Oakland University *College of Arts & Science* *Department of Physics*

PHY 1510, Introductory Physics I
4 Credit Hours
Fall 2018

Instructor: Eugene Surdutovich **E-mail:** surdutov@oakland.edu
Office: 172 Hannah Hall **Office phone:** 248-370-3409
Class Time: M, W, F, 8:00 – 9:07 am **Office hours:** MWF 10:30-11:30 am
Auditorium: 185 MSC, **SI** 9:20 – 10:20am 372 MSC.

Course (Catalog) Description: Topics include:

Kinematics: Description of motion of a point in one and two dimensions: position, displacement, velocity, acceleration, free fall, projectile motion, circular motion, radial acceleration, relative velocity.

Dynamics: Newton's laws, force of gravity, weight, friction, centripetal force, applications.

Energy: Work done by force, work-energy theorem, kinetic and potential energy, conservation and non-conservation of mechanical energy, potential energy and bound states.

Momentum: Linear momentum and its conservation, application to collisions, center of mass.

Rotational motion: Rotational kinematics, rolling; Dynamics: kinetic energy, torque, angular momentum, generalization of equilibrium. Application of rotational dynamics to planetary motion, Kepler's laws

Fluid mechanics: Pressure and density; Torricelli's, Pascal's, Archimedes' laws/principles; continuity and Bernoulli's equations

Description of gases: Definitions of temperature; 0^{th} law of thermodynamics; descriptions of an ideal gas: equation of state (processes) and kinetic theory

Thermodynamics: Heat, internal energy, phase changes, work, 1^{st} law of thermodynamics, application to processes; heat engines, 2^{nd} law of thermodynamics, entropy

Oscillations and waves: Oscillatory motion, harmonic motion, pendulum

Prerequisites: Score of 28 or higher on ACT math test or 660 or higher on SAT math test; or MTH 1441 or equivalent, or placement above MTH 0662. MTH 1554 recommended.

Corequisite for PHY 1510: PHY 1100 – General Physics Lab I.

PHY 1510 (4 credits with Lab) satisfies the university general education requirement in Natural Science and Technology knowledge exploration area.

General Education Learning Outcomes for PHY 1510: The learning outcomes for Natural Science and Technology courses state that the student will demonstrate:

- Knowledge of major concepts from natural science or technology, including developing and testing of hypotheses; drawing conclusions; and reporting of findings through some laboratory experience or an effective substitute (Laboratory experiences are met by either a limited number of interactive experiences, collecting and interpreting raw data, or other effective experiences such as a virtual laboratory). Requires at least 3 laboratory experiences during the course.
- How to evaluate sources of information in science and technology.

In addition to the general-education learning outcomes, this course also includes the crosscutting capacity of Critical Thinking.

Course Goals and Objectives: Goals of this course include: applying the material learned in the Calculus course for problem solving; learning to utilize Calculus methods to produce a mathematical representation of and to analyze physical situations; introduce a wide range of applications to fields other than physics.
To achieve these goals:

- Strong emphasis is given to sound physical arguments and conceptual learning, to strengthen the student's logical capacities.
- Emphasis is given to problem-solving methodology: a modeling approach, based on four types of models commonly used by physicists, is introduced for the students to understand they are solving problems that approximate reality. Then they learn how to test the validity of the model. This approach helps the students see the unity in physics, as a large fraction of problems can be solved using a small number of models.
- Quite often problems require the student to relate to concepts covered in previous chapters.
- Some problems require the use of a computer or graphing calculator. Modeling of physical phenomena enables the students to obtain graphical representations of variables and to perform numerical analyses.
- The course includes practical examples that demonstrate the role of Physics in other disciplines, including engineering, chemistry, life sciences and medicine, and applications relating to modern technology.
- The course connects physics principles to examples of
    - Natural phenomena – such as planetary motion and astronomy, hurricanes;
    - Technology and everyday life – such as car and driving-, sports-, cooking-, heating and cooling-related issues;
    - Ethical and societal issues such as energy and ecology concerns.
    - Philosophical issues – such as design of a physical theory and its principles.

Textbook: Serway/Jewett: Principles of Physics - 5th Edition, Hybrid

packaged with:

- WebAssign – multi-term Access Card
- Access to e-Book

Cengage Publishing – ISBN: 9781305586871 [Required]

Student Solutions Manual with Study Guide, Vol. 1 [Optional]

Cengage Publishing – ISBN: 9781133110767

Available options for purchasing the textbook:

- You may purchase the 'bundle' for $122 at
  Campus bookstore – Barnes & Noble – at the Oakland Center

- You may purchase the 'bundle' online, directly from the publisher for $114 at
  http://www.cengagebrain.com/ (search the book by ISBN)

Please notice:

- If you wish to *purchase **just** the access to **WebAssign***, you may do so:
  - *Online* – once you are logged in to WebAssign.net
    Please see the page of the syllabus dedicated to WebAssign
  - *Bookstore* – the ISBN for the printed EWA Multi Term Access Card is 9781285858418

Equipment: Protractor, metric ruler, scientific calculator.

Homework: The online program **WebAssign** will be utilized for entering and automatic grading of the homework. This requires the Access Card to be found inside the textbook.
The homework for each chapter can be submitted a ***maximum of 5 times***.

***Accessing WebAssign*:** see attached sheet.

***Due time*:** The assignments are due at 11:59 pm on the specified date.
No e-mailed homework is accepted.

The homework is worth 15% of the final grade.

Exams: There will be three exams. The exams consist of Problems and Conceptual Questions. All exams will be closed-book. You may bring several **(up to five)** 8.5" x 11" sheets containing annotated formulas. A scientific calculator is needed plus pencil and ruler.
Please notice: clear writing and clarity of expression is a very important component of the exams.

Make-up Policy: In order to be fair to the majority of students who take the exams on time, the general policy is: *NO make-up exams* will be given. A score of zero will be entered for missed tests. If you cannot be present for an exam due to an unavoidable emergency, or if you are sick, **contact**

me before the exam if possible or as quickly as possible after the exam to see if an exception can be made.

Labs are a completely independent course: PHY 1100.
Prof. K. C. Castoldi [castoldi@oakland.edu, 162 HH, (248) 370-4870] coordinates this course.

Grading: I will give you the better of the following two scores,
(1): 26% for each midterm exam + 33% for the final exam or
(2): 12% for the worst midterm + 26% for the best midterm exam + 47% for the final exam.

Exam 1		**26%**	**12%**
Exam2		**26%**	**26%**
Final Exam		**33%**	**47%**
Homework		**15%**	**15%**
Total		**100%**	**100%**

Grading Scale:

A	**96-100**
A-	**90-95**
B+	**85-89**
B	**80-84**
B-	**75-79**
C+	**70-74**
C	**65-69**
C-	**60-64**
D+	**55-59**
D	**50-54**
F	**< 50**

Attendance: Attendance to all lectures is expected. Poor attendance usually correlates with poor course grade.

Add/Drops: The University's add/drop policy will be explicitly followed. It is the student's responsibility to be aware of the university deadline dates for dropping courses.

Reasonable Accommodations:

Accessibility and Accommodations: It is the University's goal that learning experiences be as accessible as possible. Students with disabilities who have questions about course accessibility are encouraged to contact the instructor immediately. The Office of Disability and Support Services (DSS) is available to help. The DSS office is located in room 103A North Foundation Hall.
For more information, call 248-370-3266 or visit **https://www.oakland.edu/dss**

Policy on Academic Misconduct

The University's regulations that relate to academic misconduct will be fully enforced. Any student suspected of cheating and/or plagiarism will be reported to the Dean of Students and, thereafter, to the Academic Conduct Committee for adjudication. Anyone found guilty of academic misconduct in this course may receive a course grade of F, in addition to any penalty assigned by the Academic Conduct Committee. Students found guilty of academic misconduct by the Academic Conduct Committee may face suspension or permanent dismissal. The full policy on academic misconduct can be found in the General Information section of the Undergraduate Catalog.

Excused Absence Policy

The University excused absence policy applies to participation as an athlete, manager or student trainer in NCAA intercollegiate competitions, or participation as a representative of Oakland University at academic events and artistic performances approved by the Provost or designee.
For the excused absence policy, see:
https://www.oakland.edu/provost/policies-and-procedures/

Student Preferred Name/Pronoun Policy

Course rosters are typically provided to the instructor with the student's legal names. If you do not identify with the name that is listed with the Registrar's office, please notify me. I will gladly honor your request to address you by an alternate name or gender pronoun. For more information on indicating a preferred first name on university records, please visit:
https://www.oakland.edu/uts/common-good-core-resources/name-services/

WEB Assign: How to Get Started

Day One: Register

1. Go to https://webassign.net and click on LOG-IN.
2. Click on 'I have a Class Key'
3. Enter the Class Key: oakland 0909 1052 (this allows me to see your homework grades)
4. Enter your chosen Login name and the required information
5. Click on 'Create my Account'
   A review screen will appear with your Username, Institution code & Password.
   Print and retain a copy of this information.
6. Once you Login, you need to enter the WebAssign Access Code.
   - If you purchased a new textbook, the Access Code card is inside the book.
   - If you purchased a used book, you may choose to purchase the Access Code online.
   Notice: there is a 14 day grace period to use WebAssign. If you have not purchased your textbook yet, during this time you can do your homework without a registering code.
7. Once you have logged in, you will see the Homepage.
   - I suggest you click on Guide (upper right corner) and read the Student Guide.
   - For Technical Support click on Help or go to
   http://www.webassign.net/info/support/report.html~

To access the Homework:

1. Go to http://www.webassign.net/login.html (I suggest you Bookmark this page)
2. After you Login, click on 'My Assignments'.

Please notice:

- You may save your work without grading by clicking on 'Save Work' at the end of the question. Next time you access the assignment, your work will still be available.
- Web Assign will not automatically submit your answer if you only 'Save' your work. Make sure you 'Submit' it before the due date and time.
- You may also choose to 'Submit New Answers to Question xx' or 'Submit All New Answers'.

Remember that there is a maximum of 5 submissions for each problem.

PHY-1510 **Tentative Course Schedule** **Fall 2018**

Week	Day	Date	Lecture Topics	Chapters
1	W	9/5	Mathematics and language of Physics	1.1-1.5
	F	9/7	Vectors; position and displacement	1.6-1.9
2	M	9/10	Description of motion, velocity, problems	2.1-2.3
	W	9/12	Acceleration, graphs	2.4-2.6
	F	9/14	Examples of 1-D motion, free fall.	2.6-2.7
3	M	9/17	More problems and examples	
	W	9/19	Motion in two dimensions. Projectile motion.	3.1-3.3
	F	9/21	Circular motion, relative velocity	3.4-3.6
4	M	9/24	Relative velocity; Newton's laws	3.6, 4.1-4.4
	W	9/26	Newton's laws continued; weight, problems	4.5-4.7
	F	9/28	Friction	5.1
5	M	10/1	More problems	5
	W	10/3	Centripetal force	5.2
	F	10/5	More examples and applications	5.3-5.6
6	M	10/8	Work done by a force, work-energy theorem	6.1-6.5
	W	10/10	Work energy theorem with friction	6.6-6.7
	F	10/12	Potential energy and applications	7.1-7.3
7	M	10/15	Power, review	6.7-6.8
	W	10/17	**Exam 1**	
	F	10/19	Linear momentum and impulse, collisions	8.1-8.3
8	M	10/22	Collisions, continued	8.4
	W	10/24	Problems, center of mass	8.5-8.6
	F	10/26	Rotational kinematics, kinetic energy	10.1-10.4
9	M	10/29	Torque, equilibrium	10.5-10.6
	W	10/31	Torque, dynamics	10.7
	F	11/2	Angular momentum, rolling, review.	10.8-10.11
10	M	11/5	Planetary motion and Kepler's laws	11
	W	11/7	Potential energy in the gravitational field	7.6-7.7, 11
	F	11/9	Oscillations	12
11	M	11/12	Oscillations and waves	12-13
	W	11/14	Fluid statics	15.1-15.4
	F	11/16	Fluid dynamics	15.5-15.7
12	M	11/19	**Exam 2**	
	W	11/21	Temperature and its scales, Thermal expansion	16.1-16.4
	F	11/23	Thanksgiving recess	
13	M	11/26	Descriptions of an ideal gas	16.5-16.6
	W	11/28	Heat, calorimetry	17.1-17.3
	F	11/30	Heat transfer	17.10-17.11
14	M	12/3	First law of thermodynamics, processes	17.4-17.8
	W	12/5	Heat engines II law of thermodynamics	17-18
	F	12/7	Heat transfer mechanisms, review	17
15	M	12/10	8:00 – 11:00 a.m. Final Exam, cumulative	