Alexander College
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CURRICULUM GUIDE: OFFICIAL COURSE OUTLINE

Course Code	PHYS 141	Course Title	Engineering Physics I: Mechanics and Modern Physics			
Credit Value	4	Department	Mathematics and Science			
No. of weeks	14	Hrs. per week	*Lecture*	*Tutorial*	*Laboratory*	*Total*
			3	0	3	6
Course Description	Part I of a two-semester calculus-based general physics course designed for physical science and engineering students. Topics include translational and rotational motion, energy and momentum, simple harmonic motion, gravitation, and introduction to fluids and/or special relativity, as time permits. Students with credit for PHYS 101 may not take PHYS 141 for further credit					
Prerequisite(s)	ENGL 099, BC Physics 12 or PHYS 100 (B), MATH 151 (MATH 151 may be taken concurrently)					

Initial Articulation Targets	*UBC*	*SFU*	*UVic*	*UNBC*	*TRU*
	PHYS_V 117 (3)	PHYS 140 (4), Q/B-Sci	PHYS 1XX (1.5); ALEX PHYS 141 (4) & ALEX PHYS 142 (4) = UVIC PHYS 110 (1.5) & UVIC PHYS 111 (1.5)	PHYS 110 (4)	PHYS 1XXX (3)
	For updated information on the transferability of this course, please consult the BC Transfer Guide, www.bctransferguide.ca				

Learning Outcomes

Upon successful completion of this course, the student will be able to:

- Construct free body diagrams for particles and rigid bodies.
- Determine equations of equilibrium and motion on particles and rigid bodies from external forces including friction and moments.
- Predict the motion of an object using the work-energy theorem and the work-energy theorem for rotation and conservation of mechanical energy.
- Predict the motion of an object using the impulse-momentum and rotational impulse-momentum theorems and the conservation of momentum and angular momentum.
- Predict the motion of objects undergoing simple harmonic motion.
- Explain the principle of relativity and relativity of simultaneity.
- Solve problems relating to time dilation and length contraction.
- Set-up, record, and analyze data from experiments using uncertainty analysis and compare the results to theory.

Alexander College
Main Campus 4805 Kingsway, Burnaby, BC V5H 4T6
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<table>
<tr><td>Content</td><td>Core topics – all of the following will be covered:
Kinematics: Rectilinear, Curvilinear, Relative Motion
Kinetics
Impulse-Momentum Theorem and Conservation of Momentum
Work-Energy Theorem and Conservation of Mechanical Energy
Rigid Body Dynamics including Moment of Inertia
Simple Harmonic Motion
Special Relativity: Principle of Relativity, Relativity of Simultaneity, Time Dilation, and Length Contraction
Additional topics may also be covered, at the discretion of the instructor:
Fluid Statistics and Fluid Dynamics
Labs:
Uncertainty Propagation Rules
Projectile Motion
Graphing
Using Excel to Examine Air Resistance
Cart and Pulley
Rolling Motion
Friction
Hooke’s Law
Simple Harmonic Motion</td></tr>
<tr><td>Methods of Instruction</td><td>Lectures, problem sessions, assignments, laboratory work, presentations, assigned reading, quizzes, exams</td></tr>
<tr><td>Required Textbook(s)</td><td>The following textbook(s) is/are required, or approved equivalent(s).

Moebs, William et al. University Physics Volume 1, 2, 3. Houston, TX: OpenStax CNX, 2022.</td></tr>
<tr><td>Required Equipment and Technology</td><td>Students are required to have a computer with internet access.
The following resources are provided by the College:
Office 365
Student email</td></tr>
<tr><td>Homework Hours</td><td>At minimum, students can expect one hour of homework for every hour of instructional time.</td></tr>
<tr><td>Evaluation</td><td><table><tr><th>Component</th><th>% Value</th></tr><tr><td>Quizzes and assignments</td><td>10-25%</td></tr><tr><td>Laboratory experiments and activities
• Weight divided over 9 labs</td><td>10-20%</td></tr><tr><td>Midterm exam (1-2)</td><td>20-40%</td></tr><tr><td>Comprehensive final exam</td><td>30-35%</td></tr></table></td></tr>
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Completion Requirements	The minimum grade to pass this course is D (50%). Unless otherwise stated, a minimum grade of C- (55%) is required for this course to fulfil a prerequisite.		
Course Designer(s)	Michael Wortis, Ph.D., Professor Emeritus, Department of Physics, Simon Fraser University	Consultant(s), *if applicable*	Neil Alberding, Ph.D., Department of Physics, Simon Fraser University and other SFU faculty/staff
Dean's Approval	Marv Westrom, Ph.D. Professor Emeritus, Faculty of Education, University of British Columbia	Dean's Approval Date	September 29, 2010
Curriculum Committee Approval Date	February 29, 2010	First Term Offered	Fall 2011
Last Review Date	September 1, 2024	Next Review Date	September 1, 2029
Revision History	June 11, 2012-Removed from course content: "details of these units may be adjusted at the discretion of the instructor." By Mary Imran (by request of Barbara Moon) September 1, 2024 - Lab assignments and assessments detailed by Kelly Cheung.		