

York University
PHYS 2010: Classical Mechanics (3 credits)
Winter 2020

Time & Location

Lecture: TTh 10:00–11:30 (DB 0014)

Recitation: F 9:30-10:30 (DB 0014)

Instructor: Christopher Bergevin

Office: Petrie 240

Email: cberge@yorku.ca

Office Hours: Check course website (or email for appt.)

Course Website:

<http://www.yorku.ca/cberge/2010W2020.html>

Textbook:

Elements of Newtonian Mechanics, (2000, 3rd Ed.) JM Knudsen & PG Hjorth (*Springer*)

Prerequisites: SC/PHYS 1010 6.00, or SC/PHYS 1800 3.00 and SC/PHYS 1801 3.00, or SC/ISCI 1310 6.0 or a minimum grade of C in SC/PHYS 1410 6.00 or SC/PHYS 1420 6.00; SC/MATH 1014 3.00 or equivalent; SC/MATH 1025 3.00 or equivalent; SC/MATH 2015 3.00 or equivalent. Corequisite: SC/MATH 2271 3.00. PRIOR TO FALL 2010: Prerequisites: SC/PHYS 1010 6.00, or a minimum grade of C in SC/PHYS 1410 6.00 or SC/PHYS 1420 6.00; SC/MATH 1014 3.00 or equivalent; SC/MATH 1025 3.00 or equivalent; Corequisite: SC/MATH 2015 3.00.

Course Theme/Topics: Newtonian mechanics of mass points and rigid bodies. Accelerated reference frames and rotational motion, centrifugal and Coriolis forces. Central force motion in celestial mechanics. Euler's equations: precession and nutation in the gyroscope. Topics will include (but are not limited to):

- 1-D to 3-D motion (via differential equations)
- Newton's Laws
- Various coordinate systems
- Oscillations (incl. complex numbers)
- Harmonic oscillator
- Nonlinear dynamics
- Gravitation
- Collisions

- Reference frames & fictitious forces
 - Rotational motion
 - Waves
 - Diffusion (& elements of statistical mechanics)
-

Course Policy

Recitation: In addition regular course lectures, an additional *recitation* session will be given. This weekly hour-long session will allow students to ask questions and tackle new problems provided with the intention to strengthen understanding of course material. Students who are unable to attend recitation will not be penalized, and no new material will be introduced there. However, all students are strongly encouraged to participate.

Grading

There will be 100 total possible points in the course. Point breakdowns are as follows:

- Homework – **25 points**
- Exams – **60 points**
- Project – **15 points**

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

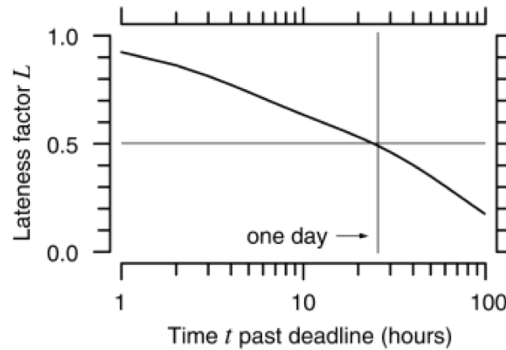
Homework: Assignments will be given on a regular basis (there will be ~7–8 assignments). Each student is expected to turn in his or her own assignment. Points may be deducted for lack of explanation/clarity/completeness. It is crucial for students to spend considerable effort on these problem sets in order to be successful in the class.

Exams: Two exams will be given, the first being an in-class midterm on **Feb. 13** and the second a 3 hour final during the assigned final exam time (TBD). Note, as specified in the *lateness policy* below, there are no makeups.

Project: There will be a computational-centric project that will have students working in (randomized) groups to create a testable hypothesis and program/run a numeric simulation relevant to a topic covered in

(or relevant to) class. Details will be provided later in the semester. In general, Matlab will be utilized in class, but students are free to use other programming languages as they see fit (e.g., Python).

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 and the project presentation (as these determine more than 75% 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, lab reports, and project deadlines) 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 and University Attendance Policies

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.

Classroom Conduct

Students at York University are expected to conform to the standards of conduct established in the Code of Student Rights and Responsibilities. Prohibited conduct includes:

1. All forms of student academic dishonesty, including cheating, fabrication, facilitating academic dishonesty, and plagiarism.
2. Interfering with University or University-sponsored activities, including but not limited to classroom related activities, studying, teaching, research, intellectual or creative endeavor, administration, service or the provision of communication, computing or emergency services.
3. Endangering, threatening, or causing physical harm to any member of the University community or to oneself or causing reasonable apprehension of such harm.
4. Engaging in harassment or unlawful discriminatory activities on the basis of age, ethnicity, gender, handicapping condition, national origin, race, religion, sexual orientation, or veteran status, or violating University rules governing harassment or discrimination.

→ Students found to be in violation of the Code are subject to disciplinary action.

Students Who Require Reasonable Accommodations Based on Disability

Students planning to use accommodations for this course should privately identify themselves to their instructor within the first few days of class.

Important Dates (2020)

First Day of Class	Jan. 6
Add Deadline	Feb. 3
Midterm Exam	Feb. 14
Winter Reading Week	Feb. 17–21 (no classes)
Drop Deadline	Mar. 13
Last Day of Class	Apr. 3
Final Exam	TBD