



Course Title : Survey of Physics with LAB
Course Code : PHYS 1115C
Credit Hours : 4
Semester : SPRING 2022
Cap : 20

Instructor : Allan Dino, Ph.D. **Email :** adino@navajotech.edu
Office : ACCRC 103 **Office Phone :**
Information : By Appointment **Home or Cell :** None

Class Location & Meeting Times: ACCRC 103 (Saturday, 09:00 AM – 12:30 PM)

Required Materials:

Textbook : Physics: A Conceptual World View 7th Edition
L.D. Kirkpatrick & G.E. Francis

Tools : Scientific Calculator (NOT PHONE CALCULATOR), Laptop

Lab Fee : \$125

Mission Statement

Navajo Technical University’s mission is to provide University readiness programs, certificates, associate, baccalaureate, and graduate degrees. Students, faculty, and staff will provide value to the Diné community through research, community engagement, service learning, and activities designed to foster cultural and environmental preservation and sustainable economic development. The University is committed to a high quality, student-oriented, hands-on-learning environment based on the Diné cultural principles: *Nitsáhákees, Nahátá, Īina, Siihasin.*

Course Description

Overview of the concepts and basic phenomena of physics. This course provides a largely descriptive and qualitative treatment with a minimum use of elementary mathematics to solve problems. No previous knowledge of physics is assumed. Includes laboratory.

Course Objectives

At the end of the semester, the students will:

- Use mathematical concepts, principles, and expressions to analyze data, and develop models.
- Relate force, mass and acceleration and solve problems using Newton’s Second Law.
- Calculate the work performed by the net force, or by each of the forces that make up the net force on an object that undergoes a specified change in speed or kinetic energy.
- Determine the force that one spherically symmetrical mass exerts on another.
- Calculate the potential energy of one or more objects in a uniform gravitational field.
- Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

- Describe the processes by which energy can be transferred between a system and its environment because of differences in temperature: conduction, convection, and radiation.
- Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
- Contrast mechanical and electromagnetic waves in terms of the need for a medium in wave propagation.
- Use ray tracing diagram to analyze situations and solve problems about image formation occurring due to the refraction of light through lenses.
- Construct an explanation of the Big Bang Theory based on the motion of distant galaxies and Doppler Effect.

Communication

PLEASE OBTAIN YOUR NAVAJO TECHNICAL UNIVERSITY EMAIL AT THE BEGINNING OF THIS COURSE. Email is the best mode of communication for the instructor. Please allow 12 to 48 hours for a response.

Student Learning Resources

The primary resources are the textbook and the additional notes. These materials are supplemented by a mixture of readings from academic journals, professional reports and authoritative websites.

Very rarely, there are tutors available for this course. In many cases, students must seek the advice of the instructor. Any questions can be submitted through email.

COURSE OUTCOMES	COURSE MEASUREMENTS
<p>Upon completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Apply concepts of classical mechanics (such as velocity, acceleration, force, free fall, graphing motion, inertia, momentum, friction, period, frequency, uniform circular motion, gravitational force, orbital motion, work, energy, conservation of energy, power, momentum and impulse, and conservation of momentum) to simple static and dynamic systems. 2. Apply simple geometric and wave optics (such as wave speed, wavelength, behavior of waves, speed of sound wave, Doppler Effect, standing waves, speed of light, electromagnetic spectrum reflection and refraction of light, dispersion, polarization, color, mirror and lenses, and polarization) in simple situations. 3. Apply mathematical concepts, principles, and expressions to analyze data, and develop models 	<p>Formative assessment, homework assignments, exams, and quizzes.</p>

<p>4. Test ideas using laboratory equipment.</p> <p>5. Estimate experimental uncertainties.</p> <p>6. Use computers to analyze and report laboratory results.</p> <p>7. Draw appropriate conclusions from quantitative scientific observations.</p> <p>8. Accurately and clearly communicate the results of scientific experiments.</p>	
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COURSE SCHEDULE		
<i>Week #, dates</i>	<i>Topics</i>	<i>Activities</i>
<u>Week 01</u> January 22	<i>A Physics Toolkit</i> <ul style="list-style-type: none"> ● Exponents, *<u>Scientific Notation</u>, Geometric Figures, Significant Digits, Formula Transformation ● Pythagorean Theorem, Trigonometric Functions, Graphing 	Classwork Homework LAB: Problem Solving Skills VL: Physics Timeline
<u>Week 02</u> January 29	<i>A Physics Toolkit</i> <ul style="list-style-type: none"> ● *<u>Measurement</u>, Fundamental and Derived Quantities, Conversion of Units ● Vectors 	Classwork Homework LAB: Metric Measurement
<u>Week 03</u> February 05	<i>Kinematics</i> <ul style="list-style-type: none"> ● *<u>Speed, Distance, Time</u> ● *<u>Average Speed</u> ● *<u>Position, Displacement, and Velocity</u> ● *<u>First Kinematics Equation</u> 	QUIZ01: Unit01 A Physics Toolkit Classwork Homework LAB: Distance & Displacement
<u>Week 04</u> February 12	<i>Kinematics</i> <ul style="list-style-type: none"> ● *<u>Free Fall</u> ● Second Kinematics Equation 	Classwork Homework LAB: Bowling Ball
<u>Week 05</u>	<i>Kinematics</i>	QUIZ02: Unit02 Average

February 19	<ul style="list-style-type: none"> ● Third Kinematics Equation ● Graphing Motion 	Speed & Velocity Classwork Homework LAB: Stomp Rocket VL: Projectile Motion
<u>Week 06</u> February 26	<p>Dynamics</p> <ul style="list-style-type: none"> ● *<u>Newton's First Law</u> ● *<u>Newton's Second Law</u> ● *<u>Mass, Weight, and Normal</u> 	QUIZ03: Unit02 Kinematics Classwork Homework LAB: Friction
<u>Week 07</u> March 05	<p>Dynamics</p> <ul style="list-style-type: none"> ● *<u>Newton's Third Law</u> ● *<u>Free-Body Diagram</u> ● *<u>Friction and Tension</u> 	Classwork Homework LAB: Hooke's Law VL: Situations Involving Friction
<u>Week 08</u> March 12	<p>Uniform Circular Motion</p> <ul style="list-style-type: none"> ● Period and Frequency ● *<u>Velocity and Acceleration</u> ● *<u>Dynamics of UCM</u> 	QUIZ04: Unit03 Dynamics Classwork Homework
<u>Week 09</u> March 26	<p>Gravitation</p> <ul style="list-style-type: none"> ● Scientific Notation ● *<u>Gravitational Force</u> ● *<u>Gravitational Field</u> ● Orbital Motion 	MIDTERM Classwork Homework VL: Gravity Force
<u>Week 10</u> April 02	<p>Energy</p> <ul style="list-style-type: none"> ● *<u>Conservation of Energy</u> ● *<u>Work and Gravitational Potential Energy</u> 	QUIZ05: Unit04A & Unit04C Gravitation Classwork Homework LAB: Potential Energy Bounce
<u>Week 11</u> April 09	<p>Energy</p> <ul style="list-style-type: none"> ● *<u>Kinetic Energy and Elastic Potential Energy</u> ● *<u>Power</u> 	Classwork Homework LAB: Marshmallow Launcher VL: Energy Forms and

		Change
<u>Week 12</u> April 16	<i>Momentum</i> <ul style="list-style-type: none"> ● *<u>Momentum and Impulse</u> ● Momentum of A System & *<u>Conservation of Momentum</u> ● *<u>Perfectly Inelastic Collisions</u> ● *<u>Elastic Collisions</u> 	QUIZ06: Unit05 Energy Classwork Homework VL: Collision
<u>Week 13</u> April 23	<i>Waves and Sound Waves</i> <ul style="list-style-type: none"> ● *<u>Speed, Frequency, and Wavelength</u> ● *<u>Behavior of Waves</u> 	QUIZ07: Unit06 Momentum Classwork Homework LAB: Water Waves VL: Wave on A String
<u>Week 14</u> April 30	<i>Waves & Sound Waves</i> <ul style="list-style-type: none"> ● *<u>Speed of Sound Wave</u> ● *<u>Doppler Effect & Big Bang Theory</u> ● *<u>Standing Waves</u> 	Classwork Homework LAB: Sound Waves
<u>Week 15</u> May 07	<i>EM Waves</i> <ul style="list-style-type: none"> ● *<u>Speed of Light Wave</u> ● Electromagnetic Spectrum ● *<u>Reflection and Refraction of Light, Dispersion</u> ● *<u>Diffraction and Single Slit Experiment</u> 	QUIZ08: Unit 10 Waves & Sound Waves Classwork Homework LAB: Reflection and Refraction of Light VL: Bending Light
<u>Week 16</u> May 14	<i>EM Waves</i> <ul style="list-style-type: none"> ● *<u>Interference by Thin Films</u> ● *<u>Polarization</u> ● *<u>Color</u> 	QUIZ09: Unit 11 Electromagnetic Waves FINAL EXAM Classwork Homework

Schedule Disclaimer: The course schedule is subject to adjustment depending on the needs of the class to focus more on a specific chapter

Grading Plan:

Midterm & Finals	15%	A= 100 – 90%
Quizzes	25%	B > 90 – 80%
Classwork & Homework	60%	C > 80 – 70%
		D > 70 – 60%
		F > 60%

Federal Compliance - Credit Hour Allocation: 2:1

- **For every credit hour spent in a class, a student is expected to spend two (2) hours outside of class studying the course materials.**

Grading Policy

Each student must do his or her own homework and case studies. Discussion among students on homework and cases is encouraged for clarification of assignments, technical details of using software, and structuring major steps of solutions - especially on the course's Web site. Students must do their own work on the homework and exam. Cheating and Plagiarism are strictly forbidden. Cheating includes but is not limited to: plagiarism, submission of work that is not the student's own, submission or use of falsified data, unauthorized access to exam or assignment, use of unauthorized material during an exam, supplying or communicating unauthorized information for an assignment or exam.

Participation

Students are expected to attend and participate in all class activities- as listed above, as it is part of the grade. Points will be given to students who actively participate in class activities including laboratories, and ask questions of guest speakers and other presenters.

Cell phone and head phone use

Please turn cell phones off or place them on silence or vibrate mode **BEFORE** coming to class. Also, answer cell phones **OUTSIDE OF CLASS** (not in the classroom). Exercising cell phone use courtesy is appreciated by both the instructor and classmates. Headphones are to be removed before coming to class.

Attendance Policy

Students are expected to regularly attend all classes for which they are registered. A percentage of the student's grade will be based on class participation. Absence from class, regardless of the reason, does not relieve the student of his/her responsibility to complete all course work by the required deadlines. Furthermore, it is the student's responsibility to obtain notes, handouts, and any other information covered when absent from class and to arrange to make up any in-class assignments or tests if permitted by the instructor. Incomplete or missing assignments will necessarily affect the student's grades. Instructors will report excessive and/or unexplained absences to the Counseling Department for investigation and potential intervention. **Instructors may drop students from the class after three (3) absences unless prior arrangements are made with the instructor to make up work and the instructor deems any excuse acceptable.**

Late Assignments or Work

Due dates are assigned during the class. Practice assignments done in class are due the same day unless the teacher assigns an extension date of submission. Submitting work beyond the date will incur a grade penalty. Scores will be capped to 60% for up to 3-day late submissions. Submitting work that is 2 weeks late will not receive any more grades but the teacher will accept the work for completion purposes.

Academic Integrity

Integrity (honesty) is expected of every student in all academic work. The guiding principle of academic integrity is that a student's submitted work must be the student's own. Students who engage in academic dishonesty diminish their education and bring discredit to the University community. Avoid situations likely to compromise academic integrity such as: cheating, facilitating academic dishonesty, and plagiarism; modifying academic work to obtain additional credit in the same class unless approved in advance by the instructor, failure to observe rules of academic integrity established by the instructor.

Diné Philosophy of Education

The Diné Philosophy of Education (DPE) is incorporated into every class for students to become aware of and to understand the significance of the four Diné philosophical elements, including its affiliation with the four directions, four sacred mountains, the four set of thought processes and so forth: Nitsáhákees, Nahát'á, Íina and Siih Hasin which are essential and relevant to self-identity, respect and wisdom to achieve career goals successfully.

Students with Disabilities

The Navajo Technical University and the Science department are committed to serving all enrolled students in a non-discriminatory and accommodating manner. Any student who feels he/she may need an accommodation based on the impact of disability, or needs special accommodations should inform NTU in accordance with the procedures of the subsection entitled "Students with Disabilities" under Section 7: Student Support Programs, NTU Student Handbook.

Notes:

The instructor reserves the right to amend this syllabus. Any such amendments will be clearly communicated in class.