Applied Physics (SCIT 1418)

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

Prerequisite: MATH1332

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

Required Textbook and Materials

1. *College Physics* by Paul Peter Urone and Roger Hinrichs, 2020 Edition. OpenStax.
   a. https://openstax.org/details/books/college-physics
2. Three-ring binder (larger than 2 inches) with tabbed dividers.
3. Scientific calculator.
4. 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
2. Use appropriate measuring devices to analyze systems
3. Apply the relationships of length, mass, and time
4. Demonstrate problem-solving techniques related to physics principles including: vectors, motion, mechanics, simple machines, matter, heat, and thermodynamics
5. Demonstrate laboratory skills related to physics principles.

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. 4 Unit Tests   50%
2. Comprehensive Final Exam   20%
3. Homeworks and Reviews   10%
4. Laboratory   20%

Course Outline

1. Introduction
   a. Physical Quantities
   b. Units
   c. Accuracy and Precision
   d. Significant Figures
2. Kinematics
   a. Displacement
   b. Vectors and Coordinates
   d. Time
   e. Velocity and Speed
   f. Falling Objects
3. Two-Dimensional Kinematics
   a. Introduction
   b. Graphical Methods
   c. Analytical Methods
4. Force and Laws of Motion
   a. Inertia
   b. Systems
   c. Symmetry
   d. Tension
   e. Friction
   f. Elasticity
5. Circular Motion
   a. Centripetal Acceleration
   b. Centripetal Force
   c. Law of Gravitation
6. Energy
   a. Work
   b. Kinetic
   c. Gravitational Potential
   d. Conservation
7. Momentum
   a. Linear Momentum
   b. Impulse
   c. Conservation
   d. Elastic Collisions
   e. Inelastic Collisions
8. Torque and Rotational Motion
   a. 1st Condition for Equilibrium
   b. 2nd Condition for Equilibrium
   c. Simple Machines
   d. Angular Acceleration
   e. Kinematics
   f. Rotational Inertia
   g. Conservation of Momentum

9. Fluids and Properties of Matter
   a. Density
   b. Pressure
   c. Variation of Pressure
   d. Pascal's Principle
   e. Gauge Pressure
   f. Absolute Pressure
   g. Archimedes' Principle
   h. Flow Rate
   i. Velocity
10. Temperature and Heat
    a. Temperature
    b. Thermal Expansion
    c. Ideal Gas Law
    d. Kinetic Theory
    e. Heat Capacity
    f. Latent Heat
11. Simple Harmonic Motion and Sound
    a. Period and Frequency
    b. Springs
    c. Simple Pendulum
    d. Waves
    e. Sound
    f. Doppler Effect
12. Electricity
    a. Static Electricity
    b. Coulomb's Law
    c. Ohm's Law
    d. Electric Power
    e. Simple Circuits
13. Magnetism
    a. Magnetic Fields
    b. Magnetic Force
    c. Hall Effect
    d. Induced Emf
    e. Magnetic Flux
    f. Faraday's Law of Induction
14. Electromagnetic Radiation and Relativity
    a. Electromagnetic Waves
    b. Electromagnetic Spectrum
    c. Time Dilation
    d. Length Contraction
15. Atomic and Nuclear Physics
    a. Photon Energies
    b. Bohr's Theory of the Atom
    c. X Rays
    d. Nuclear Decay
    e. Half-Life and Activity

Course Requirements
1. Semester binder containing all reference materials
2. Laboratory Projects
3. Homeworks and Reviews
4. Unit Tests
5. Comprehensive Final Exam

Course Policies
1. Each unit has assigned homework and review problems. All assignments are electronic and due on the dates set on the calendar for the semester. No points will be given for any work submitted on paper. It is not possible to submit late homework assignments unless dates are altered for every student or unless special permission is granted by the instructor in the case of an emergency.

2. Students will not be automatically dropped from the class due to poor attendance or low grades. Discontinuing class attendance without properly submitting a drop request will result in a failing grade (F).

3. Safety rules must be always abided by. Any student who continually breaks the safety rules will be removed from the class to ensure the safety of the other students in the class.

4. Children are **not allowed** in either the lecture class or laboratory at any time.

5. **No** food, drinks, or use of tobacco products in class.

6. **It shall be considered a breach of academic integrity (cheating) to use or possess on your body any of the following devices during any <u>examination </u>unless it is required for that examination and approved by the instructor:**

   - **Cell phone**
   - **smart watch/watch phone**
   - **laptop**
   - **tablet**
   - **electronic communication devices (including optical)**
   - **earphones connected to or used as electronic communication devices.**

   1st Offense: The exam will be taken from the student and the student will receive a grade of ZERO (0) for the exam which will be averaged into the student's class average and there will be NO MAKEUP of the test.
   2nd Offense: The student will be removed from the class and will receive a grade of FAILING (F) for the entire lecture and lab grade.
   Students with special needs and/or medical emergencies or situations should communicate with their instructor regarding individual exceptions/provisions. It is the student's responsibility to communicate such needs to the instructor.

Technical Requirements (for course using Blackboard)

The latest technical requirements, including hardware, compatible browsers, operating systems, software, Java, etc. can be found online at:
https://help.blackboard.com/en-us/Learn/9.1_2014_04/Student/015_Browser_Support/015_Browser_Support_Policy
A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of the online technology and resources.

Disabilities Statement

The Americans with Disability Act of 1990 and Section 504, Rehabilitation Act of 1973 are federal anti-discrimination statues that provide comprehensive civil rights for persons with disabilities. LIT provides reasonable accommodations as defined in the Rehabilitation Act of 1973, Section 504 and the American with Disability Act of 1990, to students with a diagnosed disability. The Special Populations Office is located in the Eagles' Nest Room 129 and helps foster a supportive and inclusive educational environment by maintaining partnerships with faculty and staff, as well as promoting awareness among all members of the Lamar Institute of Technology community. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409)839-2018. You may also visit the online resource at Special Populations - Lamar Institute of Technology (lit.edu)

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the LIT Catalog and Student Handbook. The LIT Catalog and Student Handbook may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office. Please note that the online version of the LIT Catalog and Student Handbook supersedes all other versions of the same document.

Starfish

LIT utilizes an early alert system called Starfish. Through the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff all through the Starfish home page. You can also login to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT. https://lit.edu/student-success/starfish