

***PHYS 102: Introductory Physics for Life Sciences***  
***Syllabus - Fall 2019***

**Location:** Trexler 372

**Instructor:** Dr. Hiba Assi

**Office Hours:** MWF 13:00-14:30

Open-door visits & appointments are welcome

**Time:** MWF 09:40 – 10:40

**E-mail:** assi@roanoke.edu

**Office:** Trexler 264B

**Phone:** (540) 375-2570

**Course textbook:** James S. Walker, *Physics*, 5<sup>th</sup> ed., Pearson, 2016

ISBN-10: 0321976444

ISBN-13: 9780321976444

A copy of the textbook is on course reserve at Fintel library. Regular homework problems will be mainly assigned from the textbook.

**Optional textbook:** F. R. Hallet, J. L. Hunt, R. H. Stinson, E. McFarland, G. Renninger and D. Sullivan, *Physics for the Biological Sciences*, 4<sup>th</sup> ed., Nelson, 2003.

ISBN-10: 0176224513/ ISBN-13: 978-0176224516

**Prerequisites:** None

**Other required materials:** You will need graph papers, a working scientific calculator for class sessions, assignments, and exams.

**Course Description:** This algebra-based course provides an overview of topics in physics that are of particular importance to the life and medical sciences. The course covers mechanics (units, motion, energy), electricity and magnetism, heat, atomic and nuclear physics, fluids, waves, and instrumentations, all in the context of biological systems.

**Learning Outcomes:** Upon successful completion of the course, students will be able to:

- Identify relevant physical principles which underlie the dynamics of real-world situations
- Manipulate units as a viable source of knowledge about the physical world
- Construct organized physical analyses that demonstrate logically connected steps of thought
- Synthesize numerical information, physical assumptions, and previous concepts to correctly describe physical systems
- Apply analytical thinking and physical modeling to other scientific arenas

**Required Laboratory Course:** You must be enrolled in the laboratory portion *PHYS 102L* of this course. Although *PHYS 102L* operates as a separate course, it counts as 25% of the course grade for *PHYS 102*. Please refer to the lab course syllabus for important information about the lab specifics and final grade. Note that if any lab experiment is not completed by the end of the semester, your course grade will be reduced by one whole letter grade. Lab does not meet during the first week of classes.

**Lecture Periods:** The lecture will cover topics outlined in the course schedule and will involve solving sample problems in groups, so team work and student involvement are expected. Any question is welcome in class at any point! You are strongly advised to read the corresponding sections before coming to class to benefit the most from the lecture that day.

**Attendance:** Attendance will be formally taken in the beginning of class and will count towards your final grade. The maximum number of absences, whether excused or not, is three for the whole semester. You are fully responsible for the material that was covered and for any announcements made in class, such as changes to the schedule and/or syllabus and assigned homework sets.

**Homework:** Problem sets will be regularly assigned, mainly from the textbook. These are due at the beginning of class on the due date.

Some of the exercises in each set will be graded on correctness to provide you with detailed feedback on your work, and the others will be graded on completion. Detailed solutions will be posted on Inquire for your use.

No late submissions will be allowed unless an extension is discussed and granted beforehand.

**Discussion/Review Sessions:** Review sessions for exams will be agreed upon and announced in advance in class.

**Exams:** There will be four one-hour mid-term exams and a fully comprehensive three-hour final exam, with their dates specified in the course schedule. Exam make-up for excused reasons (family or medical emergencies, and university-recognized commitments) must be discussed and arranged with me at least two weeks in advance, unless it is an emergency. If your missed exam is unexcused, you will receive a zero on that exam. You will need to create your own formula sheet of a certain approved length that will be announced in advance in class, and exams are closed-book otherwise.

The lowest mid-term exam grade will be dropped.

**Grading:** Class grades will be calculated according to the following distribution

- Lab 25%
- Attendance 5%
- Homework 20%
- Three Mid-term Exams 10% each
- Final Exam 20%

Furthermore, letter grades will be assigned at the end of the semester according to the following scale

|    |       |   |        |    |       |       |
|----|-------|---|--------|----|-------|-------|
| A- | 90-92 | A | 93-100 |    |       |       |
| B- | 80-82 | B | 83- 86 | B+ | 87-89 |       |
| C- | 70-72 | C | 73- 76 | C+ | 77-79 |       |
| D- | 60-62 | D | 63- 66 | D+ | 67-69 | F <60 |

You should expect to spend at least 12 hours inside and outside of class each week on this course.

**Extra Credit/ MCSP Conversation Series:** Extra credit is available for students who attend ONE talk in the MCSP Conversation Series (schedule available at <http://cs.roanoke.edu/MCSPSeries>) and submit a well-written reflection on the talk within one week of the presentation. The submission must present a brief summary of the key ideas of the talk and include a description of the parts of the presentation that were interesting, confusing, and relevant to this course. Your work must be grammatically-correct, typed, double-spaced, and between one and two pages in length. The submitted paper will earn 0, 0.25, or 0.5 percent to be added to the final grade. Note that a simple summary of the talk is not sufficient to receive credit.

**Use of Electronic Devices:** You are allowed to use personal laptops and tablets, but only for the purpose of taking notes. Scientific calculators can also be used during class when needed and during exams. Your phones must be on silent mode and out of reach during class and must be turned off during exams. Violations of this policy during exams can constitute a violation of the academic integrity policy.

**Disability Support:** Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at [aes@roanoke.edu](mailto:aes@roanoke.edu) to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment.

**Academic Integrity:** The Academic Integrity (AI) policy at Roanoke College will be thoroughly followed in this course, and I expect you to abide by all the outlined rules to avoid any questionable conduct. General concepts related to the homework sets may be clarified through conversations with other students, but you should solve the problems on your own. Exams are closed-book, and no discussion among students is allowed after the exam in case a student has not taken the exam. I will explicitly inform you if/when you can start discussing exams with others. You will need to create your own formula sheet of a certain approved length that will be announced in advance in class. You are allowed to use a calculator ONLY to compute numerical quantities. If I become aware of a possible violation of these guidelines, I am obligated to report it to the Academic Integrity committee. Student resources on the AI policy can be found online at:  
[https://www.roanoke.edu/inside/a-z\\_index/academic\\_affairs/academic\\_integrity/resources\\_for\\_students](https://www.roanoke.edu/inside/a-z_index/academic_affairs/academic_integrity/resources_for_students)

**Class Environment:** Each member of this class is valued, and is expected to 1) treat everyone else with respect and 2) contribute to a welcoming and inclusive environment.

**PHYS 102: Introductory Physics for Life Sciences, Fall 2019- Daily Schedule** The following schedule outlines the tentative timeline for the covered topics and exam dates:

| <i>Day</i>    | <i>Chapter</i>                      | <i>Sections</i>      | <i>Topic</i>                             |
|---------------|-------------------------------------|----------------------|--|
| 28 Aug        | 1                                   | 1.1-1.8              | Introductions + brief lecture            |
| 30 Aug        | 2                                   | 2.1-2.7              | One-dimensional kinematics               |
| 2 Sep         |                                     |                      |  |
| 4 Sep         | 3                                   | 3.1-3.4              | Vectors                                  |
| 6 Sep         | 4                                   | 4.1-4.5              | Two-dimensional kinematics               |
| 9 Sep         |                                     |                      |  |
| 11 Sep        | 5                                   | 5.1-5.7              | Newton's laws of motion                  |
| 13 Sep        | 6                                   | 6.1-6.2, 6.5         | Applications of Newton's laws            |
| 16 Sep        | 7                                   | 7.1-7.2, 7.4         | Work, kinetic energy, power              |
| <b>18 Sep</b> | <b>Test 1: Chapters 1-6</b>         |                      |  |
| 20 Sep        | 8                                   | 8.2, 8.3             | Potential energy, conservation of energy |
| 23 Sep        | 9                                   | 9.1-9.2, 9.4-9.7     | Linear momentum, center of mass          |
| 25 Sep        | 10                                  | 10.1-10.2, 10.5      | Rotational kinematics and energy         |
| 27 Sep        | 11                                  | 11.1-11.2, 11.6-11.7 | Rotational dynamics                      |
| 30 Sep        |                                     |                      |  |
| 2 Oct         | 13                                  | 13.1-13.2            | Simple harmonic oscillation              |
| 4 Oct         | 14                                  | 14.1-14.2, 14.4-14.8 | Waves and sounds                         |
| 7 Oct         |                                     |                      |  |
| 9 Oct         | 15                                  | 15.1-15.9            | Fluids                                   |
| <b>11 Oct</b> | <b>Test 2: Chapters 7-11, 13-14</b> |                      |  |
| 14 Oct        | <b>Fall Break- No classes!</b>      |                      |  |
| 16 Oct        |                                     |                      |  |
| 18 Oct        |                                     |                      |  |
| 21 Oct        | 16                                  | 16.1-16.5            | Temperature and heat                     |
| 23 Oct        | 17                                  | 17.5-17.6            | Phase changes                            |
| 25 Oct        |                                     |                      |  |
| 28 Oct        | 18                                  | 18.1-18.3, 18.5,18.8 | Laws of thermodynamics                   |
| 30 Oct        | 19                                  | 19.1-19.4            | Electricity                              |
| 1 Nov         |                                     |                      |  |
| 4 Nov         | 22                                  | 22.1-22.3            | Magnetism                                |
| 6 Nov         | 25                                  | 25.3                 | Electromagnetic spectrum                 |
| <b>8 Nov</b>  | <b>Test 3: Chapters 15-19,22</b>    |                      |  |
| 11 Nov        |                                     |                      |  |

|               |   |   |                               |
|---------------|---|---|-------------------------------|
| 13 Nov        | 26  | 26.1, 26.5-26.7                           | Geometric optics              |
| 15 Nov        |   |   |                               |
| 18 Nov        | 27  | 27.1-27.4                                 | Human eye and microscopes     |
| 20 Nov        | 31  | 31.1-31.4, 31.7                           | Atom and atomic radiation     |
| 22 Nov        |   |   |                               |
| 25 Nov        | 32  | 32.1-32.6                                 | Nucleus and nuclear radiation |
| 27 Nov        | <b><i>Thanksgiving Break- Enjoy!!!</i></b>  |   |                               |
| 29 Nov        |   |   |                               |
| 2 Dec         |   |   |                               |
| <b>4 Dec</b>  | <b><i>Test 4: Chapters 25-27, 31-32</i></b> |   |                               |
| 6 Dec         | <b><i>Review for final exam</i></b>         |   |                               |
| <b>11 Dec</b> | <b><i>08:30-11:30</i></b>                   | <b><i>Final Exam- Best of Luck!!!</i></b> |                               |