

PHYS 251

University Physics I

Spring 2023

Class #12161 (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 the principles of mechanics and thermodynamics (space, time, mass, inertia, force, velocity, acceleration, momentum, work, energy, oscillations, waves, heat, entropy, and more) to solve practical problems and examine the physical basis of technologies surrounding us. Along the way, we will learn how physicists view the world, and develop problem-solving skills of value in any career.

Prerequisite: MATH 165 Calculus I (differential and integral calculus is needed)

Instructor: Andrei Kryjevski, Associate Professor Department of Physics
andrei.kryjevski@ndsu.edu South Eng. 318D

Classes: MWF 11:00-11:50 am, M 12:00-12:50 pm, A. G. Hill (STEM) 130/132

Student Help Hours: Wednesday, 12:15 – 1:30 pm (SE 318D or via zoom), or by appointment

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

Textbook: Halliday, Resnick, Walker, Fundamentals of Physics, 11th ed. (Wiley, 2018)

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| Evaluation: | Homework Assignments | 200 points |
| | Midterm Exams (in person) | 100 points each |
| | Final Exam (in person) | 200 points |

Correct responses to the homework problems will earn the maximum 200 pts. I encourage collaborative discussion of *methods and strategies* for solving problems. Your final grade will be based on homework (200 pts), your best 2 out of 3 midterm exam scores (200 pts), your final exam score (200 pts). Classroom participation will include conceptual questions using 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/lon_capa

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

Announcements and notes will be posted on Blackboard: <https://bb.ndsu.nodak.edu>

Main Topics and Preliminary Timetable

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|-----------------------------|--|------------------------|
| Chapter 1 | Measurement | Jan 9-13 |
| Martin Luther King, Jr. Day | no class | Jan 16 |
| Chapter 2 | Motion Along a Straight Line | Jan 16-20 |
| Chapter 3 | Vectors | Jan 23-27 |
| Chapter 4 | Motion in 2 and 3 Dimensions | Jan 30- Feb 3 |
| Chapter 5 | Force and Motion I | Feb 6-10 |
| Midterm Exam 1 | Covering Chapters 1-4 | Wed, Feb 15 |
| Chapter 6 | Force and Motion II | Feb 13-17 |
| Presidents' Day | no class | Feb 20 |
| Chapter 7 | Kinetic Energy and Work | Feb 20-24 |
| Chapter 8 | Potential Energy and Conservation of Energy | Feb 27-Mar 3 |
| Chapter 9 | Center of Mass, Momentum | Mar 6-10 |
| Spring Break | no classes | Mar 13-17 |
| Chapter 10 | Rotational Motion | Mar 20-24 |
| Midterm Exam 2 | Covering Chapters 5-9 | Wed, Mar 29 |
| Chapter 11 | Rolling, Torque, and Angular Momentum | Mar 27-31 |
| Chapter 12 | Equilibrium and Elasticity | Apr 3-7 |
| Chapter 13 | Gravitation | Apr 10-14 |
| Spring Recess | no class | Apr 7, 10 |
| Chapter 14 | Fluids | Apr 17-21 |
| Midterm Exam 3 | Covering Chapters 10-14 | Wed, Apr 26 |
| Chapters 15-17 | Oscillations and Waves | Apr 24-28 |
| Chapters 18-20 | Thermodynamics: Heat, 1 st Law, Entropy and the 2 nd Law | May 1-5 |
| Final Exam | Comprehensive | Thu, 5/11, 8 AM |

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.

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 Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible.

COVID-19 Related Information

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 IT Help Desk:

ndsu.helpdesk@ndsu.edu 701-231-8685 (option 1)

Submission of Homework and Posting of Grades

Homework assignments will be submitted on the LON-CAPA homepage:

http://www.ndsu.edu/physics/lon_capa

Homework and exam scores will be posted on our LON-CAPA 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

Information on COVID-19 and NDSU's response:

https://www.ndsu.edu/police_safety/covid_19_preparedness_and_response/

I encourage all students to attend class meetings in person. According to NDSU policy and CDC guidelines, when in the classroom, you must properly wear a face covering (covering both the mouth and nose) for the entire class. Wearing a face covering helps reduce the risk to others in case you are infected but do not have symptoms, and also

may protect you from infection. *Research studies show that even if vaccinated you can become infected and transmit the virus to others.*

Students who cannot wear a face covering due to a medical condition or disability may seek accommodation through Disability Services:

701-231-8463 <https://www.ndsu.edu/disabilityservices/>

Disinfecting supplies are provided for you to disinfect your learning space. You may also use your own disinfecting supplies.

Whenever possible, observe physical distancing guidelines, maintaining 2 m separation from others. Avoid congregating around the classroom entrance before or after class.

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.

Food and drink are not allowed in class except with a documented accommodation through Disability Services.

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. For information on COVID-19, symptoms, testing, and steps to stay healthy see

https://www.ndsu.edu/studenthealthservice/covid_19/

Do not come to class if you have been exposed to individuals who tested positive for COVID-19 and/or you have been notified to self-quarantine due to exposure.

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

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; <https://www.ndsu.edu/counseling/>

Disability Services: 701-231-8463; <https://www.ndsu.edu/disabilityservices/>

Student Health Service: 701-231-7331; <https://www.ndsu.edu/studenthealthservice/>

Dean of Students Office: 701-231-7701; <https://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)

Call the FirstLink Help Line: 1-800-273-TALK (8255) or 2-1-1

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