



## COURSE OUTLINE

### 1. **Course:** PHYS 221, Mechanics - Fall 2022

Lecture 01 : MWF 12:00 - 12:50 in CHC 119

Instructor	Email	Phone	Office	Hours
Dr. Rene Plume	rplume@ucalgary.ca	contact via email only	SB 517	Wednesdays, 2:30-4:00 pm

Lecture 02 : MWF 15:00 - 15:50 in CHC 119

Instructor	Email	Phone	Office	Hours
Dr. Laura Mazzino	laura.mazzino@ucalgary.ca	403 220-8648	SB 533	Monday 13:30-14:30

Lecture 03 : TR 12:30 - 13:45 in ST 027

Instructor	Email	Phone	Office	Hours
Professor Rachid Ouyed	rouyed@ucalgary.ca	403 690-8418	SB 515	TBA

### **Coordinator(s)**

Name	Email	Phone	Office	Hours
Dr. Laura Mazzino	laura.mazzino@ucalgary.ca	403 220-8648	SB 533	Monday 13:30-14:30

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

### **In Person Delivery Details:**

This course has two in-person components: 1.1) Lectures and 1.2) Laboratories (Labs).

1.1) LECTURES: There are 5 Lecture Sections delivered in English: L01-L03 for PHYS 211 and L01-L02 for PHYS 221, which have weekly lectures at different times of the week.

PHYS 211 L01-L03 meet 4 times a week and PHYS 221 L01-L03 meet 3 times a week.

Note: All components of PHYS 221 L03 are delivered in French; this course outline does NOT apply for that section (PHYS 221 L03 has its own course outline, in French).

All PHYS 211/221 classes will meet in person and will not be recorded. The schedule for the topics of the lectures is shown in Table 1.

### 1.2) LABORATORIALS (LABS)

There are multiple Lab Sections, which are held on different days and times of the week.

**A student must enrol in one of the Lecture Sections and one of the Lab Sections, respectively.**

Note: Students enrolled in PHYS 221 L03 MUST enrol in the FLIP lab section (B46), delivered in French.

All laboratories will be performed in person. The schedule for laboratories is shown in Table 2.

The lab sessions are designed as group work to be completed in real-time.

Lab manuals will be posted on the PHYS211/221 Lab D2L shell (opens September 12, 2022). Lab manuals can be completed in hard copy or electronically. Each week, students are responsible for bringing a printed or electronic copy of the corresponding lab manual and they must complete it before the end of the lab section.

Additionally, students are required to fill in, the day before of their respective lab, a "pre-lab checklist section" to present to the TAs for evaluation, to be granted access to the labs, as indicated in the lab manuals.

### **Re-Entry Protocol for Labs and Classrooms:**

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found [here](#).

### **Course Site:**

D2L: PHYS 211/221 L01\_L03-(Fall 2022)-Mechanics

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

Communication guidelines: Students are required to read and agree to the Communication Guidelines for this course, as posted on D2L. **Students MUST use their UCalgary email account for any communications.**

Students must include in the subject line:

- a) the course code (examples: PHYS211 F2022),
- b) their first and last name and
- c) their UCID number.

Correspondence from private accounts, other than the UofC official accounts, or without the required information in the subject line will NOT be answered.

**For communications with the course coordinator, please use [phys211221@ucalgary.ca](mailto:phys211221@ucalgary.ca) rather than [laura.mazzino@ucalgary.ca](mailto:laura.mazzino@ucalgary.ca). Communications sent to [laura.mazzino@ucalgary.ca](mailto:laura.mazzino@ucalgary.ca) related to issues for the course coordinator to evaluate will not receive a response. When emailing [phys211221@ucalgary.ca](mailto:phys211221@ucalgary.ca), you must include in the subject line all the mandatory information outlined above PLUS your lecture section and for lab related issues, please insert your lab section.**

When communicating with the instructors and course coordinator, please allow 3-4 work days for a response to messages and e-mail inquiries.

Technical solutions to homework questions will not be provided by email. Students are expected to ask these types of questions in person.

### **Equity Diversity & Inclusion:**

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Physics and Astronomy EDI Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues, please reach out to our Associate Head EDI, Claudia Gomes da Rocha ([claudia.gomesdarocho@ucalgary.ca](mailto:claudia.gomesdarocho@ucalgary.ca))

## **2. Requisites:**

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

### **Prerequisite(s):**

Physics 30; and Mathematics 30-1 or Mathematics 2 (offered by Continuing Education); and Mathematics 31.

### **Antirequisite(s):**

Credit for more than one of Physics 211, 221, or 227 will not be allowed.

## **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:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Quizzes [3] <sup>1</sup>	30%	Ongoing		
Laboratories [8] <sup>2</sup>	20%	Ongoing		
Assignments [8] <sup>3</sup>	20%	Ongoing		
2% Top Hat Bonus <sup>4</sup>	0%	Ongoing		
Registrar Scheduled Final Exam <sup>5</sup>	30%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

<sup>1</sup> 3 quizzes worth 10% each: Friday, October 7; Friday, November 4; Friday, December 2. IN-PERSON and in your scheduled Lecture Section. Administered on D2L. Students MUST BRING THEIR OWN ELECTRONIC DEVICE AND CALCULATOR to complete these assessments in class. Hard copies of the quizzes will be available for those students without an electronic device; students without an electronic device can apply for an accommodation by contacting the course coordinator if they do so at the beginning of the semester and/or AT LEAST A WEEK prior to the quiz.

<sup>2</sup> 8 Labs. \*\*\*LOWEST GRADE WILL BE DROPPED\*\*\*

<sup>3</sup> 8 assignments administered using D2L. Due on Wednesdays 5 pm. \*\*\*NO LATE ASSIGNMENTS ACCEPTED BUT THE LOWEST GRADE WILL BE DROPPED\*\*\*

<sup>4</sup> 2% Top Hat Bonus: In-class Top Hat questions (10 minimum questions per semester)

<sup>5</sup> IN-PERSON 2 hrs. closed-book exam. Final exam is scheduled by the Office of the Registrar. Information about date/time of the final exam will be given to students by the last week of classes. Students MUST BRING a non-communicating CALCULATOR, of any kind, including graphing or programmable calculators. See the EXAM POLICY section for further details about the final exam.

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>	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	50 %	45 %

**The percentage grade for the course must be equal to or larger than the stated value to obtain a certain letter grade, without rounding.**

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

#### Assignment 0

Students will complete an initial "Assignment 0" before the second class. This assignment is an initial assignment regarding important information presented in this course outline and is set up for unlimited attempts. Assignment 0 will become available on September 1, 2022, in the D2L assignment section, under "quizzes" and will have a "0%" grade associated with it. However, the completion of Assignment 0 with 100% is a requirement to 'unlock' the rest of the material for the course on D2L. If a student forgets to answer this assignment or did not score 100% yet, their D2L shell will show empty. After achieving 100% in this initial assignment, all available content for the course (and subsequent content uploaded throughout the course) will appear automatically.

The University of Calgary offers a [flexible grade option](#), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

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

The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to

arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

**\*\*\*\* PLEASE NOTE: NO LATE ASSIGNMENTS WILL BE ACCEPTED \*\*\*\***

\*\* A grade of zero will be assigned to any assignment that misses the due date/time deadline. \*\*

**\*\* The one lowest assignment grade, however, will be dropped.\*\***

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

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

## 6. Course Materials:

Required Textbook(s):

Randall D. Knight, *Physics for Scientists and Engineers: A Strategic Approach, 5th Ed*: Pearson.

NOTES:

**Access to the textbook is fundamental for success in this course** but is not required. Students may opt to use older editions of the textbook if they prefer, but the student will be responsible for identifying any differences or changes between old editions and the edition adopted by the course.

PURCHASE of ACCESS CODE for Pearson MASTERING PHYSICS supporting materials is **OPTIONAL and at the discretion of the students**. Students are **NOT** required to purchase an access code for this class, as it was required in previous years.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

## 7. Examination Policy:

No aids are allowed on tests or examinations.

**The quizzes and final exams are IN-PERSON closed-book exams.**

**Students are only allowed to bring the provided formula sheet with NO edits or comments/notes on it.**

Students MUST BRING to the final exam and all quizzes a non-communicating CALCULATOR, of any kind, including graphing or programmable calculators.

The use of camera devices, MP3 Players and headphones, or wireless access devices such as cell phones, Blackberries, iPads etc., during examinations, will not be allowed. The use of the internet apart from connecting and launching D2L or the use of notes in electronic format will not be allowed during the quizzes and final exam.

FINAL EXAM: The final exam will be an in-person hard copy multiple choice exam.

QUIZZES: Quizzes are IN-PERSON and in your scheduled Lecture Section.

Quizzes will be conducted on the D2L environment. Students MUST BRING THEIR OWN (well charged) ELECTRONIC DEVICE to complete the quizzes.

Hard copies of the quizzes will be available for those students without an electronic device to complete the assessments. Students without an electronic device can apply for an accommodation by contacting the course coordinator if they do so at the beginning of the semester and/or AT LEAST A WEEK prior to the quiz.

The use of the internet, apart from connecting and launching D2L, or the use of notes in electronic or hard copy format will not be allowed during the quizzes.

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.

## 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 Services:** For more information, see their [website](#) or call [403-210-9355](#).
- c. **Sexual Violence:** 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](#). The complete University of Calgary policy on sexual violence can be viewed [here](#).
- d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)  
[Student Academic Misconduct Policy and Procedure](#)  
[Faculty of Science Academic Misconduct Process](#)  
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

**e. Academic Accommodation Policy:**

It is the student’s responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Dr. David Feder by email [phas.ahugrd@ucalgary.ca](mailto:phas.ahugrd@ucalgary.ca) preferably 10 business days before the due date of an assessment or scheduled absence.

**f. 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.

**g. Student Union Information:** [SU contact](#), Email SU Science Rep: [sciencerep1@su.ucalgary.ca](mailto:sciencerep1@su.ucalgary.ca), [Student Ombudsman](#)

**h. 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.

**i. 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.

**TABLE 1: LECTURE SCHEDULE**

Week	Dates	Topics
1	Sep 6 - Sep 9	Intro classes (might include topics from Week 2)
2	Sep 12 - Sep 16	1.8 Units and significant figures
		3.1 Scalars and vectors
		3.2 Using vectors
		3.3 Coordinate systems and vector components
		3.4 Unit vectors and vector algebra (dot and cross product)
		1.1 Motion diagrams
		1.2 Models and modelling
		1.3 Position, Time, and displacement
3	Sep 19 - Sep 23	1.4 Velocity
		1.5. Linear acceleration
		1.6 Motion in One Dimension
		1.7 Solving Problems in Physics
		2.1 Uniform motion
		2.2 Instantaneous velocity
		2.3 Finding position from velocity
		2.4 Motion with constant acceleration
		2.5 Free fall
		2.6 Motion on an inclined plane
		2.7 Instantaneous acceleration
Sep 30th National Day for Truth and Reconciliation. No lectures. University is closed		
4	Sep 26 - Sep 30	4.1 Motion in two dimensions
		We do not cover 4.3 Relative motion

		4.2 Projectile Motion (lecture 1)
		4.2 Projectile Motion (lecture 2)
5	Oct 3 - Oct 7	4.4 Uniform circular motion
		4.5 Centripetal acceleration
		4.6 Non-uniform circular motion
		5.1 Force
		5.2 A short catalog of forces
		5.3 Identifying forces
		5.4 What do forces do?
<b>***Quiz 1 (Week 1-4 Topics) - Friday October 7<sup>th</sup>, at lecture time***</b>		
Oct 10 <sup>th</sup> Thanksgiving Day. No lectures. University is closed		
6	Oct 10 - Oct 14	5.5 Newton's Second Law
		5.6 Newton's First Law
		5.7 Free-Body Diagrams
		6.1 Equilibrium model
		6.2 Using Newton's Second Law
		6.3 Mass, weight, and Gravity
		6.4 Friction
		6.5 Drag
7	Oct 17 - Oct 21	6.6 More examples of Newton's 2nd Law
		7.1 Interacting Objects
		7.2 Analyzing Interacting Objects
		7.3 Newton's Third Law
8	Oct 24 - Oct 28	7.4 Ropes and pulleys
		7.5 Examples of interacting-object problems
		8.2 Uniform circular motion
		8.3 Circular orbits
		8.4 "Why does Water Stay in the Bucket" subsection
		8.5 Nonuniform circular motion
9	Oct 31 - Nov 4	12.1 Rotational motion
		12.5 Torque
		12.10 The vector description of rotational motion
		12.8 Static equilibrium
<b>***Quiz 2 (Weeks 5-8 Topics) - Friday November 4<sup>th</sup>, LECTURE TIME***</b>		
10	Nov 7 - Nov 11	TERM BREAK
Nov 7 - Nov 11 TERM BREAK, no lectures		
Nov 11th is Remembrance Day - University is closed		
11	Nov 14 - Nov 18	9.1 Energy overview
		9.2 Work and kinetic energy for a single particle
		9.3 Calculating the work done
		9.4 Restoring forces and the work done by a spring
		9.5 Dissipative forces and thermal energy
		9.6 Power
12	Nov 21 - Nov 25	10.1 Potential energy
		10.2 Gravitational potential energy
		10.3 Elastic potential energy
		10.4 Conservation of energy
13	Nov 28 - Dec 2	10.5 Energy diagrams
		10.6 Force and potential energy
		10.7. Conservative and non-conservative forces
		10.8 The energy principle revisited
<b>***Quiz 3 (Weeks 9-12 Topics) - Friday Dec 2<sup>th</sup>, LECTURE TIME***</b>		
14	Dec 5 - Dec 7	11.1 Momentum and Impulse
		11.2 Conservation of momentum
		11.3 Collisions
		11.4 Explosions

**TABLE 2: LABORATORY SCHEDULE**

Dates	Labatorial	LAB TOPIC
Sep 6 - Sep 9	--	NO LABATORIAL
Sep 12 - Sep 16	--	NO LABATORIAL

Sep 19 - Sep 23	Labatorial 1	Introduction to the Equipment
Sep 26 - Sep 30	Labatorial 2	Motion on an Inclined Plane
Oct 3 - Oct 7	Labatorial 3	Projectile Motion
Oct 10 - Oct 14	--	NO LABATORIAL
Oct 17 - Oct 21	Labatorial 4	Circular Motion
Oct 24 - Oct 28	--	NO LABATORIAL
Oct 31 - Nov 4	Labatorial 5	Newton's Second Law (Atwood Machine)
Nov 7 - Nov 11	--	NO LABATORIAL
Nov 14 - Nov 18	Labatorial 6	Static Equilibrium
Nov 21 - Nov 25	Labatorial 7	Work-Kinetic Energy Theorem
Nov 28 - Dec 2	Labatorial 8	Conservation of Energy/Exploring Concepts of Momentum
Dec 5 - Dec 7	--	NO LABATORIAL

**Course Outcomes:**

- Upon completion of the course students should be able to: apply vector notation and algebra in kinematics and dynamics problems in one and two dimensions;
- Develop mathematical models of physical situations;
- Exploit and use principle of conservation of energy and momentum;
- Carry out calculations symbolically (in terms of physical variables) and numerically (using appropriate values and their units);
- Obtain and analyze experimental data, and relate them to physical laws governing kinematics and dynamics;
- Communicate and collaborate effectively within a team environment.

Electronically Approved - Aug 31 2022 23:59

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**Department Approval**