

# University Physics I

## Physics 231N/226N

Welcome to University Physics I at Old Dominion University. This course is intended to give a solid introduction to basic principles of Classical Mechanics. It covers the basic concepts of Newtonian mechanics, fluid mechanics and waves. We will study how the motion of an object can be understood and predicted in terms of the forces that are acting on the object. Classical Mechanics is one of major foundations in science and engineering.

The key objectives of the course include developing problem-solving skills, as well as preparing university students for professional careers in science and engineering. The course is calculus based.

<b>The catalog description</b>	PHYS 231N. University Physics. 4 Credits. "A general introduction to physics in which the principles of classical and modern physics are applied to the solution of physical problems. The reasoning through which solutions are obtained is stressed. Topics include mechanics, fluids, and thermodynamics. This course is designed for majors in the physical sciences, engineering, mathematics, and computational sciences."
<b>Pre/Co requisites</b>	Prerequisites: MATH 211 with a grade of C or better. Pre- or co-requisites: MATH 212 or permission of instructor. Math proficiency in the following areas is essential: algebra, trigonometry, vectors and introductory calculus. If you are uncertain about your preparation, consult the instructor.
<b>Classes</b>	Tuesday and Thursday 8:00 – 11:30, Room OCNPS 0200
<b>Instructor</b>	Dr. Alexander L. Godunov Office: OCNPS 0219 (Oceanography and Physics) Phone: 683-5805 agodunov@odu.edu Web: www.odu.edu/~agodunov
<b>Materials</b>	<ol style="list-style-type: none"><li>1. Textbook (<u>required</u>): "University Physics" by Young &amp; Freedman (15<sup>th</sup> edition). This book can be accessed as an e-text through Canvas (under modules)</li><li>2. Mastering Physics (<u>required</u>) The Mastering Physics is on-line assignment system. It is integrated with Canvas (under modules)</li><li>3. Laboratory manual Specific information will be provided by your lab instructor.</li></ol>
<b>Support resources</b>	<i>Canvas</i> : Majority of information including lecture notes, will be posted on the class Canvas page. <i>Office hours</i> : Tuesday, Thursday 13:30–14:30 <i>Place</i> : Zoom Meeting ID: <b>970 3377 0735</b> , Passcode: <b>Force=ma</b> and by appointment. <i>E-mail</i> : agodunov@odu.edu (please have "Physics 231" in the subject line).

<b>Time commitment</b>	Summer Physics 231 is a highly demanding and intense course. Students should allocate sufficient time during the short summer semester to do well in the course. If you feel overwhelmed with this summer class, you should contact the instructor to develop a different studying strategy
<b>Course Grades</b>	<p>The final grade is calculated on an absolute scale. There are 100 points possible for this course of which</p> <p>30 points – Final Exam</p> <p>45 points – Three Midterm Exams (20+20+5) (5 for the lowest exam)</p> <p>15 points – Homework assignments (Mastering Physics)</p> <p>10 points – Labs (You must receive a passing grade to pass the course).</p> <p>The grading policy is non-competitive and lenient, but there will be <b>no curve</b>. If everyone in the class does well, everyone can get an A.</p> <p>A letter grade is determined only at the end of the term.</p> <p>Grade Requirements (breakpoints)</p> <p><math>92 \leq A &lt; 100</math>   <math>88 \leq A- &lt; 92</math>   <math>83 \leq B+ &lt; 88</math></p> <p><math>77 \leq B &lt; 83</math>   <math>72 \leq B- &lt; 77</math>   <math>66 \leq C+ &lt; 72</math></p> <p><math>60 \leq C &lt; 66</math>   <math>55 \leq C- &lt; 60</math>   <math>50 \leq D &lt; 55</math>   <math>F &lt; 50</math></p>
<b>Homework assignments</b>	<p>The homework accessed through Mastering Physics (see Canvas)</p> <p>Homework assignments will be set as we progress through the course. One assignment will be given for every chapter.</p> <p>Assignments are due before 11:59 p.m. on the indicated date.</p> <p><u>No individual extensions of assignment submission dates will be given.</u></p> <p>If you do not finish an assignment by the due date, you can still do it at any time, but you will not receive any credit for any late problems.</p>
<b>Reading Assignments</b>	<p>Because there will be limited time for presenting information in class so it is VITALLY IMPORTANT that you read the appropriate sections of the textbook BEFORE coming to class. Reading ahead requires time management and discipline, but the payoff is considerable - the material will be much easier to understand.</p>
<b>Laboratory</b>	<p>The lab instructor will detail the format of lab reports and the grading criteria to be applied.</p>
<b>Mid-term exams</b>	<p>There will be three midterm exams. The midterm examinations will be given during the regularly scheduled class periods. The examinations will emphasize the material in lectures and homework assignments. Some material covered in class may be omitted.</p> <p>No make-up examinations will be given. In case you have a legitimate reason for missing an exam, consult with me before, or at least within 24 hours after the exam. If you miss a midterm examination for an officially excused reason (documented illness or family emergency, major religious holidays, or official university business) your missed examination score will be replaced with the appropriately scaled score on the portion of the final exam that covers same material as the missed midterm examination.</p>

**Final Exam**                      June 23, 2022, 8:00 – 11:30

**Professional Integrity**                      In Physics 231, high professional and ethical standards are promoted. Plagiarism and cheating are serious offenses and may be punished by failure on the exam and failure in the course. The academic integrity code is to be maintained at all times. Using Google, Chegg, and similar resources for getting solutions to exam problems is considered as cheating.

**Collaboration**                      Collaboration in class and on homework assignments is strongly encouraged. Because the course is graded on an absolute scale, you will never reduce your grade by helping others — on the contrary, by doing so you will reinforce your own knowledge and improve your performance. Although, before working together or consulting others on any assignments, it is helpful to first tackle the work alone. Activities for which collaboration is not permitted are: examinations and submission of homework assignments.

**Accommodation**                      Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

## Course Outline

### Subject

With chapter and section numbers from

“University Physics with Modern Physics” by Young & Freedman (15<sup>th</sup> edition)

1. Units and Dimensional Analysis. Math and Vectors. (sections 1.1 – 1.10)
2. Motion Along a Straight Line (sections 2.1 – 2.6)
3. Motion in Two Dimensions (sections 3.1 – 3.5)
4. Newton's Laws of Motion (sections 4.1 – 4.6)
5. Applying Newton's Laws (sections 5.1 – 5.5)
6. Energy, Work and Power (sections 6.1 – 6.4)
7. Conservation of Energy (sections 7.1 – 7.5)
8. System of Particles (Momentum and Collisions) (sections 8.1 – 8.5, 8.6\*)
9. Rotational Motion (sections 9.1 – 9.4, 9.5\*, 9.6\*)
10. Dynamic of Rotational Motion (sections 10.1 – 10.6, 10.7\*)
11. Static Equilibrium. (sections 11.1 – 11.3)
12. Fluids (sections 12.1 – 12.4, 12.5\*, 12.6\*)
13. Gravitation (sections 13.1 – 13.4, 13.6\*, 13.7, 13.8)
14. Periodic Motion (sections 14.1 – 14.6, 14.7\*, 14.8\*)
15. Mechanical waves. (sections 15.1 – 15.3, 15.4\* – 15.8\*)
16. Sound (sections 16.1, 16.2, 16.8, 16.9, 16.3\* - 16.7\*)
17. Temperature and Heat (sections 17.1 – 17. 5, 17.6\*, 17.7\*)

\* If we get that far

## Tentative Schedule

17 May 2022 (Tuesday)

- Introduction to the course
- Chapter 1: Nature of physics, units, significant figures, estimates, vectors

19 May 2022 (Thursday)

- Reading assignments for the day: Chapter 2 (sections 2.1-2.5), Chapter 3 (sections 3.1-3.3)
- Chapter 2: 1D dimensional motion
- Chapter 3: 2D motion

24 May 2022 (Tuesday)

- Reading assignments for the day: Chapter 4 (sections 4.1-4.3)
- Chapter 3: cont.
- Chapter 4: Newton's laws of motion
- Chapter 5: Applying Newton's laws (forces) (if we get that far)

26 May 2022 (Thursday)

- Reading assignments for the day: Chapter 5 (sections 5.1-5.3)
- [Exam 1](#) (chapters 1-3)
- Chapter 5: Applying Newton's laws

31 June 2022 (Tuesday)

- Reading assignments for the day: Chapter 5 (section 5.4)
- Chapter 5: Applying Newton's laws

2 June 2022 (Thursday)

- Reading assignments for the day: Chapter 6 (sections 6.1-6.2), Chapter 7 (7.1-7.3)
- [Exam 2](#) (chapter 4-5)
- Chapter 6: Energy
- Chapter 7: Conservation of energy

7 June 2022 (Tuesday)

- Reading assignments for the day: Chapter 8 (sections 8.1-8.3)
- Chapter 8: Momentum

9 June 2022 (Thursday)

- Reading assignments for the day:  
Chapter 9 (sections 9.1-9.3), Chapter 10 (10.1,10.2, 10.3)
- Chapter 9: Rotation
- Chapter 10: Dynamics of rotational motion

14 June 2022 (Tuesday)

- Reading assignments for the day: Chapter 11 (11.1-11.3), Chapter 13 (13.1-13.3)
- [Exam 3](#) (Chapters 7,8,10)
- Chapter 11: Equilibrium
- Chapter 13: Gravitation

16 June 2022 (Thursday)

- Reading assignments for the day: Chapter 12 (sections 12.1-12.3),
- Chapter 12: Fluid Mechanics
- Chapter 14 Oscillations

21 June 2022 (Tuesday)

- Reading assignments for the day: Chapter 14 (sections 14.1, 14.2), Chapter 15 (15.1-15.3)
- Chapter 15, 16: Waves and sound
- Chapter 17: Temperature and heat

23 June 2022 (Thursday)

- [Final examination](#) (comprehensive)

Please note that all reading assignments are from the textbook "University Physics" by Young and Freedman (15th edition).