UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF PHYSICS AND ASTRONOMY
COURSE OUTLINE

1. **Course:** Physics 321, Harmonic Motion, Waves, and Rotation Winter 2018

Instructor: Dr. Ania Harlick | SB 533 | anna.harlick@ucalgary.ca | Office Hours: TBD

Lecture Sections: L01: MWF 08:00-08:50 | TI STUDIO D/E

Tutorials: L01: R 14:00 – 15:30 | TI STUDIO D/E

Course Website: d2l.ucalgary.ca

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

MasteringPhysics Course ID – MPHARLICK32118

TopHat Course ID: W2018PHYS321, Join Code: 533497

2. **Prerequisites:** Physics 211 or 221 and Mathematics 211 or 213 and Mathematics 267 or 277 or 253 or Applied Mathematics 217.
Anti-requisites: Credit for Physics 321 and 227 will not be allowed.

3. **Grading:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments (6)	15%	See schedule on page 5 for due dates See section 3a for details
Mini Quizzes (5)	10%	See schedule on page 5 for due dates See section 3b for details
Activities	10%	See section 3c for details
Presentation	5%	See section 3d for details
Midterm Test	25%	**Thursday, March 1st , During Tutorial**
Final Exam	35%	To be scheduled by the Registrar's Office

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

Percentage to letter grade conversion scale:

≥ 95 %	A +	≥ 80 %	B +	≥ 65 %	C +	≥ 50 %	D +
≥ 90 %	A	≥ 75 %	B	≥ 60 %	C	≥ 45 %	D
≥ 85 %	A –	≥ 70 %	B –	≥ 55 %	C –	< 45 %	F

Any other 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 assignments are due at 23:59 on Sundays as listed on page 5 of this document. Assignments will be done **on-line in Mastering Physics**. Students need to register in Mastering Physics (instructions below) **no later than Friday, January 19, 2018**. 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 – every second Monday, following a closing of an assignment, a mini-quiz (10 minutes, 1 question based on a previous assignment) will be administered in the beginning of the class. There will be 5 mini quizzes (see schedule for dates), worth 2% each for total of 10%.

c) Activities The **marked** activities will commence on **Monday, January 22nd, 2018.**

In class	Individual Assignments [2.5%]	Answers to variety of problems presented in class, both conceptual, qualitative and quantitative. 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.
	Group Assignments [2.5%]	Hand-written answers to variety of problems presented in class, both conceptual, qualitative and quantitative. Marked 50% for participation and 50% for correctness.
At home	Pre-readings [2.5%]	Administered using D2L. Open once a week and are due at 23:59 on Sundays when there are no assignments due (see schedule on page 5).
	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.

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. The presentation can be delivered during **February** and **March** only. Students who deliver a presentation in February and are not happy with their assessment can redo it in March with a possibility of improving their grade. If the second presentation is less successful, the higher of the grades will be awarded.

e) Tutorials/ Problem Solving Sessions - A tutorial is scheduled on Thursdays between 2:00 pm – 3:30 pm in TI STUDIO D/E. 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 that could be used to supplement marks described in sections 3a), 3b and 3c.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize himself/herself with these regulations. See also Section E.6 of the University Calendar

5. **Scheduled out-of-class activities:** There are no scheduled out-of-class activities for this course.

6. **Course Materials:** *"Physics for Scientists and Engineers – a Strategic Approach"*, 4th Edition by Randall A. Knight, Pearson

Online Course Components:

Mastering Physics is used for assignments. Students must register in Mastering Physics to do the homework assignments. Do not wait until the due date of the first assignment to do this! Access to Mastering Physics is included with the purchase of a new textbook. **You may already have access if you used Mastering Physics in the Fall term or last year**. Please check this before proceeding. **If you choose to just access the MasteringPhysics 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 MasteringPhysics account, **Sign In** at http://www.masteringphysics.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 for MasteringPhysics. Your login name and password will be sent to your email.

If you have purchased the package with MasteringPhysics in the bookstore:

- Go to www.masteringphysics.com and click **Students** under **Register**.
- To register using the student access code above, Click **In US or Canada** under **Select Your Location**.
- Select **No, my course doesn't require an ID** Click **Next**.
- Select **Yes, I have an Access Code** Click **Next**.
- **License Agreement and Privacy Policy:** Click **I Accept** to indicate that you have read and agree to the license agreement and privacy policy.
- Select the appropriate option under "Do you have a Pearson Education account?" Continue to give the requested information until you complete the process. The **Confirmation & Summary** page confirms your registration. This information will also be emailed to you for your records. You can either click **Log In Now** or return to www.masteringphysics.com later.

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

7. **Examination Policy**: Exams are cumulative. Use of books is not allowed on the exams. Use of a calculator is allowed and recommended. Use of electronic devices with a camera, mass storage, or wireless communication is not allowed on exams, except when determined a necessity for students that qualify under section 11(c) below. Calculator software on mobile phones or similar devices, and "smart watches" are not allowed on the exams. Use of a ruler is allowed, and may be recommended because exams can include problems with graphs. Students should also read the Calendar, Section G, on Examinations.
   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 exam.
   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.

8. **Approved Mandatory and Optional Course Supplemental Fees**: There are no mandatory or optional supplemental fees.

9. **Writing across the curriculum statement:** 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 be asked to participate in or be subjects of any human studies. See also Section E.5 of the University Calendar.

11. OTHER IMPORTANT INFORMATION FOR STUDENTS:

    (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@ucagary.ca.
SU Faculty Rep: Phone: 220-3913 Email: science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.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.

12. 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, traveling 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.

13. SCHEDULE

Week	Dates	Topic	Pre-Class Preparation	
1	8-Jan-18	Introduction to course		
	10-Jan-18	Rotational motion		12.1
	12-Jan-18	Rotation about the centre of mass		12.2
2	15-Jan-18	Rotational energy	Pre-Reading Quiz 1 Due 23:59 on Jan 14th	12.3
	17-Jan-18	Calculating moment of inertia		12.4
	19-Jan-18	Torque		12.5
3	22-Jan-18	Rotational dynamics	Assignment 1 Due 23:59 on Jan 21st	12.6
	24-Jan-18	Rotation about a fixed axis		12.7
	26-Jan-18	Static equilibrium		12.8
4	29-Jan-18	Rolling motion	Pre-Reading Quiz 2 Due 23:59 on Jan 28th	12.9
	31-Jan-18	Vectorial Description of Rotational Motion		12.10
	2-Feb-18	Angular momentum		12.11
5	5-Feb-18	Angular momentum (continued)	Assignment 2 Due 23:59 on Feb 4th	12.11
	7-Feb-18	Simple harmonic motion		15.1
	9-Feb-18	Simple harmonic motion		15.1
6	12-Feb-18	SHM and circular motion	Pre-Reading Quiz 3 Due 23:59 on Feb 11th	15.2
	14-Feb-18	Energy in simple harmonic motion		15.3
	16-Feb-18	The dynamics of simple harmonic motion		15.4
7	19-Feb-18	Reading Week. No Lectures or Tutorials		
	21-Feb-18			
	23-Feb-18			
8	26-Feb-18	Vertical oscillations	Assignment 3 Due 23:59 on Feb 25th	15.5
	28-Feb-18	Review Class (Pre-Midterm)		
	MIDTERM EXAM, THURSDAY, MARCH 1st *DURING TUTORIAL*			
	2-Mar-18	The pendulum		15.6
9	5-Mar-18	Damped oscillations	Pre-Reading Quiz 4 Due 23:59 on March 4th	15.7
	7-Mar-18	Driven oscillations and resonance		15.8
	9-Mar-18	Traveling Waves		16.1-2
10	12-Mar-18	Wave Equation	Assignment 4 Due 23:59 on March 11th	16.3-4
	14-Mar-18	Sound Intensity and Intensity Levels		16.5, 16.8
	16-Mar-18	Doppler Effect		16.9
11	19-Mar-18	Waves in 2D and 3D. Superposition.	Pre-Reading Quiz 5 Due 23:59 on March 18th	16.7
	21-Mar-18	Standing Waves		17.1-17.4
	23-Mar-18	Interference		17.5-17.8
12	26-Mar-18	Fluids	Assignment 5 Due 23:59 on March 25th	14.1
	28-Mar-18	Pressure. Measuring and using pressure.		14.2-14.3
	30-Mar-18	Good Friday. No lectures.		
13	2-Apr-18	Buoyancy		14.4
	4-Apr-18	Fluid dynamics		14.5
	6-Apr-18	Fluid dynamics		14.5
14	9-Apr-18	Elasticity	Assignment 6 Due 23:59 on April 8th	14.6
	11-Apr-18	Elasticity (continued)		14.6
	13-Apr-18	Review Class (Pre-Final)		

Department Approval_____Date_____