



CAMOSUN COLLEGE
School of Arts & Science
Department of Physics & Astronomy

PHYS-140-D02A and D02B
Physics for Science/ENGR 1
Fall 2020

COURSE OUTLINE

The course description is available on the web @ <http://camosun.ca/learn/calendar/current/web/phys.html>

Ω Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

1. Instructor Information

(a) Instructor	Christopher Avis (D02A and D02B lectures / D02B Labs)
(b) Office hours	M: 10:30-11:20, W: 10:30-12:20; 2:30-3:20 , or by appointment
(c) Location	Online via D2L (online.camosun.ca)
(d) Phone	250-507-3361 (please email first) Alternative: _____
(e) E-mail	avisc@camosun.bc.ca
(f) Website	D2L (online.camosun.ca)

(a) Instructor	Stephanie Ingraham (D02A Labs)
(b) Office hours	W: 3:30-5:20, or by appointment
(c) Location	Online via D2L (online.camosun.ca)
(d) Phone	250-634-8657 (please email first) Alternative: _____
(e) E-mail	ingrahams@camosun.bc.ca
(f) Website	D2L (online.camosun.ca)

2. Intended Learning Outcomes

(If any changes are made to this part, then the Approved Course Description must also be changed and sent through the approval process.)

Upon completion of the course the student will be able to:

1. Apply techniques of vector algebra to solve problems where vectors sum to zero or calculate resultant vectors.
 - a. Perform coordinate system conversions.
 - b. Demonstrate operations of vector addition and subtraction using graphical, vector component and unit vector techniques.
 - c. Calculate and interpret scalar product and vector products.
2. Solve problems involving particle kinematics and dynamics for translational motion with non-constant force.
 - a. Apply kinematic equations to analyze motion of objects subject to constant acceleration.
 - b. Use calculus to analyze motion of objects with non-constant acceleration.
 - c. Use vector components to analyze motion in two and three dimensions.
 - d. Solve problems for objects undergoing uniform and non-uniform circular motion.
 - e. State and apply Newton's Laws to analyze systems subject to concurrent forces including friction, inclines and connected objects.

3. Analyze the rotational motion of rigid bodies.
 - a. Calculate the center-of-mass and moment-of-inertia for uniform objects including the parallel-axis theorem.
 - b. Perform calculations and answer conceptual questions using torques. Solve equilibrium problems for non-concurrent forces.
 - c. Define the rotational kinematic quantities; transform between linear and rotational quantities.
 - d. Use the rotational form of Newton's 2nd Law to solve dynamics problems.
 - e. Apply translational and rotational conditions of mechanical equilibrium.
4. Use work-energy theorem and other conservation laws to solve applied problems.
 - a. Solve problems involving work by constant and non-constant forces in two and three dimensions.
 - b. Calculate work, energy and power for rotational systems.
 - c. Perform calculations utilizing the conservation of momentum of isolated systems for elastic and inelastic collisions.
 - d. Perform calculations utilizing the conservation of angular momentum for rotating systems.
5. Apply concepts of dynamics, work and energy to analyze charged particles in electric and magnetic fields.
 - a. Calculate electric fields, forces, potential and potential energy for point charges and simple charge distributions.
 - b. Perform calculations for charged particles moving in uniform electric and magnetic fields; describe their motion and practical applications.
 - c. Solve problems for multi-branch direct current circuits using Ohm's Laws and Kirchhoff's Rules.
6. Examine the validity of key physical principles through the use of practical experimental techniques.
 - a. Assemble experimental apparatus using written instructions.
 - b. Observe and record data including sources of error and estimate the range of uncertainty in results.
 - c. Interpret meaning of experimental results in the context of the experimental objectives.
 - d. Write scientific reports in correct format.

3. Required Materials

(a) Texts

Optional reference textbook: Physics for Scientists and Engineers: A Strategic Approach by Knight, 4th Edition

(b) Other

Scientific calculator, ruler, protractor.

Access to a computer with Microsoft Excel*.

Access to a cellphone, camera or scanner capable of generating pdf documents for submission of homework, labs and tests

*Excel is available as part of the Office 365 suite provided free to all Camosun students. See: <http://camosun.ca/services/its/other-services.html> for details.

4. Course Content and Schedule

This course is designed to be largely delivered **asynchronously** (meaning that students can access and engage with course content at a time of their choosing) with optional **synchronous** (set time) office hours and tutorials delivered as per the schedule below. Asynchronous lecture content will consist of pre-recorded videos, supplemented with typed lecture notes. Students are encouraged to work through the videos, taking notes as if they were participating in a lecture and pausing videos to work on problems themselves. The time commitment to work through the asynchronous lectures is estimated to take approximately 4 hours a week, just as it would in a regular face-to-face term.

The optional tutorials are designed to allow students to engage with specific problems drawn from the homework. To fully benefit from the tutorials, students should ensure that they've watched the asynchronous lecture content for the portion of the week leading up to the tutorial and at least read through the homework problems. Tutorials will be recorded and made available on D2L for asynchronous viewing.

Labs are also set up to be **asynchronous**. They consist of an introductory video to guide students through the material accompanied by written instructions. Optional support for the labs will be available during the two-hour lab office hours noted below. It is estimated that it will take students between 2 to 4 hours to complete each lab.

There will be **four synchronous** tests delivered in the lab period throughout the term and students **must be available** to write tests at those times at the dates noted below. There will be an asynchronous quiz delivered each week that must be completed by the start of the following week. All synchronous content will be delivered via D2L's Blackboard Collaborate feature.

Content Schedule:

All times below are specified in terms of Pacific Time (Pacific Daylight Time prior to Nov. 1st; Pacific Standard Time after Nov. 1st)

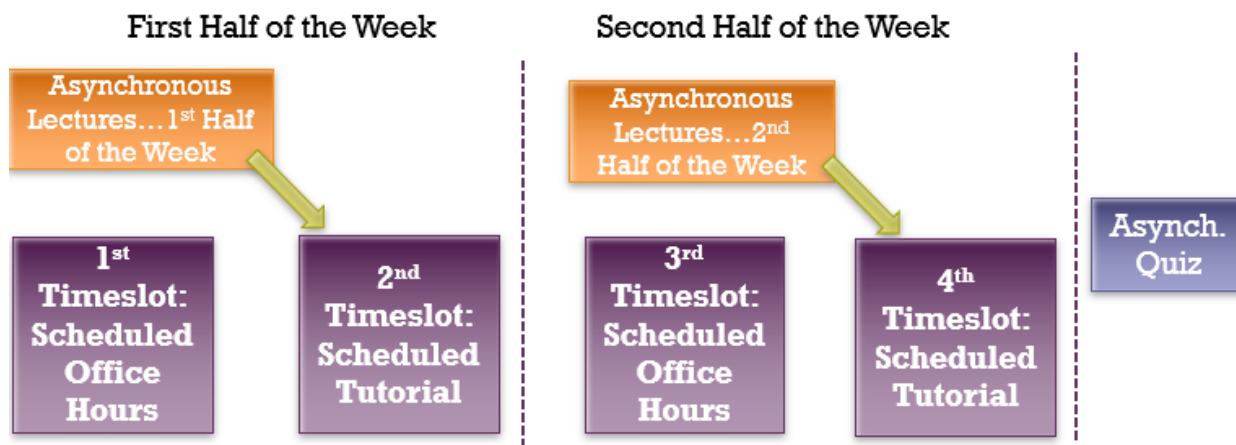
Monday: 10:30 AM - 11:20 PM Optional lecture office hour
 Tuesday: 11:30 AM - 12:20 PM Optional tutorial
 Wednesday: 10:30 AM - 12:20 PM Optional D02B Lab office hour / mandatory test time*
 2:30 PM – 3:20 PM Optional lecture office hour
 3:30 PM – 5:20 PM Optional D02A Lab office hour / mandatory test time*
 Friday: 2:30 PM – 3:20 PM Optional tutorial

*On test days only

There are four evenly weighted term tests. The first three will occur during the regular term and the fourth will occur during the final exam period. Test days and times for the first three tests are as noted below:

Test #1: Wednesday, September 30th: 10:30 AM – 12:20 PM (D02B); 3:30 PM – 5:20 PM (D02A)
 Test #2: Wednesday, October 28th: 10:30 AM – 12:20 PM (D02B); 3:30 PM – 5:20 PM (D02A)
 Test #3: Wednesday, November 25th: 10:30 AM – 12:20 PM (D02B); 3:30 PM – 5:20 PM (D02A)
 Test #4: In final exam period. Date and time TBA.

Lecture Content



Lab Content

Lab Timeslot (Asynchronous for labs;
Synchronous for tests)

5. Basis of Student Assessment (Weighting)

- (a) Homework: 15 %
- (b) Quizzes: 15 %
- (c) Labs: 30 %
- (d) Tests: 40 %

Course Guidelines

Please carefully read the following course guidelines.

Homework and Labs

A detailed calendar of due dates will be available on the course page on D2L, but in general:

- Homework problems will be assigned at the beginning of a particular week and will be due by the end of the day (11:59 PM) on the Wednesday of the following week. (E.g. Week #1's HW will be due by the Wednesday of Week #2; Week #2's HW will be due by the Wednesday of Week #3, etc.).
- Labs assigned in a particular week will be due by the end of the day (11:59 PM) on the Friday of the following week. (E.g. if Lab #1 occurs during week #1, it will be due the Friday of Week #2, etc.). Exceptions will apply when there are tests in which case students will have two weeks to work on a lab if a due date corresponded to a test date. Students can access and work on the labs at any point during the week, with specific support for the labs available during the lab office hours.
- Students requiring an extension to labs or homework due to illness or other extenuating circumstances must contact me prior to the due dates. Otherwise, late penalties will apply as noted. For overdue labs (or assignments), a late penalty of 10 % per day will be assessed for the first five days following the due date. After this, a completed lab or homework assignment earns a maximum mark of 50%.
- All late homework and lab assignments must be submitted by the last day of the term (11:59 PM on December 12th); after this point, outstanding assignments will receive a mark of zero.
- Students who are repeating Physics 140 and have a lab mark from the previous attempt at the course greater than 70% can apply for lab exemption and carry over their previous lab mark. Please contact me in the first week of the term with the name of your previous instructor if this applies to you.
- Students must obtain an overall grade of 50% or higher in the laboratory component of the course order to obtain credit for the course.

Tests

- Tests must be completed during the specified synchronous time slot for the labs noted in the content schedule and must be submitted by the end of this timeslot; students experiencing any difficulty accessing or completing the test during the specified timeslot must **immediately** contact me for assistance by email (avisc@camosun.bc.ca) or phone (250-507-3361).
- Students who know in advance that the assigned test time will pose a problem for them (e.g. due to illness or family emergency) must contact me in advance of the test.
- Late tests received without a suitable explanation will be assigned a mark of zero.

Submission of Assignments and Tests

- Labs, Homework and Tests are to be submitted as a single .pdf file per submission using the Assignments drop box on D2L..
- Students are strongly encouraged to ensure that they are comfortable with the submission process prior to the date of first test. Students must budget their test time carefully as the time available for each test includes the time necessary for scanning and uploading of tests.
- In the event of any difficulty submitting assessments to D2L, students can email me their assignment (avisc@camosun.bc.ca). The same time deadlines will apply to emailed submissions.

Quizzes

- Weekly asynchronous multiple choice quizzes cover lecture material.
- The first week's quiz covers the details of the course outline and the School of Arts & Science Academic Honesty Guidelines. This quiz is available at the start of the first week and does not have a time limit.
- Subsequent quizzes will focus on lecture content. These quizzes will go live on Thursday of a given week and will be available until 11:59 PM on the Monday of the following week. Quizzes can be attempted at any point during this window, but once the quiz has been started, there is a 30 minute time limit. (E.g. Week #2's quiz will be available as of Thursday, September 17th and must be completed by Monday, September 21th).
- Quiz grades and correct quiz answers will be available for review once the cut off time for the week's quiz has passed.

Academic Honesty

- Students in this course are subject to the School of Arts & Science Academic Honesty Guidelines available at the link below and mirrored on the D2L website.

<http://camosun.ca/learn/school/arts-science/images/Arts%20and%20Science%20Academic%20Honesty%20Guidelines.pdf>

- You should read the above document thoroughly by the end of the first week of classes and be familiar with what constitutes academic dishonesty. Failure to read this document is not considered a valid excuse if you are found to have committed academic dishonesty!
- Note that, per the document, all academic dishonesty infractions (including unintentional infractions) are recorded and kept on file with the Arts and Science Office.
- Significant academic honesty infractions can lead to serious grade penalties and potentially ineligibility for scholarships, prizes and bursaries.
- I encourage you to reach out to me if you have any questions about academic honesty. You are welcome to consult with other students in working through homework problems and labs, but ultimately your final submitted work must be your own.

- Certain students are eligible for special academic accommodations through the college's Centre for Accessible Learning (CAL). (<http://camosun.ca/services/accessible-learning/>). If you suspect that you are eligible for accommodations, please contact the Centre as soon as possible.
- If you have been provided with CAL accommodations, please contact me as early as possible with your letter of accommodations.

6. Grading System

(If any changes are made to this part, then the Approved Course description must also be changed and sent through the approval process.)

(Mark with "X" in box below to show appropriate approved grading system – see last page of this template.)

- Standard Grading System (GPA)
- Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

8. College Supports, Services and Policies



Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. GRADING SYSTEMS <http://camosun.ca/about/policies/index.html>

The following two grading systems are used at Camosun College:

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://camosun.ca/about/policies/index.html> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.

Tentative Class Schedule

Below is a tentative class schedule including a recommended pacing schedule for working through the asynchronous lecture videos and labs. Labs may be subject to change.

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #1	Lab #1: Measurement Uncertainties		
Mon. Sept. 7 th	LABOUR DAY – NO CLASS		
Tues. Sept. 8 th	Introductory Class. Watch introductory video, familiarize yourself with D2L, etc.	Drop in support on Blackboard Collaborate	
Weds. Sept. 9 th	Lab #1: Measurement Uncertainties	Lecture / Lab Office Hours	
Thurs., Sept. 10 th	1.1: Unit Conversions		
Fri. Sept. 11 th	First synchronous tutorial... orientation and check in.	Tutorial	
WEEK #2	Lab #2: Components of a Vector		
Mon. Sept. 14 th	1.2: Vectors and Vector Addition	Office Hours	Quiz #1 by 11:59 PM
Tues. Sept. 15 th	1.3: Vector Components	Tutorial	
Weds. Sept. 16 th	Lab #2: Components of a Vector	Lecture / Lab Office Hours	HW #1 by 11:59 PM
Thurs., Sept. 17 th	1.4: Unit vectors and 1.5: Products of vectors Part 1 (Dot product)		
Fri. Sept. 18 th	1.5: Products of vectors Part 2 (Cross product)	Tutorial	Lab #1 by 11:59 PM
WEEK #3	Lab #3: 1-D Kinematics with Tracker		
Mon. Sept. 21 st	2.1: Displacement, time and average velocity and 2.2: Instantaneous velocity and acceleration.	Office Hours	Quiz #2 by 11:59 PM
Tues. Sept. 22 nd	2.3: Average and Instantaneous acceleration	Tutorial	
Weds. Sept. 23 rd	Lab #3: 1-D Kinematics with Tracker	Lecture / Lab Office Hours	HW #2 by 11:59 PM
Thurs., Sept. 24 th	2.4: Motion w/ constant acceleration.		
Fri. Sept. 25 th	2.5: Free-fall	Tutorial	Lab #2 by 11:59 PM
WEEK #4	No Lab (Test #1)		
Mon. Sept. 28 th	2.6: Velocity and Position by Integration Part 1	Office Hours	Quiz #3 by 11:59 PM
Tues. Sept. 29 th	2.6: Velocity and Position by Integration Part 2	Tutorial	
Weds. Sept. 30 th	Test #1	Lecture / Lab Office Hours	HW #3 by 11:59 PM Test #1 by 12:20 PM (D02B) Test #1 by 5:20 PM (D02A)
Thurs., Oct. 1 st	3.1: Kinematics in 2-D and 3-D		
Fri. Oct. 2 nd	3.2: Projectile Motion	Tutorial	
WEEK #5	Lab #4: Graphing		
Mon. Oct. 5 th	4.1: Review of Forces, 4.2: N1L, 4.3: N2L	Office Hours	Quiz #4 by 11:59 PM
Tues. Oct. 6 th	4.2: Newton's First Law and 4.3: Newton's Second Law	Tutorial	
Weds. Oct. 7 th	Lab #4: Projectile Motion	Lecture / Lab Office Hours	HW #4 by 11:59 PM
Thurs., Oct. 8 th	4.4: Dynamics w/ Inclines;		
Fri. Oct. 9 th	4.5: Problems Involving Friction	Tutorial	Lab #3 by 11:59 PM

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #6	Lab #5: Projectile Motion		
Mon. Oct. 12 th	Thanksgiving	No Office Hours	
Tues. Oct. 13 th	4.6: Newton's 3 rd Law and Connected Objects	Tutorial	Quiz #5 by 11:59 PM
Weds. Oct. 14 th	Lab #5: Projectile Motion	Lecture / Lab Office Hours	HW #5 by 11:59 PM
Thurs., Oct. 15 th	4.7: Dynamics of Circular Motion		
Fri. Oct. 16 th	4.7: Dynamics of Circular Motion	Tutorial	Lab #4 by 11:59 PM
WEEK #7	Lab #6: Atwood's Machine		
Mon. Oct. 19 th	5.1: The Work/ KE Theorem; 5.2: Work & Energy w/ Variable Forces	Office Hours	Quiz #6 by 11:59 PM
Tues. Oct. 20 th	5.2: Work and Energy w/ Variable Forces and 5.3: Power	Tutorial	
Weds. Oct. 21 st	Lab #6: Atwood's Machine	Lecture / Lab Office Hours	HW #6 by 11:59 PM
Thurs., Oct. 22 nd	5.4: Potential Energy		
Fri. Oct. 23 rd	5.4: Potential Energy	Tutorial	Lab #5 by 11:59 PM
WEEK #8	No Lab (Test #2)		
Mon. Oct. 26 th	5.5: Conservation of Energy with Non-Conservative Forces	Office Hours	Quiz #7 by 11:59 PM
Tues. Oct. 27 th	6.1: Impulse and Momentum	Tutorial	
Weds. Oct. 28 th	Test #2	Lecture / Lab Office Hours	Test #2 by 12:20 PM (D02B) Test #2 by 5:20 PM (D02A) HW #7 by 11:59 PM
Thurs., Oct. 29 th	6.2: Conservation of Momentum in 1-D		
Fri. Oct. 30 th	6.3: Centre of Mass	Tutorial	
WEEK #9	Lab #7: Conservation of Momentum		
Mon. Nov. 2 nd	7.1: Coulomb's Law	Office Hours	Quiz #8 by 11:59 PM
Tues. Nov. 3 rd	7.2: Coulomb's Law	Tutorial	
Weds. Nov. 4 th	Lab #7: Conservation of Momentum	Lecture / Lab Office Hours	HW #8 by 11:59 PM
Thurs., Nov. 5 th	7.2: Electric Fields (Part 1)		
Fri. Nov. 6 th	7.2: Electric Fields (Part 2)	Tutorial	Lab #6 by 11:59 PM
WEEK #10	Lab #8: Electric Fields		
Mon. Nov. 9 th	7.3: Electrical Potential Energy	Office Hours	Quiz #9 by 11:59 PM
Tues. Nov. 10 th	7.3: Electrical Potential Energy	Tutorial	
Weds. Nov. 11 th	Remembrance Day College Closed Lab #8: Electric Fields and Electric Potential	No Office Hours	
Thurs., Nov. 12 th	7.4: Electric Potential		HW #9 by 11:59 PM
Fri. Nov. 13 th	7.4: Electric Potential	Tutorial	Lab #7 by 11:59 PM
WEEK #11	Lab #9: Kirchoff's Rules		
Mon. Nov. 16 th	8.1: Current, Resistance and EMF and 8.2: Power	Office Hours	Quiz #10 by 11:59 PM
Tues. Nov. 17 th	8.2: Kirchoff's Rules	Tutorial	
Weds. Nov. 18 th	Lab #9: Kirchoff's Rules	Lecture / Lab Office Hours	HW #10 by 11:59 PM
Thurs., Nov. 19 th	8.2: Kirchoff's Rules		
Fri. Nov. 20 th	9.1: Introduction to Magnetism	Tutorial	Lab #8 by 11:59 PM

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #12	No Lab (Test #3)		
Mon. Nov. 23 rd	9.2: Forces on Charges in Magnetic Fields;	Office Hours	Quiz #11 by 11:59 PM
Tues. Nov. 24 th	9.3: Motion of a Charge in a Uniform B-Field	Tutorial	
Weds. Nov. 25 th	Test #3	Lecture / Lab Office Hours	Test #3 by 12:20 PM (D02B) Test #3 by 5:20 PM (D02A) HW #11 by 11:59 PM
Thurs., Nov. 26 th	10.1: Angular Acceleration and 10.2: Rotation with Constant Angular Velocity		
Fri. Nov. 27 th	10.3: Relating Angular and Linear Quantities	Tutorial	
WEEK #13	Lab #10: Rotational Inertia (Part 1)		
Mon. Nov. 30 th	10.4: Moment of Inertia Calculations	Office Hours	Quiz #12 by 11:59 PM
Tues. Dec. 1 st	10.4: Moment of Inertia Calculations	Tutorial	
Weds. Dec. 2 nd	Lab #10 Part 1	Lecture / Lab Office Hours	HW #12 by 11:59 PM
Thurs., Dec. 3 rd	10.5: Torque and Angular Acceleration		
Fri. Dec. 4 th	10.5: Torque and Angular Acceleration	Tutorial	Lab #9 by 11:59 PM
WEEK #14	Lab #10: Rotational Inertia (Part 2)		
Mon. Dec. 7 th	10.6: Energy in Rotational Motion;	Office Hours	Quiz #13 by 11:59 PM
Tues. Dec. 8 th	10.7: Static Equilibrium	Tutorial	
Weds. Dec. 9 th	Lab #10 Part 2	Lecture / Lab Office Hours	HW #13 by 11:59 PM
Thurs., Dec. 10 th	10.7: Static Equilibrium		
Fri. Dec. 11 th	10.8: Angular Momentum	Tutorial	
Sat. Dec. 12th	All outstanding labs and homework due by 11:59 PM		Lab #10 by 11:59 PM