



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 321, Harmonic Motion, Waves, and Rotation - Winter 2020

Lecture 01: MWF 09:00 - 09:50 - Remote Learning (check with your instructor or coordinator for details)

Instructor	Email	Phone	Office	Hours
Dr. Anna Harlick	anna.harlick@ucalgary.ca	403 220-8648	SB 533	ONLINE - ZOOM SESSION MONDAY, 9:00 am - 10:00 am+ by appt.

Lecture Sections: L01: MWF 09:00-09:50 | TI STUDIO A

Tutorials: L01: R 12:30 - 14:20 | CHF 214

Course Website: d2l.ucalgary.ca

Departmental Office: SB 605, 403-220-5385, phasugrd@ucalgary.ca

MyLabandMastering Course ID - UOFCPHYS321W20

TopHat Course ID: W2020PHYS321, Join Code: **656067**

Course Site:

D2L: PHYS 321 L01-(Winter 2020)-Harmonic Motion, Waves, and Rotation

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 211 or 221 and Mathematics 211 or 213 and Mathematics 267 or 277.

Antirequisite(s):

Credit for Physics 321 and 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:

Component(s)	Weighting %	Comments
		See the schedule at the end of the outline for details.
Assignments (6)	15%	See section a) for the details [Assignments #5 and #6 are now both open and due THE LAST DAY OF CLASSES , April 15th, 2020 at 11:59 pm] See the schedule at the end of the outline for details.
Mini Quizzes (5 -> 4)	10%	See section b) for the details [As 4 out of 5 mini quizzes have been administered, the final grade will be calculated using them. The weight of each quiz is not 2.5%. If you missed any quizzes, see section b) for details]
Activities	10%	See section c) for the updated details
Presentation	5%	See section d) for the updated details
		Midterm 1 - February 10th , 2020, IN CLASS
		Midterm 2 - March 18th , 2020, ONLINE
Midterm Tests	25% OR 35%	<i>Original Note: In final grade calculation the midterm with the higher score will be worth 15% and the midterm with the lower score will be worth 10%.</i>
Final Exam	35% OR 25% OR	Take-home exam. Released during the last scheduled class (9:00 am on April 15th, 2020) and due at the end of originally scheduled by the registrar Final Exam (3:00 pm on Saturday, April 18th.)

NOTE: Due to the extenuated circumstances students can pick from the following options for the semester evaluation:

If the both midterm grades are higher than the Final Exam grade, the midterms are worth 35% and the final exam is worth 25% in the final grade calculation. Keeping the weight differential between midterms in mind, the midterm in the higher score will be worth 21% ($0.6 \times 35\%$) and the midterm with the lower score will be worth 14% ($0.4 \times 35\%$). The summative assessment calculation will be: $(0.21 \times M_h + 0.14 \times M_l + 0.25 \text{ FE})$.

If the lower midterm grade is less than the Final Exam grade, the weight of the lower midterm (10%) will be added to the final exam. The summative assessment calculation will be $(0.15 \times M_h + 0.45 \times \text{FE})$. This is done to accommodate for the fact that the online midterm format was an experimental one, designed and written during the transitional week.

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

The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar.

The course grade expressed as a percentage is calculated from the percentage grades of the separate course components with weights indicated above. A table for the conversion of percentage grades for the course to letter grades is provided above. The percentage grade for the course must be equal to or larger than the stated value to obtain a certain letter grade, without rounding.

Any missed course component will be assigned a zero grade, unless a valid reason as described in the University Calendar is presented with appropriate documentation (for example a doctor's note).

a) Homework assignments: Six assignment due as listed in the schedule. Assignments will be done **online in Mastering Physics**. Students need to register in Mastering Physics (instructions below) **no later than Friday, January 17, 2020**. Detailed instructions are given below. Last-minute technical problems are not a valid excuse

for missing the due date of any assignment.

b) Mini-Quizzes - approximately every second Wednesday, following a closing of an assignment on Tuesday, a mini-quiz (10 minutes, 1 question based on a previous assignment) will be administered in the beginning of the class. There will be **4** mini quizzes (see schedule for dates), worth 2.5% each for total of 10%. In case they were missed, their weight gets automatically added to the final exam.

c) Activities - The **GRADED** activities will commence on **Monday, January 20th, 2020**. All activities will be accessed through the same TopHat site (W2020PHYS321, Join Code: 656067). The grades for individual components will be posted on D2L at the end of the semester). **ALL IN CLASS ACTIVITIES ARE DUE Mondays at 9:00 am.**

In class	Individual In-Class Assignments [2.5%]	Answers to variety of problems presented in class, both conceptual, qualitative, and quantitative. Intended for formative assessment. Submitted using both TopHat system and on paper. The TopHat submissions are marked 50% for participation and 50% for correctness. Hand-written submissions are not marked for correctness. These will open every Monday at 9:00 am and will be due 9:00 am on Monday of the following week. They will be related to the course material scheduled/released for that week.
	Group In-Class Assignments [2.5%]	Hand-written answers to variety of problems presented in class, both conceptual, qualitative, and quantitative; theoretical, experimental, and problem solving. Marked 50% for participation and 50% for correctness. No more will be administered after Monday, 16 March 2020. The grade of group assignments will be determined based on the to-date grade.
At home	Pre-Class Questions [2.5%]	Administered using TopHat. Released for the whole week on Friday of the previous week. Due at the beginning of assigned class. Marked 75% for participation and 25% for correctness. Will continue opening, every Monday, 9:00 am for the FOLLOWING week. Due the following Monday, 9:00 am.
	Post-class Questions [2.5%]	Administered using TopHat system. After each class a question regarding the material covered in class will be posted. The question will be available until the beginning of the next class. Marked 75% for the correctness and 25% for participation. Will continue opening, every Monday, 9:00 am for the current week. Due the following Monday, 9:00 am (they will be opened for ~12 days).

d) Presentation - Students will be responsible for scheduling (preferably during office hours) a 10 minute slot for a 5 minute presentation on a topic relevant to the course (of student's choice). Presentation will be delivered without any aids other than a whiteboard/ paper.

The time for presentations is extended to the last day of classes (April 15th, at 9:00 am, when the final exam is released). If you need to complete/redo the presentation (everyone who has already presented qualifies for the redo due to presenting in February), you will need to schedule a 10-minute skype call with the course instructor.

e) Tutorials/ Problem Solving Sessions - A tutorial is scheduled on Thursdays between 12:30 - 14:20 in CHF 214. The tutorials will consist of problem solving session that will last approximately 1h. After that time, the students will be presented with an exam-style question followed by a solution presented by the instructor, while the students will correct their work and submit it. The work will not be marked for correctness, but participation in tutorials will be worth total of **2% bonus** marks which can be used to supplement marks for components described in sections a), b) and c).

In weeks of March 23, March 30 and April 6, the worksheets for the scheduled tutorial session will be released on Monday, at 9:00 am. During the regularly scheduled tutorial session (12:30 pm - 14:20 pm), the course TA, Rana Z. will be available in ONLINE ROOMS.

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.

5. Scheduled Out-of-Class Activities:

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

6. **Course Materials:**

Recommended Textbook(s):

Randall A. Knight, *Physics for Scientists and Engineers, 4th edition* Pearson.

Online Course Components:

MyLabandMastering is used for assignments. Students must register in <https://www.pearsonmylabandmastering.com> portal to do the homework assignments. Do not wait until the due date of the first assignment to do this! Access to MyLabandMastering is included with the purchase of a new textbook. **You may already have access if you used the portal last year.** Please check this before proceeding. **If you choose to just access the Pearson assignments without purchasing access** to the study material please email Pearson at ucphysics.mastering@gmail.com to get an access code and registration instructions. You will be able to access only the assignments.

If you have a Pearson account, Sign In at <https://www.pearsonmylabandmastering.com> and enter your Username and Password. If you cannot remember your username or your password, click [Forgot your username or password?](#) and enter the email address you used to register. Your login name and password will be sent to your email.

Top Hat (tophat.com) is used for collecting responses to individual in-class assignments, completing pre-readings and post-class questions.

7. **Examination Policy:**

Midterm 1 covers material from the beginning of the semester **up to and including** material covered on February 3rd, 2020.

Midterm 2 covers material from February 5th **up to and including** material covered on March 9th, 2020.

Final Exam is cumulative.

Final Exam is the take home final exam and students can use any resources available to complete it.

Students should also read the Calendar, Section G, on Examinations.

All exams will include short-answer conceptual question and quantitative problems that could have multiple parts. Exam regulations as outlined in the university calendar are also applicable to the midterm exams.

Grading of exams will be based on clarity and completeness of the method used to derive the answer, and correctness of the answer including correct units. Illegible text will not be marked. Scratched-out sections of exam papers will not be marked.

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.

Exams will be graded based on clarity and completeness of answers provided. Otherwise, there is no assessment of student's writing in this course. 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.

Students will not be asked to participate in or be subjects of any 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 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) 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 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](#) Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: [403-220-3913](#) Email: sciencerep@su.ucalgary.ca. [Student Ombudsman](#), Email: 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.
- a. **Academic 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.*
- b. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on [assembly points](#).
- c. **Student Accommodations:** 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 http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.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 and Astronomy, Dr. David Feder, by email (dfeder@ucalgary.ca) or by phone (403.220.3638).
- d. **Safewalk:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- e. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, 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 also <http://www.ucalgary.ca/secretariat/privacy>.
- f. **Student Union Information:** [VP Academic](#) Phone: 220-3911 Email: suvpaca@ucalgary.ca.

Student Ombuds Office: 403 220-6420

Email: ombuds@ucalgary.ca; <http://ucalgary.ca/provost/students/ombuds>

- g. **Internet and Electronic Device Information:** You can assume that in all classes that you attend, your cell phone should be turned off unless instructed otherwise. Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.
- h. **U.S.R.I.:** At the University of Calgary, feedback provided by students through the Universal Student Ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference - please participate in USRI Surveys.

4. OTHER COURSE RELATED INFORMATION:

a. Course Description

Newtonian mechanics of rigid body rotation. Simple harmonic oscillations. Progressive waves in one dimension. Energy of a wave. Superposition. Standing waves. Static and dynamic fluids. Elasticity.

b. Course Learning Outcomes

- a. Students will be able to define and characterize rotational, oscillatory, wave and fluid motion.
- b. Students will be able to recognize and explain forces governing rotational, oscillatory and fluid motion as well as forces acting on an object in fluids.
- c. Students will be able to identify and mathematically describe rotational, oscillatory, wave, and fluid motion.
- d. Students will be able to give examples of oscillations, waves, as well as statics and dynamics of rigid bodies and fluids in real systems.
- e. Students will be able to apply calculus to solve quantitative and qualitative problems on rigid body rotation, oscillations, travelling and standing waves, and static and dynamic fluids.
- f. Students will be able to analyze real systems and apply appropriate models to simplify and evaluate them.

c. Course Learning Incomes

- a. Students can describe and analyze motion of a particle in one and two dimensions.
- b. Students are able to define Newton's Laws and state conditions of static equilibrium.
- c. Students are able to apply kinematic equations, Newton's Laws and conservation of momentum and mechanical energy principles to solve quantitative and qualitative problems.
- d. Students are able to solve systems of algebraic equations.
- e. Students are able to recognize and manipulate vectorial variables.
- f. Students can apply calculus to solve quantitative problems.

REVISED AND UPDATED Schedule:

Week	Dates	Topic	Important Items	Book Chapter
1	13-Jan-20	Course introduction		
	15-Jan-20	Rotational motion		12.1
	17-Jan-20	Rotation about the center of mass		12.2
2	20-Jan-20	Rotational energy	Assingment#1 Due Tue, Jan 21	12.3
	22-Jan-20	Calculating moment of inertia	MINI QUIZ #1	12.4
	24-Jan-20	Torque		12.5
	27-Jan-20	Torque		12.5
3	29-Jan-20	Rotational dynamics		12.6, 12.7
	31-Jan-20	Work and rotational kinetic energy		Course Notes
	3-Feb-20	Static Equilibrium	Assingment#2 Due Tue, Feb 4	12.8

4	5-Feb-20 Rolling Motion	MINI QUIZ #2	12.9
	7-Feb-20 Vectorial Description of Rotations		12.10
	10-Feb-20 MIDTERM 1		
5	12-Feb-20 Angular Momentum		12.11
	14-Feb-20 Angular Momentum		12.11
6	17-Feb-20		
	19-Feb-20	Reading Week. No Lectures/Tutorials.	
	21-Feb-20		
	24-Feb-20 Simple harmonic motion	Assingment#4 Due Tue, Feb 25	15.1
7	26-Feb-20 Simple harmonic motion	MINI QUIZ #3	15.2
	28-Feb-20 Energy in simple harmonic motion		15.3
	2-Mar-20 Dynamics of simple harmonic motion		15.4
8	4-Mar-20 Vertical oscillations		15.5
	6-Mar-20 Applications of SHM		Course Notes
	9-Mar-20 Pendulums	Assingment#5 Due Tue, Mar 10	15.6
9	11-Mar-20 Damped and Driven Oscillations	MINI QUIZ #4	15.7,15.8
	13-Mar-20 Traveling Waves		16.1-16.3
	16-Mar-20 MIDTERM 2		
10	18-Mar-20 Wave Equation		16.4, 16.6
	20-Mar-20 Sound intensity and intensity levels		16.5, 16.8
	23-Mar-20 Doppler effect		16.9
11	25-Mar-20 Waves in 2D and 3D. Superposition.		16.7,17.1
	27-Mar-20 Interference		17.5-17.7
	30-Mar-20 Standing Waves		17.2-17.4
12	1-Apr-20 Fluids.		14.1
	3-Apr-20 Pressure. Measuring and using pressure.		14.2-14.3
	6-Apr-20 Buoyancy		14.4
13	8-Apr-20 Buoyancy		14.4
	10-Apr-20	GOOD FRIDAY	
	13-Apr-20	EASTER MONDAY	
14	15-Apr-20 Fluid dynamics	Assignments #5 & #6 Due	
		Final Exam released.	14.5-14.6

Electronically Approved - Mar 22 2020 20:35

Department Approval

Electronically Approved - Mar 23 2020 08:47

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