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

PHYS-101-D01
Introduction to Physics
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.*

Instructor Information

Instructor:	Nancy McLean
Office Hours:	Tues: 9-9:20 am and 4:30-5:20 pm Wed: 5:00-5:20 pm Thurs: 4:30-5:20 pm Fri: 9:30 – 10:20 am or by appointment
Location:	Remotely online via D2L (online.camosun.ca)
Phone:	N/A
Email:	McLeanN@camosun.bc.ca
Website Info:	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 this course a student will be able to:

1. Demonstrate skill in the use of S.I. base and derived units.
2. Draw graphs (by hand), determine slopes of linear graphs, linearize non-linear data, and write an equation to represent a linear graph.
3. Solve technical problems involving one-dimensional kinematics for a single particle with constant acceleration.
4. Solve technical problems involving the dynamics of a single particle in one dimension using Newton's Laws of Motion.
5. Perform vector analysis using scaled diagrams with applications to displacement and force.
6. Define the terms work, kinetic energy, gravitational potential energy and power.
7. Solve technical problems using the work-kinetic energy theorem and conservation of mechanical energy.
8. Solve technical problems involving simple DC electric circuits, Ohm's Law, and electric power.
9. Define and describe the following properties of waves: period, frequency, wave speed and amplitude.
10. Define the properties of light, including the electromagnetic spectrum.
11. State and apply the Law of Reflection and the Law of Refraction.
12. Assemble simple experimental apparatus using written instructions.
13. Observe, record, organize and display experimental data in tables, graphs or charts.
14. Analyze linear graphs (determine area, slope, intercept, etc.).
15. Interpret experimental results in the context of the experimental objectives.

3. Required Materials

(a) Texts Physics 101 Course Materials book – Available on D2L for free **OR** Hardcopy from Camosun bookstore

(b) Other Scientific calculator, ruler, protractor
Access to a computer with Microsoft Word**
Access to a cellphone, camera or scanner capable of generating PDF documents for submission of homework, labs, tests, etc
Graph paper (must be either 10 lines/inch or millimeter graph paper) – I will post a copy of a blank page on D2L

**Word 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 **synchronously** (meaning that students can access and engage with course content delivery at the set times and days of the week posted on Camlink) These **synchronous** (set time) sessions will be recorded and posted on D2L for students to access & review any time after delivery of the content. Some office hours will be delivered during these synchronous sessions. Other office hours will be delivered outside of class time as per the schedule below.

Asynchronous lecture content will consist of pre-recorded videos, supplemented with typed lecture notes/instructions of content to view and learn. 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 1.5 hours a week.

Labs are set up to be predominantly **synchronous**. Most labs consist of a virtual online introductory session delivered via Collaborate to guide students through the accompanied material consisting of written instructions/data to analyze/virtual labs to complete. Support for the labs will be available during the two-hour lab period or other 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 posted on D2L. There will be an asynchronous quiz delivered each week during the lab period that must be completed by the end of the lab period. All synchronous content will be delivered via D2L's Blackboard Collaborate feature.

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

LECTURE:

Monday:	8:30 AM - 9:20 AM	Synchronous Lecture
Tuesday:	8:30 AM - 9:00 AM	Synchronous Lecture
Tuesday:	9:00 AM – 9:20 AM	Optional Office hours
Wednesday:	Asynchronous material delivered at a time of your choosing	
Thursday:	8:30 AM - 9:20 AM	Synchronous Lecture

LAB:

Friday:	8:30 AM – 9:20 AM	Synchronous Lab/ mandatory test time (on test days)
Friday:	9:20 AM – 10:20 AM	Optional Office hours/mandatory test time (on test days)

OUTSIDE Class time Office Hours: (Or by appointment)

Tuesday & Thursday:	4:30 PM - 5:20 PM
Wednesday:	5:00 PM - 5:20 PM

5. Basis of Student Assessment (Weighting)

The student must be successful in both the theory (≥ 50%) and laboratory assignments (≥ 50%) to pass the course. The approximate percentages used for the final grading are:

4 Term tests	30%	(Dates and times will be posted on D2L)
Assignments	20%	
Quick Quizzes	5%	(During every lab period on Fridays)
Lab Work (1 drop lab allowed)	20%	
Final Exam (3 hours)	25%	

Course Requirements - Please carefully read the following:

Homework and Labs
Due dates for all material, including assignments, labs, texts, will be available on the course page on D2L, but in general:

- Assignments will be given throughout the term (generally weekly) and will be due by the end of the day (11:59 PM) on the posted Due Date for any particular assignment – generally 5 days later.

- Labs assigned in a particular week on Friday lab period will be due by the end of the day (11:59 PM) on the Tuesday of the following week. (E.g. if Lab #1 occurs during week #1 Friday, it will be due the Tuesday of Week #2, etc.). Exceptions will apply when there are tests during the lab period in which case students will have a designated longer time to work on a lab. Students can access and work on the labs after the Friday synchronous lab session, 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 101 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 and must be completed during the specified synchronous time slot in the lab periods noted on the D2L website 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 (mcleanN@camosun.bc.ca)..

- 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, Assignments 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 (McleanN@camosun.bc.ca). The same time deadlines will apply to emailed submissions.

Quizzes

- Weekly asynchronous quizzes cover lecture material.

- These quizzes will go live at the beginning of the Friday lab period (8:30 AM) of a given week and will be available until 10:20 AM of the same lab period. Quizzes can be attempted at any point during this window, but once the quiz has been started, there is a 20-minute time limit.

- 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.

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

(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.)

X	Standard Grading System (GPA)
	Competency Based Grading System

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

STUDY TIME

It is recommended that between 5 and 10 hours per week (or more for students with a weak background) be spent studying for this course outside of class time.

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

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	*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.

OUTLINE:

1. **Measurement**
   - 1.1. Système international d'unités, SI (International System of Units)
     - 1.1.1. Base Units
     - 1.1.2. Prefixes
     - 1.1.3. Derived Units
   - 1.2. Dimensional Analysis for unit conversion
   - 1.3. Significant Figures
   - 1.4. Precision and accuracy
   - 1.5. Scientific Notation

2. **Graphical Analysis**
   - 2.1. Constructing graphs of linear data
     - 2.1.1. Plotting data
     - 2.1.2. Best-fit line
   - 2.2. Analyzing linear graphs
     - 2.2.1. Determination of slope and intercept
     - 2.2.2. The linear equation
   - 2.3. Analyzing non-linear graphs
     - 2.3.1. Recognition of power graphs
     - 2.3.2. Changing variables to produce linear graphs
     - 2.3.3. Writing equations for non-linear graphs

3. **Kinematics in One Dimension**
   - 3.1. Motion diagrams
   - 3.2. Position, distance, displacement
   - 3.3. Vector and scalar quantities
   - 3.4. Graphs of kinematic quantities
     - 3.4.1. Position versus time
     - 3.4.2. Displacement versus time
   - 3.5. Speed and velocity
   - 3.6. Accelerated Motion
     - 3.6.1. Definition of acceleration
     - 3.6.2. Graphs of velocity versus time
     - 3.6.3. Kinematic equations of motion with constant acceleration
     - 3.6.4. Acceleration due to Earth's gravity
     - 3.6.5. Vertical motion near the Earth

4. **Dynamics in One Dimension**
   - 4.1. Force and accelerated motion
   - 4.2. Newton's first law of motion
     - 4.2.1. Concept of inertia
   - 4.3. Newton's second law of motion
     - 4.3.1. Applications of Newton's second law of motion
   - 4.4. Newton's third law of motion
     - 4.4.1. Interaction forces
     - 4.4.2. Ropes and strings
     - 4.4.3. Normal forces

5. **Vectors in Two Dimensions**
   - 5.1. Scaled diagrams for displacements and forces
   - 5.2. Vector components in scaled diagrams

6. Work, Energy and Power

6.1. Work done by a force
6.2. Definition of mechanical power
6.3. Types of mechanical energy
  6.3.1. Kinetic energy
  6.3.2. Gravitational potential energy
  6.3.3. Elastic potential energy
6.4. Work-Energy theorem
6.5. Conservation of mechanical energy

7. Waves

7.1. Types of mechanical waves
  7.1.1. Periodic Motion
  7.1.2. Transverse waves
  7.1.3. Longitudinal waves
7.2. Properties of mechanical waves
  7.2.1. Amplitude
  7.2.2. Wave speed
  7.2.3. Wavelength
  7.2.4. Frequency
  7.2.5. Period
  7.2.6. Wave Superposition

8. Light

8.1. Properties and characteristics
  8.1.1. Ray model
  8.1.2. Luminous sources and illumination
  8.1.3. Opaque, transparent, and translucent materials
8.2. Speed of light
8.3. Wave model of light and the electromagnetic spectrum
8.4. Law of Reflection
  8.4.1. Specular and diffuse reflection
  8.4.2. Images in plane mirrors
  8.4.3. Ray trace diagrams for plane mirrors
8.5. Law of Refraction
  8.5.1. Snell's Law
  8.5.2. Total internal reflection
  8.5.3. Dispersion
  8.5.4. Ray trace diagrams for converging lens

9. Direct Current Circuits

9.1. Definitions
  9.1.1. Properties of charge
  9.1.2. Electric current
  9.1.3. Voltage
  9.1.4. Resistance
9.2. Ohm's Law
9.3. Circuit Diagrams
9.4. Electrical energy and power
9.5. Resistors in Series
9.6. Resistors in Parallel