

York University
PHYS 1420: Physics with Applications to Life Sciences
(6 credits; two-semester course)
Fall 2019 Syllabus

Time & Location

Lecture: MWF 12:30-1:30 (ACE 102)

Tutorial: T 1:30-2:30 (ACE 102)

Labs: Scheduled individually via course registration

Instructor: Christopher Bergevin

Email: cberge [at] yorku.ca

Office: Petrie 240

Office Hours: T 2:30(ish)–4:00 and/or by appointment (email to set up)

TAs/Graders:

- TBD (TBD@yorku.ca)

Course Website – <http://www.yorku.ca/cberge/1420F2019.html>

Prerequisites: A survey of physics in which many fundamental concepts are emphasized through applications to the life sciences. Topics include kinematics, dynamics, momentum and energy for linear and rotational motion; elementary kinetic theory and thermodynamics; static and current electricity; waves and physical and geometrical optics; elements of modern physics. This is a calculus-based course recommended for students unlikely to take 2000-level Physics courses. Prerequisites: 12U Physics or OAC Physics or SC/PHYS 1510 4.00; MHF4U Advanced Functions and MCV4U Calculus and Vectors, or 12U Advanced Functions and Introductory Calculus, or OAC Algebra and OAC Calculus, or SC/MATH 1505 6.00, or SC/MATH 1520 3.00. Course Credit Exclusions: SC/PHYS 1010 6.00; SC/PHYS 1410 6.00; SC/PHYS 1800 3.00 and SC/PHYS 1801 3.00; SC/ISCI 1310 6.0.

Two-semester Sequence: Note that PHYS 1420 is a two-semester course. C. Bergevin will be teaching the Fall 2019 (F19) term, while Prof. Cody Storry will be teaching the Winter 2020 term. This syllabus applies to the fall term. For F19, we are aiming to cover chapters 1–9 & 11–13 of the text. Not all material in these chapters will be covered, and there will be material covered in class not explicitly covered from the textbook.

Learning Objectives: By the end of the course (F19), students should be able to

- Understand the foundations of the areas of physics with application in life sciences. More specifically, topics include: kinematics (1-D and 2-D); momentum; work and energy for linear and rotational motion; fluid statics and dynamics; diffusion; oscillations; waves.
- Recognize problems to which knowledge of physics may be productively applied
- Apply knowledge of physics to solve problems

- Be experienced with both the theory and practice of physics

Textbook: *University Physics for the Physical and Life Sciences vols. 1 & 2*, Kesten PR & Tauck DL (W H Freeman & Co, 2012). Note that for the online component of the homework, you will need the Sapling Online Homework license, which comes packaged w/ the hard copy of the course text (as sold by the bookstore) or sold individually. You will also need a copy of the lab manual, available only from the university bookstore. You will not need a “clicker” for F19.

Class Reps: PHYS 1420 will employ a team of volunteer student “class reps” (see <https://bethune.yorku.ca/classreps/>), who will play a key role in the course as it progresses. If you are interested in volunteering for participating, please contact the course instructor at the start of the semester.

Bethune: Bethune is the college affiliated with the Faculty of Science and Lassonde School of Engineering and offers academic support and social events for our students, including a variety of peer-based support programs, some of which are affiliated with specific courses. Such can be an enormously helpful resource for PHYS 1420 students (e.g., math review help can be found at bethune.yorku.ca/math). See the main Bethune link (<http://bethune.yorku.ca/>) for further information.

Grading

For the fall term, your grade will be based upon 100 total possible points*. Point breakdowns are as follows:

- Homework & In-class activities– **20 points**
- Midterm – **25 points**
- Final Exam – **40 points**
- Laboratories – **15 points**

Once the semester starts, we will aim to post assignment grades to Moodle (details to be provided). Final grades (which will average both the F19 and W20 components) will be no lower than as listed below:

- 90 < points (90%-100%) = A+
- 80 < points (80%-89%) = A
- 75 < points (75%-79%) = B+
- 70 < points (70%-74%) = B
- 65 < points (65%-69%) = C+
- 60 < points (60%-64%) = C
- 55 < points (55%-59%) = D+
- 50 < points (50%-54%) = D

*Prof. Storry will provide a grading breakdown for W20 at a later date. Ultimately, your final grade for PHYS 1420 will be an evenly-weighted average of your fall and winter term grades, and also include your lab component.

~ 50 points (~50%) = E
points < 50 (0%-50%) = F

Homework (HW): Assignments will come in two different forms. For the first type, online assignments will be given on a (mostly) weekly basis via Sapling (<https://www.macmillanlearning.com/college/ca/digital/sapling>) the online provider tied to the course text). Details will be provided once the course starts. For the second type, several problems will be assigned at periodic intervals throughout the semester and written solutions will be handed in. They will be checked for completeness, and a subset of problems will be chosen at random and thoroughly graded. Your total homework graded will be a combination of these two components. Points may be deducted for lack of explanation/clarity/completeness, or if it is unclear that the student independently came up with their own solution. While students are not discouraged from working together, each student is expected to complete his or her own assignment. For further specifics, see Academic Honesty section below.

Exams: There will be two exams: one midterm and one (comprehensive) final exam. Exams will cover all topics dealt with in class during lecture and assigned reading, as well as the HW. While material from the labs will not be covered directly, salient topics in class relevant to the labs will be. Students will be allowed to bring a single page (double-sided) of notes with them for each exam. Note, as specified in the *lateness policy* below, there are no makeups.

Attendance: Students are expected to attend every scheduled class and be familiar with the University Class Attendance policy.

Tutorials: While not required, you are strongly encouraged to attend the weekly tutorial sessions. They will provide an opportunity to work together in groups, interact w/ the course TA, ask questions, etc. Further, advanced problems will be discussed, allowing for the chance to critically engage with course-related materials.

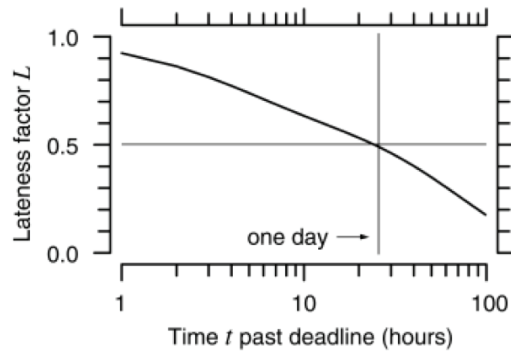
Extra Credit: There **MAY** be an opportunity for extra credit (up to 5 points, or 5% of your F19 grade) involving computational methods using Matlab (see <https://www.mathworks.com/academia/tah-portal/york-university-40713236.html>). Details will be announced later in the semester.

Course Policy

Lateness

Unfortunately, some deadlines in the *real world* are quite harsh and allow no room for lateness. Given such, this course will implement two policies:

1. **There will be no makeup exams.** It is very important that you are present in class for the exams (as these determine 65% of your final grade!). Exceptions in extreme cases may be granted, but only upon prior approval or for an (excused) emergency.
2. All other due dates (i.e., for HW) will be subject to a severe lateness penalty. The grade for a particular



assignment will be multiplied by a lateness factor

$$L = 0.3e^{-t/4} + 0.7e^{-t/72}$$

where t is the number of hours late. See figure for the lateness factor plotted as a function of time. Notice that the maximum grade for a report that is more than ONE DAY LATE is less than 50%.

Academic Honesty, University Attendance Policies and Classroom Conduct

An important part of the course is discussing concepts and problems with other people. This makes it important to think about what constitutes plagiarism. Here are some guidelines. You can discuss assigned problems with others as much as you want, but in the end you must do your own work. If you copy someone else's solution, you are plagiarizing. If you find yourself looking at someone else's solution writing your own, you are probably plagiarizing. If you memorize someone else's solution and write it in without understanding how it works, you are plagiarizing. You should think of the HW as problem solving, and it is important that you provide your own solutions to assigned problems. Writing out a solution independently is a good way to test your understanding of the solution. That said, discussions are an important part of solving difficult problems, and it is inevitable and acceptable that different people's solutions will end up being similar in some ways.

Students at York University are expected to conform to the standards of conduct established in the Code of Student Rights and Responsibilities. Students found to be in violation of the Code are subject to disciplinary action. Students are responsible to be informed of University policies:

<http://www.yorku.ca/secretariat/policies/index-policies.html>

Regarding the Academic Honesty, students found to be in violation of the Code are subject to sanctions that will be determined by the severity of the infraction. The Code of Academic Integrity will be enforced in all areas of the course, including projects, tests, and homework. For assignments (e.g., HW, labs), students can (and are encouraged to) work together in groups. However, each student will be expected to turn in their own individual assignments and (reasonably) acknowledge contributions made by others.

Students are expected to attend every scheduled class and be familiar with the University Class Attendance policy. It is the student's responsibility to keep informed of any announcements, syllabus adjustments, or policy changes made during scheduled classes. Students may be administratively dropped if they miss more than three classes and/or the first class.

Students Who Require Reasonable Accommodations Based on Disability

Students who feel that there are extenuating circumstances that may interfere with their ability to successfully complete the course requirements are encouraged to discuss the matter with the Course Director **as soon as possible**.

Students with physical, learning or psychiatric disabilities who require reasonable accommodations in teaching style or evaluation methods should consult with the Office for Persons with Disabilities (OPD) and ensure that requests for appropriate accommodations are arranged with the Course Director early in the term.

Important Dates (2019)

First Day of Class	Sept. 4
Add Deadline	Sept. 17
Fall Reading Week	Oct. 14–18 (no classes)
Midterm Exam	Oct. 21
Drop Deadline	Nov. 8
Last Day of Class	Dec. 2
Final Exam	TBD