UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	September 1997
COURSE REVISED IMPLEMENTATION DATE:	September 2007
COURSE TO BE REVIEWED:	March 2011
(Four years after implementation date)	(MONTH YEAR)

OFFICIAL COURSE OUTLINE INFORMATION

Students are advised to keep course outlines in personal files for future use.
Shaded headings are subject to change at the discretion of the department and the material will vary - see course syllabus available from instructor

FACULTY/DEPARTMENT: **Faculty of Science, Health and Human Services**

COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
PHYS 100		**4**

Intoductory Physics I
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course is designed for students who have not taken physics before, and either need grade 11 physics equivalency for entry to a technical program, or are interested in continuing on in science. It also satisfies the Laboratory Science requirement for the UCFV BA. The course material overlaps Physics 11 and PHYS 083, and includes such topics as: kinematics, energy, wave motion, and geometric optics. Some discussion of relativity and nuclear energy is also included. This course is designed as an entry-level course for students strong in mathematics who have no physics background.

PREREQUISITES: **Any BC Math 12 or MATH 094 or COMP 138**
COREQUISITES: **MATH 095 is suggested**

SYNONYMOUS COURSE(S)
(a) Replaces: **n/a** *(Course #)*
(b) Cannot take: **PHYS 083** *(Course #)* for further credit.

SERVICE COURSE TO: *(Department/Program)* *(Department/Program)*

TOTAL HOURS PER TERM: **90**
STRUCTURE OF HOURS:

Lectures:	**60**	Hrs
Seminar:		Hrs
Laboratory:	**30**	Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

TRAINING DAY-BASED INSTRUCTION
LENGTH OF COURSE:
HOURS PER DAY:

MAXIMUM ENROLLMENT:	**36**	
EXPECTED FREQUENCY OF COURSE OFFERINGS:	**two sections per year**	
WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☒ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by department)	☒ Yes	☐ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☒ Yes	☐ No

AUTHORIZATION SIGNATURES:

Course Designer(s): Tim Cooper / Norm Taylor/Carmen Herman
Chairperson: Arthur Last *(Curriculum Committee)*
Department Head: Norm Taylor
Dean: Wanda Gordon
PAC Approval in Principle Date:
PAC Final Approval Date: Mar. 2, 2007

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

Student Objectives:
After completing PHYS 100, the 100% successful student will be able to:

1. Explain what is meant by uniform motion, uniform accelerated motion, and free fall motion.
2. Apply one of the five constant acceleration motion equations to solve for one of the five parameters; displacement, initial and final speed, time, or acceleration.
3. Analyze a distance versus time graph in order to determine instantaneous and average speed, or find the equation relating the distance and time.
4. Analyze a velocity versus time graph in order to determine instantaneous and average acceleration and displacement, or find the equation relating the velocity and time.
5. Apply the equations for accelerated motion to solve free fall problems.
6. Add vectors using a vector diagram, and apply it to determine the net force acting on a object.
7. Solve relative motion problems using vector diagrams.
8. Solve circular motion problems using the equation relating the centripetal acceleration, radius of a circle, and the object's velocity or period.
9. Explain the differences between mass and weight, and measure them both using the appropriate instruments (mass balance or spring balance).
10. Characterize the gravitational field; field strength and variations due to latitude and height above sea level.
11. Construct and interpret a free body diagram from the forces acting on the body.
12. Apply the appropriate equation to calculate the unknown variable using the equations for gravitational force between two objects, spring force, friction force, kinetic energy, potential energy, work, power, and momentum.
13. State and apply Universal Gravitation Law, Friction Law, Hooke's Law, Newton's three Laws, Conservation of Momentum Law, Conservation of Energy Law, and Refraction and Reflection Laws in solving problems and in explaining events from everyday life (motion, interaction of objects, free fall, rotation of the planets, etc.).
14. Identify and explain situations in which mechanical energy is conserved.
15. Describe the operating principle of simple machines.
16. Determine the resultant of two and more waves using the Principle of Superposition.
17. Use ray diagrams, wave-front sketches, and standing waves diagrams to explain the phenomena of reflection, refraction, diffraction, and interference, and how images are formed in lenses and mirrors.
18. Explain the operating principle of a simple telescope, simple camera, magnifying glass, and microscope, and explain eye defects using reflection and refraction.
19. Apply the appropriate equation to calculate the unknown variable in the magnification equation as it applies to mirrors and lenses.
20. State the two postulates of the special theory of relativity, explain the equivalence of energy and mass, and describe the relativistic effects of time dilation, length contraction, and mass increase.
21. Compare and contrast fusion and fission reactions, and describe the operating principles of a nuclear reactor, an atomic bomb, and the Sun.

Laboratory objectives:
After completing the experiments in PHYS 100, successful students should be able to:

1. Gather a complete and accurate record of the data, and then tabulate it for each experiment.
2. Estimate the level of accuracy of different types of measuring apparatus; rulers, metersticks, spring and mass balances, ticker tape, and photogate timers for each experiment.
3. Estimate the magnitude of the errors in their measurements using the error analysis method for each experiment.
4. Summarize and discuss the final results, analyze the difficulties of the experiment, and offer suggestions for improvement for each experiment.
5. Measure and record data to construct correct Distance versus Time, Velocity versus Time, and Force versus Acceleration graphs for uniform and accelerated motions using a recording timer, ticker tape, and graph paper.
6. Analyze a distance versus time graph in order to determine instantaneous and average speed, or the equation relating the distance and time for the motion of an object on an inclined plane or a free falling object.
7. Analyze a velocity versus time graph in order to determine instantaneous and average acceleration for the motion of an object on an inclined plane or a free falling object.
8. Use one of two different methods (motion on an inclined plane or free fall motion) to determine the acceleration due to the gravity.
9. Verify the Friction law using Friction Force versus Normal Force graph for wood-wood contact surfaces or, alternatively, Hooke's Law using a Force versus Extension graph for a spring of negligible mass.
10. Verify Newton's second Law for a constant mass system using a Force versus Acceleration graph.
11. Test the Conservation of Energy Law for the motion of an object on an inclined plane or a free falling object using an Energy versus Position graph.
12. Test the Conservation of Momentum Law in one dimension for both elastic and inelastic collisions between two laboratory

carts, using a time recording device (ticker tape timer or photogate timer).

13. Verify the Law of Reflection and Law of Refraction (Snell's Law) using ray boxes, mirrors, semi-circular lenses, and polar graph paper, and apply those laws in determining the physical variables characterizing mirrors and lenses.

Department Objectives:

1. Students will become acquainted with the scientific methods of physics.
2. Students will be able to more realistically assess their chance for a successful career in a science or technology-related field.
3. Successful completion of this course will also give students access to our PHYS 101 and PHYS 111 courses.
4. Students will appreciate that the knowledge they have gained has provided them with the ability to better understand the world in which they live.
5. Students will appreciate the fact that science demands that all theories be checked as often as possible in a laboratory.
6. Students will be able to discuss and use the methods and techniques of theoretical and experimental physics.
7. Students will be able to enter and successfully complete more advanced physics courses.

METHODS:

Lecture, demonstration, small group practice, discussion, laboratory.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

Credit can be awarded for this course through PLAR (Please check:) ☒ Yes ☐ No

METHODS OF OBTAINING PLAR:

Please see the Physics PLAR policy on the department's webpage.

TEXTBOOKS, REFERENCES, MATERIALS:

[Textbook selection varies by instructor. An example of texts for this course might be:]

D.C. Heath, 'Fundamentals of Physics' (1993)

SUPPLIES / MATERIALS:

Fully-equipped physics lab

STUDENT EVALUATION:

[An example of student evaluation for this course might be:]

Final weighting to be determined by instructor.

Final exam	45%
Midterm	25%
Labs	15%
Homework	15%

COURSE CONTENT:

[Course content varies by instructor. An example of course content might be:]

Week 1 Introduction, Kinematics in one dimension

Week 2 Kinematics in one dimension

Week 3 Kinematics in one and two dimensions, Projectiles

Week 4 Forces in one dimension (gravity, friction, springs)

Week 5 Newton's Laws

Week 6 Work, Energy, Power, Efficiency

Week 7 Momentum, Impulse

Week 8 Midterm

Week 9 Waves (qualitative, quantitative)

Week 10 Reflection, Interference, Diffraction, Refraction

Week 11 Geometric Optics: Mirrors

Week 12 Geometric Optics: Lenses

Week 13 Modern Physics (relativity and nuclear energy)

Week 14 Review/Catch-up

LABORATORY EXPERIMENTS:

Lab 1 Introduction, Measurement and Graphing Exercises, Error Analysis and Math Review (2 weeks)

Lab 2 Uniformly Accelerated Motion

Lab 3 Forces: Friction

Lab 4 Forces: Springs

Lab 5 Newton's 2nd Law of Motion

Lab 6 Conservation of Momentum

Lab 7 Conservation of Energy

Lab 8 Mirrors and Images

Lab 9 Refraction