple Machines	pp. 266-295
Week 10	Chapter 9: Rotational Motion	pp. 232-265
Week 11	Chapter 12:Matter	pp. 308-339
Week 12	Test 3:Chapters 10, 9, 12 Chapter 13:Fluids	pp. 340-365
Week 13	Chapter 13:Fluids, cont. Chapter 14:Temperature and Heat Transfer	pp. 340-365 pp. 366-405
Week 14	Chapter 14:Temperature and Heat Transfer	pp. 366-405
Week 15	Chapter 15:Gas Laws	pp. 406-419
Week 16	Test 4: Chapters 13, 14, 15 Final Exam: Comprehensive	