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

PHYS-104-D03
General College Physics 1
Winter 2021

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	Chris Avis		
(b) Office hours	Tuesday 5:30 PM – 6:20 PM; Thursday 10:30 PM -11:20 PM or by appointment		
(c) Location	Blackboard collaborate within D2L course page		
(d) Phone	250-507-3361 (please email first)	**Alternative:**	
(e) E-mail	avisc@camosun.bc.ca		
(f) Website	D2L (online.camosun.ca)		

2. Intended Learning Outcomes

Upon completion of this course a student will be able to:

1. Perform addition, subtraction and scalar multiplication of vectors in two-dimensions using graphical and trigonometric techniques.
2. Solve technical problems involving kinematics and dynamics of particles in one- and two-dimensions.
    a. Define and differentiate between kinematic variables (position, displacement, velocity, speed acceleration)
    b. Solve technical kinematics problems involving constant acceleration in one-dimension (horizontal and inclined surfaces, and free fall) and two-dimensions (projectile motion).
    c. Describe Newton's Laws and use Free-Body diagrams to represent forces acting on an object.
    d. Apply Newton's Laws to solve dynamics problems involving gravitational forces, friction and interacting pairs of objects.
3. Apply conservation principles to solve technical problems involving energy and momentum
    a. Solve problems involving the work done by constant forces in one- and two-dimensions using the work-kinetic energy theorem.
    b. Use the conservation of energy principle to solve problems involving gravitational potential energy and dissipative forces.
    c. Calculate power output and efficiency for simple mechanical systems
    d. Apply the concepts of momentum and impulse to solve problems involving collisions in one- and two-dimensions.
4. Apply kinematics and dynamics concepts to the study of circular, rotational and orbital motion
    a. Use the concept of centripetal acceleration to solve dynamics problems involving objects in uniform circular motion.
    b. Describe Newton's Law of Universal Gravitation and use this principle to solve problems involving orbital motion.

c. Evaluate the torque produced by a force and use the first and second condition for equilibrium to solve problems involving rigid objects in static equilibrium.

5. Solve technical problems involving elastic properties of solids and fluid statics and dynamics.
    a. Define density, pressure (including gauge pressure), stress, strain and elastic modulus.
    b. Characterize and evaluate the variation in pressure with depth in a fluid in hydrostatic equilibrium including applications of Pascal's Principle.
    c. Apply Archimedes' principle to evaluate the buoyant force on objects partially or completely immersed in fluids
    d. Solve technical problems involving surface tension and capillary action.
    e. Use the equation of continuity and Bernoulli's equation to qualitatively describe aspects and applications of fluids in motion.
6. Explore energy transfer by thermal mechanisms through investigations into heat exchange, thermal expansion and calorimetry.
    a. Identify common temperature scales and appropriate conversion factors between scales.
    b. Solve technical problems involving the thermal expansion of solids and fluids.
    c. Define and distinguish between the terms temperature, heat, thermal energy, specific heat capacity and latent heat.
    d. Solve technical calorimetry problems including problems involving phase changes of matter.
    e. Describe heat transfer by radiation, thermal conduction and convection.
7. Analyze, interpret, and report on experimental results in the context of experimental objectives.
    a. Observe, records, organize and display data in tables, and record sources of error and determine the uncertainty in results
    b. Plot and analyze linear graphs (determine area, slope, intercept, including uncertainties)
    c. Convey findings in scientific reports written in an acceptable, traditional discipline-specific format.

3. Required Materials

(a) Texts

Physics by Giancoli, 7th Edition (**Optional**… copies available in Lansdowne Campus Library)

(b) Other

- Ruler, protractor, scientific calculator
- 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.

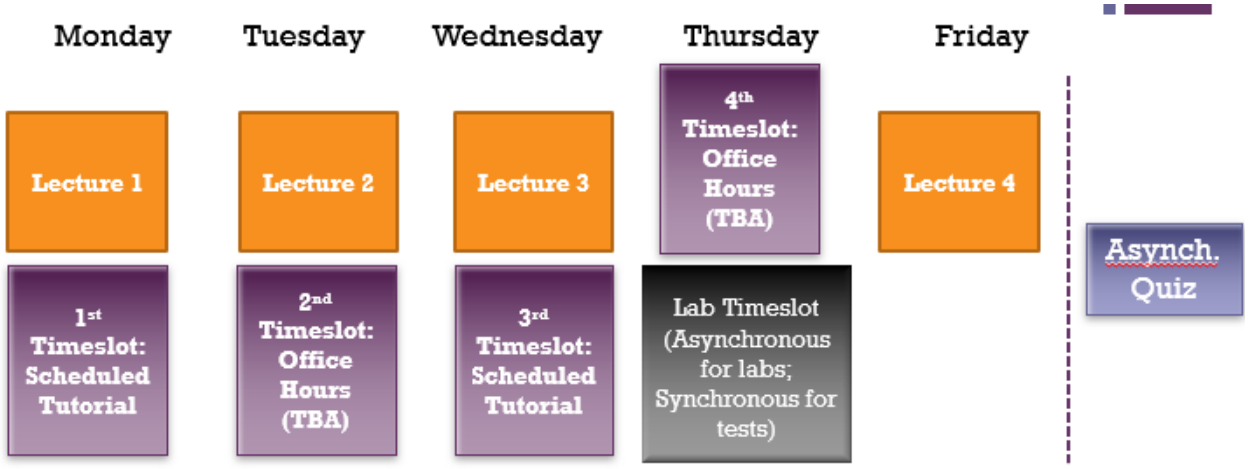
There will be **four synchronous** tests delivered in the lab period throughout the term and students **must be available** to write tests at those times at the dates noted below. There will be an asynchronous quiz delivered each week that must be completed by the start of the following week. All synchronous 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:	5:30 PM - 6:20 PM	Optional tutorial
Tuesday:	5:30 PM – 6:20 PM	Office hours
Wednesday:	5:30 AM - 6:20 PM	Optional tutorial
Thursday:	10:30 AM – 11:20 PM	Office hours
Thursday:	5:30 AM – 7:20 PM	Optional lab office hour / mandatory test time

A visual guide to the course schedule is as shown below. Purple and black boxes represent synchronous delivery points for the course. Orange boxes represent asynchronous lecture videos for a given week.



Term tests will be held during the scheduled timeslot on the following dates and students **must** write the tests starting at 5:30 PM on those dates.

Thursday, February 4th, 2021
Thursday, February 25th, 2021
Thursday, March 18th, 2021
Thursday, April 8th, 2021

5. Basis of Student Assessment (Weighting)

(a) Homework: 15%

(b) Quizzes: 15%

(c) Labs: 25%

(d) Term Tests: 30% (Best 3 of 4, each worth 10%)

(e) Final Exam: 15%

Course Guidelines

Homework and Labs

A detailed calendar of due dates will be available on the course page on D2L as well as in the schedule at the end of the course outline. There will be some modifications to the schedule below based on reading break and holidays, but in general:

- I ask that you complete homework and test problems using the notation, formulas and techniques introduced in the lectures. A full formula sheet for the course is available on D2L**. Failure to do so will result in problems being awarded a grade of zero.**

- 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…)

- 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. (Lab #1 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 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 Saturday, April 17th); after this point, outstanding assignments will receive a mark of zero.

- Students who are repeating Physics 104 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

- Unless otherwise noted, Labs, Homework and Tests are to be submitted as a single .pdf file per submission using the Assignments drop box on D2L.

- 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

- Short weekly asynchronous 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.

- These subsequent quizzes will consist of 5 multiple choice questions based on the lecture material for a given week.

- Once quizzes have been graded, students can email me to regain half of the marks lost for wrong answers if they provide an explanation as to why the correct answer to a question is right.

Academic Integrity

- Students in this course are subject to the Camosun College Academic Integrity Policy available at the link below and mirrored on the D2L website.
  http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf

- You should read the above document thoroughly by the end of the first week of classes and be familiar with what constitutes academic misconduct. Failure to read this document or this course outline is not considered a valid excuse if you are found to have committed academic misconduct!

- You may also wish to consult the supporting documents on the Process for Documenting and Addressing Academic Misconduct (http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.1.pdf) as well as the Guide to Academic Misconduct and How to Address It. (http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.5.pdf)

- As there are unique forms of academic misconduct that can occur when a course is delivered entirely online, please be advised that I consider the following to be specific examples of academic misconduct, though this list is not exhaustive:

    - Communicating with classmates or other individuals during tests and quizzes
    - Posting homework, quiz, lab or test material to homework helper sites such as Chegg, Slader, CourseHero, etc…
    - Direct copying from any resources without approval of the instructor (including, but not limited to your classmates' work, online non-D2L resources, lab manual instructions, and an instructor's own posted solutions)
    - Having an individual (classmate, friend, professional tutor) complete work on your behalf
    - Sharing detailed information about tests, quizzes or assignments with students who have not yet taken the test or completed the assignment (In this case, all participating students will be penalized)
    - Copying data taken by another student in an individual lab exercise, or sharing your own data with other students.
    - Submission of any work that is not your own.

All students found to have committed any form of academic misconduct will be assigned an appropriate consequence as outlined in the Academic Integrity Policy.

- Please note that student academic misconduct is documented and kept on record in the Office of the Registrar. Repeated breaches of academic integrity within this course or across courses can lead to more significant consequences per the policy and its supporting documents.

- Students are encouraged to engage with the instructor to discuss any concerns around academic integrity or violations thereof. Should a student and the instructor disagree as to the outcome of a misconduct allegation, then the student may reach out to the department Chair for support.

Centre for Accessible Learning

- 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

[X] 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, Student Ancillary Fees, Academic Integrity, Grade Review & Appeals, Student Misconduct and Academic Accommodations for Students with Disabilities 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	*Incomplete*: 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	*In progress*: 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	*Compulsory Withdrawal*: 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.

Class Schedule

Below is a tentative class schedule including a recommended pacing schedule for working through the asynchronous lecture videos and labs.

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #1	**Vectors**		
Mon. Jan. 11th	Introductory Class	Drop in support on Blackboard Collaborate	
Tues. Jan. 12th	1.1: Vector Addition (Graphical Method)	Office Hours	
Weds. Jan. 13th	1.2: Vector Components	Tutorial	
Thurs. Jan. 14th	Lab #1: Sig. Figs, Sci. Notation, Unit Conversions	Office Hours Lab Office Hours	
Fri. Jan. 15th	1.3: Vector Operations (Component Method)		
WEEK #2	**Kinematics in 1-D**		
Mon. Jan. 18th	2.1: Position and Displacement in 1-D	Tutorial	Quiz Week #1 by 11:59 PM
Tues. Jan. 19th	2.2: Average and Instantaneous Velocity	Office Hours	
Weds. Jan. 20th	2.3: Kinematics with Uniform Acceleration	Tutorial	HW Week #1 by 11:59 PM
Thurs. Jan. 21st	Lab #2: Graphing	Office Hours Lab Office Hours	
Fri. Jan. 22nd	2.4: Free-Fall		Lab #1 by 11:59 PM
WEEK #3	**Kinematics in 2-D**		
Mon. Jan. 25th	3.1: Kinematics in 2-D	Tutorial	Quiz Week #2 by 11:59 PM
Tues. Jan. 26th	3.2: Projectile Motion	Office Hours	
Weds. Jan. 27th	3.2: Projectile Motion	Tutorial	HW Week #2 by 11:59 PM
Thurs. Jan. 28th	Lab #3: Free-Fall	Office Hours Lab Office Hours	
Fri. Jan. 29th	4.1: Review of Forces		Lab #2 by 11:59 PM
WEEK #4	**Dynamics I**		
Mon. Feb. 1st	4.2: Newton's First Law	Tutorial	Quiz Week #3 by 11:59 PM
Tues. Feb. 2nd	4.3: Newton's Second Law	Office Hours	
Weds. Feb. 3rd	4.4: Inclined Planes	Tutorial	HW Week #3 by 11:59 PM
Thurs. Feb. 4th	Test #1	Office Hours Test	Test #1 by 7:30 PM
Fri. Feb. 5th	4.5: Problems involving Friction		
WEEK #5	**Dynamics II**		
Mon. Feb. 8th	4.6: Newton's Third Law and Connected Objects	Tutorial	Quiz Week #4 by 11:59 PM
Tues. Feb. 9th	5.1: Kinematics of UCM	Office Hours	
Weds. Feb. 10th	5.2: Dynamics of UCM	Tutorial	HW Week #4 by 11:59 PM
Thurs. Feb. 11th	Lab #4: Mechanical Equilibrium	Office Hours Lab Office Hours	
Fri. Feb. 12th	5.2: Dynamics of UCM II		Lab #3 by 11:59 PM
WEEK #6	**READING BREAK – NO LAB**		
Mon. Feb. 15th	Family Day		Quiz Week #5 by 11:59 PM
Tues. Feb. 16th	Reading Break		
Weds. Feb. 17th	Reading Break		

Thurs. Feb. 18th	Reading Break		
Fri. Feb. 19th	Reading Break		
Date	**Suggested Lecture Schedule / Weekly Lab**	**Synchronous Delivery**	**Due Dates**
WEEK #7	**Gravity and Work**		
Mon. Feb. 22nd	5.3: Newton's Law of Universal Gravitation	Tutorial	Lab #4 by 11:59 PM HW Week #6 by 11:59 PM
Tues. Feb. 23rd	5.4: Gravity and Orbits	Office Hours	
Weds. Feb. 24th	6.1: Work	Tutorial	
Thurs. Feb. 25th	Test #2 (Forces)	Office Hours Test	Test #2 by 7:30 PM
Fri. Feb. 26th	6.2: The Work-Kinetic Energy Theorem		
WEEK #8	**Conservation of Energy**		
Mon. Mar. 1st	6.3: Potential Energy	Tutorial	Quiz Week #7 by 11:59 PM
Tues. Mar. 2nd	6.4: Conservation of Energy	Office Hours	
Weds. Mar. 3rd	6.5: Conservation of Energy with Non-Conservative Forces	Tutorial	HW Week #7 by 11:59 PM
Thurs. Mar. 4th	Lab #5: Uncertainties	Office Hours Lab Office Hours	
Fri. Mar. 5th	6.6: Power and Efficiency		
WEEK #9	**Conservation of Momentum**		
Mon. Mar. 8th	7.1: Impulse and Momentum	Tutorial	Quiz Week #8 by 11:59 PM
Tues. Mar. 9th	7.2: Conservation of Momentum (1-D)	Office Hours	
Weds. Mar. 4th	7.3: Conservation of Momentum (2-D)	Tutorial	HW Week #8 by 11:59 PM
Thurs. Mar. 5th	Lab #6: Conservation of Momentum	Office Hours Lab Office Hours	
Fri. Mar. 6th	7.4: Centre of Mass		Lab #5 by 11:59 PM
WEEK #10	**Equilibrium**		
Mon. Mar. 15th	8.1: Torque	Tutorial	Quiz Week #9 by 11:59 PM
Tues. Mar. 16th	8.2: The Second Condition for Equilibrium	Office Hours	
Weds. Mar. 17th	8.2: The Second Condition for Equilibrium	Tutorial	HW Week #9 by 11:59 PM
Thurs. Mar. 18th	Test #3	Office Hours Test	Test #3 by 7:30 PM
Fri. Mar. 19th	8.3: Stress and Strain		
WEEK #11	**Fluids Part I**		
Mon. Mar. 22nd	9.1: Phases of Matter; 9.2: Hydrostatic Equilibrium	Tutorial	Quiz Week #10 by 11:59 PM
Tues. Mar. 23rd	9.2: Hydrostatic Equilibrium	Office Hours	
Weds. Mar. 24th	9.3: Pascal's Principle	Tutorial	HW Week #10 by 11:59 PM
Thurs. Mar. 25th	Lab #7: Buoyancy	Office Hours Lab Office Hours	
Fri. Mar. 26th	9.4: Buoyancy and Archimedes' Principle I		Lab #6 by 11:59 PM
WEEK #12	**Fluids Part II**		
Mon. Mar. 29th	9.4: Buoyancy and Archimedes' Principle II	Tutorial	Quiz Week #11 by 11:59 PM
Tues. Mar. 30th	9.5: Surface Tension and Capillarity	Office Hours	
Weds. Mar. 31st	9.6: The Equation of Continuity	Tutorial	HW Week #11 by 11:59 PM

Thurs. Apr. 1st	9.7: Bernoulli's Principle NO LAB	Office Hours Lab Office Hours	
Fri. Apr. 2nd	**Good Friday – No Class**		Lab #7 by 11:59 PM

Date	Suggested Lecture Schedule / Weekly Lab	Synchronous Delivery	Due Dates
WEEK #13	**Thermodynamics Part I**		
Mon. Apr. 5th	**Easter Monday – No Class**		Quiz Week #12 by 11:59 PM
Tues. Apr. 6th	10.1: Temperature, Internal Energy, Thermal Expansion	Office Hours	
Weds. Apr. 7th	10.2: Heat	Tutorial	HW Week #12 by 11:59 PM
Thurs. Apr. 8th	Test #4	Office Hours Test	Test #4 by 7:30 PM
Fri. Apr. 9th	10.3: Calorimetry Problems with no Phase Changes		
WEEK #14	**Thermodynamics Part II**		
Mon. Apr. 12th	10.4: Calorimetry Problems with Phase Changes	Tutorial	Quiz Week #13 by 11:59 PM
Tues. Apr. 13th	Lab #8: Specific Heat	Office Hours	
Weds. Apr. 14th	Review	Tutorial	HW Week #13 by 11:59 PM
Thurs. Apr. 15th	Review	Office Hours Lab Office Hours	
Fri. Apr. 16th	Review		
Sat. Apr. 17th	**All outstanding labs and homework due by 11:59 PM**		Lab #8 by 11:59 PM