UNIVERSITY OF THE FRASER VALLEY

UPAC FORM #2 (Page 1)

COURSE IMPLEMENTATION DATE:	June 1993
COURSE REVISED IMPLEMENTATION DATE:	September 2011
COURSE TO BE REVIEWED:	May 2010
(Four years after UPAC final approval date)	(Month Year format)

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 - see course syllabus available from instructor

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

PHYS 382		**3**
COURSE NAME/NUMBER	FORMER COURSE NUMBER	UFV CREDITS

Modern Physics Laboratory I
COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This eclectic laboratory course is designed to give students a chance to perform many traditional and modern experiments. The students will be required to do a selection of experiments from a list spanning the many disciplines of physics: dynamics, optics, solid state physics, fluid dynamics, thermodynamics, electricity, magnetism, electronics, nuclear physics, etc. Students will also have the option of selecting a group of experiments concentrating on one branch of physics (e.g. advanced mechanics, optics, etc.)

PREREQUISITES **PHYS 221 or PHYS 232**
COREQUISITES: **One of PHYS 302, 321, 322, 351 or 410 is strongly recommended**

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

SERVICE COURSE TO: *(Department/Program)*

TOTAL HOURS PER TERM: **45**
STRUCTURE OF HOUR

Lectures:		Hrs
Seminar:		Hrs
Laboratory:	**45**	Hrs
Field Experience:		Hrs
Student Directed Learnin		Hrs
Other (Specify):		Hrs

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

MAXIMUM ENROLLMENT: **24**
EXPECTED FREQUENCY OF COURSE OFFERINGS: **Once every 2 or 3 years**

WILL TRANSFER CREDIT BE REQUESTED? (lower-level courses only)	☐ Yes	☐ No
WILL TRANSFER CREDIT BE REQUESTED? (upper-level requested by departm	☐ Yes	☒ No
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE:	☐ Yes	☒ No

AUTHORIZATION SIGNATURES:

Course Designer(s): G. McGuire/P. Mulhern, revised N. Taylor
Chairperson: Gillian Mimmack *(Curriculum Committee)*

Department Head: Norm Taylor
Dean: Dan Ryan

UPAC Approval in Principle Date:
UPAC Final Approval Date February 26, 2010

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

General Objectives:

1. The students should learn that a theoretical claim is only as good as the supporting data.
2. The students will have a chance to form and answer their questions experimentally.

Specific Objectives:

1. The students will use several standard measuring devices found in most modern physics labs.
2. Students will have the opportunity to measure and to check if the classroom theory is reproducible in the lab.
3. Students will have the opportunity to do some simple research projects.
4. The students are to develop lab and presentation skills to make them more employable.
5. Students will have to practise the technical communication and presentation skills used in industry and research.
6. Students will become familiar with the theory, apparatus, procedure and results of several experiments from the list in the Course Content section.

METHODS:

1. The student will be required to do a selection of experiments from a suggested list related to a specific course like PHYS 410 (History of Physics), PHYS 302 (Optics), PHYS 321 (Advanced Mechanics), PHYS 322 (Advanced Electricity and Magnetism) or PHYS 351 (Quantum Mechanics) or they may choose from a list of suggested experiments, which will cover a wide cross section of the standard physics disciplines: mechanics, electricity, magnetism, optics, thermodynamics, solid state physics, electronics, etc.
2. The students will work individually.

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:]

None

SUPPLIES / MATERIALS:

Fully-equipped Physics Lab

STUDENT EVALUATION:

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

1. The majority of marks earned (75%) in this course will be derived from the accumulated grades assigned to the individual laboratory reports.

2. The students will be required to give a seminar in which they will discuss the theory and present their data. This seminar will be worth 25% of the final grade assigned.

COURSE CONTENT:

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

Optics Group: (PHYS 302)

1. Geometric Optics (Visible Light or Microwave Optics)
2. Interference and Diffraction (Single & Double Slit)
3. Grating and/or Prism Spectrometer
4. Michelson Interferometer and the Index of Refraction of Air
5. Fabry-Perot Interferometer
6. Speed of Light (2 procedures – Rotating Mirror and Coaxial cable)
7. Fresnel Lenses
8. Zeeman Effect
9. Thin Film Interference
10. Analysis of Mirage optics demo

Advanced Mechanics Group: (PHYS 321)

1. Determine the numerical value for the Gravitational constant G. (Cavendish apparatus)
2. Measuring the acceleration due to gravity. (Kater's Pendulum)
3. Mechanical Equivalent of Heat
4. Angular Momentum
5. Gyroscopic Precession and Nutation
6. Measuring the rolling friction and air friction on an automobile as a function of its speed
7. Measuring the lift to drag ratio on various shaped bodies in a laminar airflow situation
8. Terminal Velocity of a Balloon and Bubbles

Advanced E&M Group: (PHYS 322)

1. Plotting of Magnetic Fields (3D) – Helmholtz Coils
2. Ferromagnetism (Hysteresis)
3. Impedance of Loudspeakers
4. Current Balance
5. Coils & Spinning Magnets

6. Hall Effect

20th Century Physics Group: (PHYS 351)

1. Black Body Radiation
2. Millikan Oil Drop Experiment
3. Photoelectric Effect
4. Michelson/Morley
5. Radiation – Physics and Probability
6. Franck-Hertz Experiment
7. Electron Spin Resonance
8. Measurement of heat loss from various residences using an infrared camera

Historical Group: (PHYS 410)

1. Millikan Oil Drop Experiment
2. Photoelectric Effect
3. Michelson/Morley
4. Curvature of the Earth
5. Geometric Parallax
6. Galilean experiments (rolling bodies, speed of light, etc.)
7. Galilean Astronomy (telescope, observations, calculations, etc.)
8. Foucault's Pendulum
9. Gas Laws (Boyle's Law, Charles Law)

Other Experiments:

1. Expansion and Thermal Conductivity of Metals
2. Viscous Flow through tubes
3. Doppler Effect

. . . and many more . . .

Individual Research Projects