PHYS 2425.032 Advanced Physics I F2F

Course Syllabus: Spring 2025 (1st 8-weeks)

"Northeast Texas Community College exists to provide personal, dynamic learning experiences empowering students to succeed."

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	Monday	Tuesday	Wednesday	Thursday	Friday
Office Hours	9:30 – 10:30 1:30 – 3:30	11:00 – 12:30	9:30 – 10:30 1:30 – 3:30	11:00 – 12:30	By appt

This syllabus serves as the documentation for all course policies and requirements, assignments, and instructor/student responsibilities.

Information relative to the delivery of the content contained in this syllabus is subject to change. Should that happen, the student will be notified.

Course Description: This is a calculus-based physics course intended for students majoring in computer science, engineering, mathematics, physics, or related fields of study. Topics include 1-D motion, 2-D motion, rotational motion, Newton's Laws, energy, momentum, equilibrium, gravity, oscillatory motion, waves, and heat. Four hours of college credit.

Prerequisite(s): MATH 2413

Student Learning Outcomes:

2425.1 Determine the components of linear motion, (displacement, velocity, and acceleration), and especially motion under conditions of constant acceleration.

2425.2 Solve problems involving forces and work.

2425.3 Apply Newton's Laws to physical problems.

2425.4 Identify the different types of energy.

2425.5 Solve problems using principles of conservation of energy.

2425.6 Define the principles of impulse, momentum, and collisions.

2425.7 Use principles of impulse and momentum to solve problems.

2425.8 Determine the location of the center of mass and center of rotation for rigid bodies in motion.

2425.9 Discuss rotational kinematics and dynamics and the relationship between linear and rotational motion.

2425.10 Solve problems involving rotational and linear motion.

2425.11 Define equilibrium, including the different types of equilibrium.

2425.12 Discuss simple harmonic motion and its application to real-world problems.

2005.L1 Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.

2005.L2 Conduct basic laboratory experiments involving classical mechanics.

2005.L3 Relate physical observations and measurements involving classical mechanics to theoretical principles.

2005.L4 Evaluate the accuracy of physical measurements and the potential sources of error in the measurements.

2005.L5 Design fundamental experiments involving principles of classical mechanics.

2005.L6 Identify appropriate sources of information for conducting laboratory experiments involving classical mechanics.

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

Program 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.

Evaluation/Grading Policy: The cumulative average of your homework (via WebAssign) and Blackboard quizzes will represent 25% of your total grade. WebAssign homework is automatically graded, as are the Blackboard quizzes. Late assignments will be given a grade of 0. Due to the quick schedule of an 8-week course

Laboratory work and assignments will represent 25% of your grade. Labs consist of three parts: Pre-lab, lab work, and post-lab. Pre-labs will be due when lab begins. If you do not complete the pre-lab before you arrive, you will not be allowed to stay. Lab work will be turned in with your post-lab at the end of the lab period. If the post-lab involves a lab report, it will be due when you arrive at lab the following week. All lab parts will be graded and returned to you by the end of lab the following week. Failure to turn in a lab assignment on time will result in a 0 for that assignment.

There will be three lab practicals during the 8-weeks. These will be purposeful, but un-guided labs where you will satisfy an investigative goal and write a full lab report with a team. Grading for these will be relaxed at the beginning, and strict at the end of the 8-weeks. Lab practicals will be due a week after the lab date, and the graded lab (with notations) will be returned within a week.

There will be three (3) exams during the semester and one mandatory final exam. The cumulative average of all exams will represent 50% of your total grade. Your test will consist of a multiple choice part and a show-your-work part. The multiple choice part will be 8 questions assessed at 5 points per question. The show-your-work part will be worth over 60 points total and will vary from 3-7 questions depending on the material. These questions WILL require calculation and critical thinking skills. Exams will be graded at least one week after the exam date. Make-up exams will not be given unless the student has coordinated with the instructor prior to the exam.

Homework/Quizzes	25%
Lab Grade	25%
Exams	50%
Total	**100%**

This course uses a traditional letter-grade system as follows. Percentages will be rounded to the nearest whole value:

A	(90% - 100%)
B	(80% - 89%)
C	(70% - 79%)
D	(60% - 69%)
F	(< 60%)

Required Instructional Materials:
You will need *Physics for Scientists and Engineers, 10th Ed.* for this course. This text is included in your Inclusive Access bundle, which was part of your course fees (if you want to 'opt-out' of this program, you can do so at the Inclusive Access link in Blackboard during the first week of class). If you prefer to have a paper copy, you can ask for an 'upgrade' at the NTCC bookstore, or order your own online. The textbook and homework is accessible online, so you will need online access to complete your assignments.

You will also need a scientific calculator for this course (Any scientific calculator will work). A TI-Nspire is recommended, but not required.

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

Optional Instructional Materials:
If you need a little more background on any topic this semester, I highly recommend *The Cartoon Guide to Physics* by Larry Gonick and Art Huffman. While this test will not be used directly in class, I have found it to help students struggling with difficult concepts.

Minimum Technology Requirements:
A scientific calculator is required for this course, TI-Nspire is preferred. You will also need access to the Internet for your Blackboard and WebAssign work.

Required Computer Literacy Skills:
You will need to be able to navigate Blackboard and WebAssign to access your online work. Also, you will need to use a word processor to type lab reports.

Course Structure and Overview:
This is an 8-week face-to-face course consisting of Blackboard and WebAssign online work and assignments, face-to-face lecture, and face-to-face lab. A typical week will start with preliminary video(s) and quiz covering basic information, difficult material discussed in lecture, and concepts explored in lab. Lecture will be a mixture of new information and time to work difficult problems. Expect to work with others in class. Labs will match the topic discussed in lecture during the same week.

Communications:
Email will be responded to within 24 hours IF SENT SUNDAY-THURSDAY. Due to personal obligations, I cannot guarantee responses over the weekend, though I will do my best. Blackboard discussions will be checked in the afternoons around 5 pm during the week. You can also call my office during office hours if you need to speak with me but can't make it to campus. However, I prefer face-to-face discussions, especially if you have a question about a homework problem. Any information that I send out will be done in class, via Blackboard, or via NTCC email. I will NOT email sensitive information to email addresses that are not "@ntcc.edu".

Institutional/Course Policy: Late work will not be accepted without prior approval by the instructor. Students and instructor are expected to treat each other with respect in and out of the classroom. Prompt attendance is expected for all class meetings. Missing lecture means missing discussion and important notes. Missing or being late to lab results in a 0 for pre-lab, 0 for lab work, and 0 for post-lab. Keep up with online preliminary assignments as well as homework, as the preliminary assignment will prepare you for lecture, and the homework will give you practice. During lecture, students are expected to be attentive to the topic discussed. Students found being consistently inattentive will be asked to leave.

Alternate Operations During Campus Closure and/or Alternate Course Delivery Requirements:
In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Northeast Texas Community College to move to altered operations. During this time, Northeast Texas Community College may opt to continue delivery of instruction through methods that include, but are not limited to, online through the Blackboard Learning Management System, online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor NTCC's website (http://www.ntcc.edu/) for instructions about continuing courses remotely, Blackboard for each class for course-specific communication, and NTCC email for important general information.

Additionally, there may be instances where a course may not be able to be continued in the same delivery format as it originates (face-to-face, fully online, live remote, or hybrid). Should this be the case, every effort will be made to continue instruction in an alternative delivery format. Students will be informed of any changes of this nature through email messaging and/or the Blackboard course site.

NTCC Academic Honesty/Ethics Statement:
NTCC upholds the highest standards of academic integrity. The college expects all students to engage in their academic pursuits in an honest manner that is beyond reproach using their intellect and resources designated as allowable by the course instructor. Students are responsible for addressing questions about allowable resources with the course instructor. Academic dishonesty such as cheating, plagiarism, and collusion is unacceptable and may result in disciplinary action. This course will follow the NTCC Academic Honesty and Academic Ethics policies stated in the Student Handbook. Refer to the student handbook for more information on these subjects.

Statement Regarding the Use of Artificial Intelligence (AI) Technology:
Absent a clear statement from a course instructor, use of or consultation with generative AI shall be treated analogously to assistance from another person (collusion). Generative AI is a subset of AI that utilizes machine learning models to create new, original content, such as images, text, or music, based on patterns and structures learned from existing data (Cornell, Center for Teaching Innovation). Unauthorized use of generative AI tools to complete an assignment or exam is not permitted. Students should acknowledge the use of generative AI and default to disclosing such assistance when in doubt. Individual course instructors may set their own policies regulating the use of generative AI tools in their courses, including allowing or disallowing some or all uses of such tools. Students who are unsure of policies regarding generative AI tools are encouraged to ask their instructors for clarification. **(Adapted from the Stanford University Office of Community Standards-- accessed August 31, 2023)**

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 the Academic Advisor/Coordinator of Special Populations located in Student Services and can be reached at 903-434-8264. For more information and to obtain a copy of the Request for Accommodations, please refer to the special populations page on the NTCC website.

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.

Tentative Course Timeline on next page (*note* instructor reserves the right to make adjustments to this timeline at any point in the term).

Semester Outline

	Monday	Tuesday	Wednesday	Thursday	Tuesday Lab	Thursday Lab
Week 1	**Martin Luther King, Jr. Day**	Introduction to Physics, Units, Vectors, and Scalars	One-Dimensional Motion	Two-Dimensional Motion	Lab 1: Units and Significant Digits, Vectors in 2D	**Lab Practical 1**: 1-Dimensional Motion
Week 2	Two-Dimensional Motion Practice Problems	Newton's Laws of Motion	Special Applications of Newton's Laws	Practice with Newton's Laws and Motion	Lab 2: Projectile Motion	Lab 3: Determining Friction
Week 3	Exam 1 (Kinematics and Forces)	Work and Kinetic Energy	Potential Energy and Conservative Forces	Power, Energy Conservation, and Non-Conservative Forces	**Lab Practical 2**: Projectile Motion (Bullet drop)	Lab 4: Using Conservation of Energy
Week 4	Momentum and Impulse, Conservation of Momentum	Collisions (Elastic, Inelastic, and Explosive)	Center of Mass and Motion of a Rigid System of Particles	Work-Energy Theorem and Systems of Particles	Lab 5: Collisions in 1-D	Lab 6: Conservation of Energy with a System
Week 5	Energy and Momentum Practice Problems	Rotational Kinematics (Angular Position, Velocity, and Acceleration)	Torque, Moment of Inertia, and Angular Acceleration	Rotational Dynamics and Energy	Lab 7: Torque	Lab 8: Rotational Inertia
Week 6	Energy and Momentum Practice Problems	Exam 2 (Work, Energy, Momentum, and Rotation)	Newton's Law of Universal Gravitation	Gravitational Potential Energy and Orbits	Lab 9: Freefall	Lab 10: Pendulum Swing in 'Variable' Gravity
Week 7	Gravitational Fields and Equipotential Surfaces	Simple Harmonic Motion (SHM) and Restoring Forces	Energy in Simple Harmonic Motion, Damped and Forced Oscillations	Waves on a String (Wave Speed, Frequency, and Wavelength)	**Lab Practical 3**: Determining *g*	Lab 11: Pendulum Swing
Week 8	Exam 3 (Gravity and Oscillation)	Review For Final Exam	Review for Final Exam	Final Exam	Lab 12: Resonance	TBA