



**REVISED COURSE OUTLINE FOR REMOTE LEARNING**

To account for the necessary transition to remote learning from March 13 onward, adjustments have been made to assessment deadlines and requirements so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff). If you are unable to meet the deadlines or requirements specified, please connect with your course instructor to work out alternative dates/assessments.

1. **Course:** PHYS 343, Classical Mechanics II - Winter 2020

Lecture 01: TR 12:30 - 13:45 - Remote Learning (check with your instructor or coordinator for details)

| Instructor      | Email             | Phone        | Office | Hours                 |
|-----------------|-------------------|--------------|--------|-----------------------|
| Dr. Jeroen Stil | jstil@ucalgary.ca | 403 220-8015 | SB 519 | Wednesdays, 2pm - 4pm |

**Course Site:**

D2L: PHYS 343 L01-(Winter 2020)-Classical Mechanics II

**Note:** Students must use their U of C account for all course correspondence.

2. **Requisites:**

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

**Prerequisite(s):**

Physics 341.

3. **Grading:**

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar. In determining the overall grade in the course the following weights will be used:

| Component(s)  | Weighting % |
|---|-------------|
| Midterm exam, February 25, in class   | 30          |
| Assignments   | 35          |
| Final exam, electronic timed exam in D2L at time scheduled by the registrar | 35          |

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

|                           | A+   | A    | A-   | B+  | B   | B-   | C+   | C   | C-  | D+   | D    |
|---------------------------|------|------|------|-----|-----|------|------|-----|-----|------|------|
| <b>Minimum % Required</b> | 93 % | 85 % | 80 % | 75% | 70% | 65 % | 60 % | 55% | 50% | 45 % | 40 % |

Grading of individual course components depends in part on completeness, clarity and conciseness of the solution provided. Illegible responses or responses that are not offered in a logical, structured way will receive a lower or even a zero grade.

The percentage grades required to earn a particular letter grade for the course are strict minimum thresholds applied to the weighted mean percentage course grade. There is no rounding. For example, a mean percentage grade of 79.99% for the course translates into a letter grade B+.

Any missed component of course work receives a zero grade.

Bear in mind that a grade of D+ or below will result if a student does not receive a passing grade for the final exam. If a passing grade for the final exam is not obtained, the maximum possible letter grade for the course is D+ irrespective of the weighted mean percentage grade for the course.

For every student, the TopHat assignment that received the lowest grade will be excluded from calculating the over-all assignment grade. This applies only to assignments done in the TopHat system.

#### 4. **Missed Components Of Term Work:**

The University has suspended requirements for students to provide evidence for reasons for absences so please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations. Please let your instructor know immediately if you are ill and cannot meet the deadlines specified.

Missed components of term work receive a zero grade without exception. This includes late assignments. If a documented valid reason for missed work is provided a solution will be offered that may include transfer of weight or an opportunity to finish the work at a later date at the discretion of the instructor. Such accommodation will only be considered if the request is made at the earliest possible opportunity by email to the instructor. For the duration of the COVID-19 crisis, a doctor's note or a declaration with a commissioner of oaths is not required.

Students are responsible for accurate and complete personal information in TopHat. This includes first name, last name, and UCID. Missing information can result in a missing (zero) grade for assignments.

It is not allowed to register more than one TopHat account per student for PHYS 343. Multiple accounts can be removed without notice, and credit for work will be lost.

#### 5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

#### 6. **Course Materials:**

Required Textbook(s):

Fowles & Cassiday, *Analytical Mechanics, 7th edition*: Brooks/Cole, Cengage Learning.

The text book for PHYS 343 is the same as for PHYS 341. Scanned lecture notes will be posted on D2L. The posted lecture notes are provided as a study aid, not as a replacement for the text book. In order to be successful in the course, students are expected to study the set sections of the text book. It is recommended to consult the instructor if you consider buying an older edition of the text.

#### 7. **Examination Policy:**

In-class exams will be closed book. Use of a scientific calculator is allowed and highly recommended for exams. Calculator Apps on portable devices are not allowed on exams. Use of any device with wireless capability, including smart watches, is not allowed on the exams. Devices with a USB or equivalent port, or a complete keyboard, are not allowed as calculators on the exams.

The timed final exam in D2L will be open book. Students are reminded that communication during the exam is a form of academic misconduct. Students are required to submit their work for the final exam through D2L dropbox within 12 hours of the final exam in order to receive partial marks for methodology.

PHYS 343 teaches methods to solve a broad class of physics problems. Exams can contain applications that were not explicitly covered in the lectures or the assignments for the purpose of testing your ability to apply the problem solving methodology taught in this course.

**All exams are cumulative.**

Students should also read the Calendar, [Section G](#), on Examinations.

#### 8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course

## 9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

Grading depends in part on clarity and conciseness of the answers provided. This includes the structure and logic progression of solutions. No points are awarded for unclear or illegible answers. No points will be subtracted for minor grammatical, style, or spelling errors.

## 10. Human Studies Statement:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

## 11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. **Non-academic grounds are not relevant for grade reappraisals.** Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar

b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

## 12. Other Important Information For Students:

a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).

b. **SU Wellness Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see [www.ucalgary.ca/wellnesscentre](http://www.ucalgary.ca/wellnesscentre) or call [403-210-9355](tel:403-210-9355).

c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (<https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email ([svsa@ucalgary.ca](mailto:svsa@ucalgary.ca)) or phone at [403-220-2208](tel:403-220-2208).

d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under [Section K](#). Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples.**

e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the

information on [assembly points](#).

- f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at [procedure-for-accommodations-for-students-with-disabilities.pdf](#).

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Physics & Astronomy, Dr. David Feder by email [phas.ahugrd@ucalgary.ca](mailto:phas.ahugrd@ucalgary.ca) or phone 403-220-8127. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See [Section E.4](#) of the University Calendar.

- g. **Safewalk:** Campus Security will escort individuals day or night (See the [Campus Safewalk](#) website). Call [403-220-5333](tel:403-220-5333) for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- h. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.
- i. **Student Union Information:** [VP Academic](#), Phone: [403-220-3911](tel:403-220-3911) Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca). SU Faculty Rep., Phone: [403-220-3913](tel:403-220-3913) Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca). [Student Ombudsman](#), Email: [ombuds@ucalgary.ca](mailto:ombuds@ucalgary.ca).
- j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.
- k. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.
- l. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.

### 1. If you need help.

Part of the challenge of PHYS 343 is amount of material that must be covered in a single term. Time to practice problems during lectures is extremely limited. If you need clarification on something, come see the instructor immediately. Do not wait until the last moment.

Detailed course information will be posted on D2L. Check D2L for important dates like due dates for assignments, midterm information, etc.

**Email to the instructor is strictly for issues related to the organization of the course, or to book an appointment. Questions about course material cannot be effectively answered by email. Do not send scanned notes by email.**

Questions about course material can be asked immediately after class, during office hours, or by appointment. The instructor will make an effort to stay after lectures until all questions have been answered.

The course TA, Robert Bell, will hold flexible office hours by appointment, for questions about course content.

During the on-line course delivery as a result of the COVID-19 virus, office hours will be held in town-hall style zoom meetings. Details to be announced.

Lectures delivered through zoom will be recorded, and will be posted on D2L for the sole purpose of studying for PHYS 343, if technology permits.

## 2. TopHat.

We will use TopHat in this course for assignments. TopHat is available free of charge for registered students. The instructor will assume that you are familiar with TopHat. If you have any questions or problems, please ask the instructor.

**The course ID for TopHat is PHYS343W2020. The join code is 682283.**

**You must have registered for the course in TopHat by Friday, January 17**

**Assignments for PHYS 343 will be administered through TopHat. Details will be posted on D2L. Missed assignments will be awarded a zero grade.**

## 3. Course Learning Incomes

- Vector algebra and how it is used in examining physical systems
- Differential equations: separation of variables for first order ODE's, methods for second order ODE's with constant coefficients
- Time dependent forces, velocity dependent forces, position dependent forces
- Potential energy functions, conservation of mechanical energy, equilibrium conditions, turning points for bound motion
- Forced damped simple harmonic oscillator, phase space and phase space portraits, perturbations of dynamical variables.
- Central forces, angular momentum conservation, Kepler's laws, bound and scattering motions, effective potentials
- Non-inertial frames, linearly accelerated motion, rotational motion, inertial forces.

## 4. Syllabus

Topics to be covered in this course include:

### Chapter 5. Noninertial reference systems

1. Accelerated coordinate systems
2. Inertial forces
3. Rotating coordinate systems
4. Dynamics of a particle in a rotating coordinate system.

### Chapter 7. Dynamics of Systems of Particles

1. Centre of mass
2. Linear momentum
3. Angular momentum
4. Kinetic energy
5. Reduced mass of two interacting bodies
6. Collisions in Lab and Centre-of- Mass frames
  - a. Elastic collisions
  - b. Inelastic collisions

### Chapter 8. Planar Motion of Rigid Bodies

1. Centre of mass
2. Moment of inertia
3. Perpendicular and Parallel axis Theorems

4. Applications
  - a. Physical Pendulum
  - b. Rolling motion

**We will cover Chapter 10 before Chapter 9**

Chapter 10. Lagrangian and Hamiltonian Dynamics

1. Variational Principles
2. Generalized coordinates
3. Kinetic and Potential energy
4. Lagrange's equations of motion
5. Generalized momenta
6. Hamilton's equations

Chapter 9. 3D Motion of Rigid Bodies

1. 2D Concepts generalized to 3D
  - a. Moment of inertia tensor
  - b. Angular momentum
  - c. Rotational kinetic energy
2. Principal axes of rotating objects
3. Euler's equations of motion
4. Applications

**Course Outcomes:**

- know how to compute mechanical properties of multi-particle systems
- able to analyze collisions in lab and centre-of mass frames
- recognize the concept of a rigid body and its properties
- able to calculate moments of inertia
- apply Newton's 2nd law for rotating systems
- understand general methods in calculus of variations
- understand and use Lagrangian methods to derive equations of motion
- understand and use Hamiltonian methods to derive equations of motion

Electronically Approved - Mar 17 2020 19:02

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**Department Approval**

Electronically Approved - Mar 17 2020 19:13

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**Associate Dean's Approval for alternate final examination arrangements or remote learning**