

# PHYS 251

# University Physics I

Fall 2025

Class #23072 (4 credit hours)

**Bulletin:** Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics.

**Objectives:** We will explore principles of mechanics (space, time, mass, inertia, force, velocity, acceleration, momentum, work, energy, oscillations, waves) and (time allowing) thermodynamics (heat, entropy) to solve practical problems and examine the physical basis of technologies surrounding us. Along the way, we will learn how physicists view the world, appreciate that physics is for everyone, and develop problem-solving skills of value in any career.

**Prerequisite:** MATH 165 Calculus I (some differential and integral calculus)

**Instructor:** Dr. Alan R. Denton (he/him) [alan.denton@ndsu.edu](mailto:alan.denton@ndsu.edu)  
Professor, Dept. of Physics office: South Eng. 214B, NDSU

**Classes:** MWF 10:00-10:50 am, W 9:00-9:50 am, A. G. Hill (STEM) 300

**Attendance is expected** ([NDSU Policy 333](#))

**Student Help Hours:** TBA

**To succeed:** Attend classes, invest two hours out of class per hour in class, seek help!

**Textbook:** Halliday, Resnick, Walker, Fundamentals of Physics, 11<sup>th</sup> ed. (Wiley, 2018)

<b>Evaluation:</b>	Homework Assignments	100 points
	Midterm Exams (in person)	100 points each
	Final Exam (in person)	150 points
	Classroom participation	50 points

I encourage collaborative discussion of *methods and strategies* for solving problems. Your final grade will be based on homework (100 pts), your best 2 out of 3 midterm exam scores (200 pts), your final exam score (150 pts), and class participation (50 pts). We will make time for group work on a subset of homework problems. Representatives from each group will present solutions and guide discussions in class (see Rubric).

Classroom participation will also include answering conceptual questions (ABCD cards).

**Grades:** A: 90-100%; B: 80-89.9%; C: 70-79.9%; D: 60-69.9%; F: < 60%

**Communication:** Weekly homework will be posted on the [LON-CAPA homepage](#):  
[http://www.ndsu.edu/physics/students/lon\\_capa](http://www.ndsu.edu/physics/students/lon_capa)

Follow the login instructions to access our course and mind the assignment deadlines.

Announcements and notes will be posted on Blackboard: [blackboard.ndsu.edu](http://blackboard.ndsu.edu)

## Main Topics and Preliminary Timetable

Chapter 1	Measurement	Aug 27-29
Labor Day Holiday	no class	Sep 1
Chapter 2	Motion Along a Straight Line	Sep 3-5
Chapter 3	Vectors	Sep 8-12
Chapter 4	Motion in 2 and 3 Dimensions	Sep 15-19
Chapter 5	Force and Motion I	Sep 22-26
<b>Midterm Exam 1</b>	<b>Covering Chapters 1-4</b>	<b>Wed, Oct 1</b>
Chapter 6	Force and Motion II	Sep 29-Oct 3
Chapter 7	Kinetic Energy and Work	Oct 6-10
Chapter 8	Potential Energy and Conservation of Energy	Oct 13-17
Chapter 9	Center of Mass, Momentum	Oct 20-24
Chapter 10	Rotational Motion	Oct 27-31
<b>Midterm Exam 2</b>	<b>Covering Chapters 5-9</b>	<b>Wed, Nov 5</b>
Chapter 11	Rolling, Torque, and Angular Momentum	Nov 3-7
Chapter 12	Equilibrium and Elasticity	Nov 10-14
Chapter 13	Gravitation	Nov 17-21
Chapter 14	Fluids	Nov 24
Thanksgiving Break	no classes	Nov 26-28
<b>Midterm Exam 3</b>	<b>Covering Chapters 10-14</b>	<b>Wed, Dec 3</b>
Chapters 15-17	Oscillations and Waves	Dec 1-5
Chapters 18-19	Thermodynamics: Heat, 1 <sup>st</sup> Law	Dec 8-10
Chapters 19-20	Entropy and the 2 <sup>nd</sup> Law	Dec 10-12
<b>Final Exam</b>	<b>Comprehensive</b>	<b>Dec 19, 8:00 AM</b>

### Academic Honesty and Special Needs:

*The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at [www.ndsu.edu/academichonesty](http://www.ndsu.edu/academichonesty).*

*Any students with disabilities or special needs who need accommodations in this course are invited to share concerns or requests with the instructor and to contact the Center for Accessibility and Disability Resources as soon as possible.*

*Your personally identifiable information and educational records as they relate to this course are subject to FERPA. Veterans and student service members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders.*

## **In-Class Problem-Solving Guidelines and Expectations**

During class, students self-assemble into groups of up to four members at each table. Each group member contributes to discussions and writes solutions in their own words. A complete written solution includes (1) statements of physical concepts and principles, (2) definitions of all symbols, (3) explanations in words of all steps, and (4) conclusion (interpreting significance). A sequence of equations lacking context is not acceptable. Each group collaborates and submits one set of handwritten solutions, and each group member prepares to present solutions in class (all are accountable).

## **Rubric for Evaluating Presentations of Solutions**

Element	Expectations	Score
Clarity	identify concepts, define symbols, write legibly	3
Completeness	show all steps and explain reasoning	3
Accuracy	reason logically to obtain correct results	3
Interpretation	explain meaning and significance of results	3
Accountability	answer questions and defend solution	3
Total		15

## **Communication**

Course-related information will be communicated primarily during our class meetings. Reminders and notifications of any schedule changes will be communicated through NDSU email and posted on the Blackboard announcements page.

Your NDSU email address is the official route for course-related information.

Office hours will be conducted in person and via Zoom (at times to be announced).

If you have any technology concerns, please contact the NDSU IT Help Desk:

[ndsu.itservice@ndsu.edu](mailto:ndsu.itservice@ndsu.edu) 701-231-8685 (option 1)

## **Submission of Homework and Posting of Grades**

Online homework assignments will be submitted on the [LON-CAPA homepage](#):

[http://www.ndsu.edu/physics/students/lon\\_capa](http://www.ndsu.edu/physics/students/lon_capa)

Grades will be posted on our Blackboard course homepage.

## Copyright of Course Materials

Recording any class meetings with your own personal devices is strictly prohibited. See [NDSU Policy 190](#) on Intellectual Property.

## Health and Safety Expectations

I encourage all students to attend class meetings in person.

*Do not come to class if you are sick.* Please protect your health and the health of others by staying home, where you may participate remotely.

If you are unable to attend class at the scheduled time due to illness, email me promptly for alternate arrangements, including accommodations and extensions.

Food and drink are not allowed in class except with a documented accommodation through the [Center for Accessibility and Disability Resources](#).

In accordance with [NDSU Policy 601](#), failure to comply with instructions, including this syllabus, may be handled according to the Code of Student Conduct resolution process and may result in disciplinary sanctions.

## Additional Resources for Students

As a valued member of the NDSU community, you have access to resources should you need help in dealing with adverse reactions to things happening in the world today:

Counseling Services: 701-231-7671; [www.ndsu.edu/counseling](http://www.ndsu.edu/counseling)

Accessibility/Disability Resources: 701-231-8463; [www.ndsu.edu/accessibility-disability](http://www.ndsu.edu/accessibility-disability)

Student Health Service: 701-231-7331; [www.ndsu.edu/studenthealthservice](http://www.ndsu.edu/studenthealthservice)

Dean of Students Office: 701-231-7701; [www.ndsu.edu/deanofstudents](http://www.ndsu.edu/deanofstudents)

## In a Crisis or Emergency Situation:

Call University Police: 701-231-8998

Call 9-1-1

For physical health crises: Go to a Hospital Emergency Room

For mental health crises: Go to Prairie St. John's for a Needs Assessment

510 4th St. S, Fargo (701-476-7216 or 701-792-7200)

Call the FirstLink Help Line: 2-1-1

Call the Rape and Abuse Crisis Center: 701-293-7273