UNIVERSITY COLLEGE of the FRASER VALLEY

COURSE IMPLEMENTATION DATE:	June 1993
COURSE REVISED IMPLEMENTATION DATE:	September 2006
COURSE TO BE REVIEWED:	November 2009
(Four years after UPAC final approval 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 Sciences, Health & Human Services/Physics**

COURSE NAME/NUMBER	FORMER COURSE NUMBER	UCFV CREDITS
PHYSICS 222		**4**

Electricity, Magnetism & Circuits

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course extends the topics covered in Physics 112. Topics include steady-state and time-varying electric and magnetic fields, elements of DC and AC circuits, complex vector representation of sinusoidal quantities, and electric and magnetic properties of solids. Experiments in voltage, current and impedance measurements, and RC, RL and RLC circuits are used to reinforce the classroom theory. The course will be presented using lectures, tutorials, and laboratory experiments.

PREREQUISITES: **Phys 221 and Phys 112**
COREQUISITES:

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

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

TOTAL HOURS PER TERM: **120**

STRUCTURE OF HOURS:

Lectures:	**75**	Hrs
Seminar:		Hrs
Laboratory:	**45**	Hrs
Field Experience:		Hrs
Student Directed Learning:		Hrs
Other (Specify):		Hrs

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

MAXIMUM ENROLLMENT:	**24**	
EXPECTED FREQUENCY OF COURSE OFFERINGS:	**once a 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): George McGuire
Chairperson: Gillian Mimmack *(Curriculum Committee)*
Department Head: Norm Taylor
Dean: Jackie Snodgrass
UPAC Approval in Principle Date:
UPAC Final Approval Date: December 14, 2005

LEARNING OBJECTIVES / GOALS / OUTCOMES / LEARNING OUTCOMES:

If successful in this course, students should be able to:

1. demonstrate their understanding of the physics they have studied by being able to solve related problems;
2. appreciate that the knowledge they have gained has provided them with the ability to better understand the world in which they live;
3. appreciate the fact that science demands that all theories be checked in a laboratory;
4. discuss and use the methods and techniques of theoretical and experimental physics;
5. enter and successfully complete more advanced physics courses.

METHODS:

This course will be presented using lectures and laboratory experiments. Audio-visual aids and computer algebra (Maple) will be used where appropriate. Close coordination will be maintained between laboratory and classroom work whenever possible.

PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

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

METHODS OF OBTAINING PLAR:

Departmental Review and/or Course Challenge

TEXTBOOKS, REFERENCES, MATERIALS:

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

Griffiths, D. Introduction to Electrodynamics, 3rd Edition , Prentice Hall, 1999

REFERENCES:

1. Melissinos and Lobkowicz, Physics for Scientists and Engineers, Saunders
2. Morris, N., Electrical Circuits and Systems, Prentice-Hall, 1973
3. Driscoll, F., Analysis of Electric Circuits, Prentice-Hall, 1973
4. Kip, A., Fundamentals of Electricity and Magnetism, McGraw-Hill, 1969

SUPPLIES / MATERIALS:

Fully-equipped physics lab

STUDENT EVALUATION:

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

Assignments	10%
Mid-term and in-term exams	25%
Laboratory Work	10%
Quizzes	10%
Final Examination	45%

COURSE CONTENT:

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

AC CIRCUITS: complex representation of AC circuits, series and parallel RLC circuits, resonance, transient and steady state responses, Norton's and Thevenin's theorem

VECTOR ANALYSIS: Curvilinear coordinates, Del operator (gradient, divergence and curl), Dirac Delta function

ELECTROSTATICS: electric fields, electric potential, work and energy

SPECIAL TECHNIQUES: method of images, numerical techniques

DIELECTRICS: introduction to polarization, dipole moment per unit volume, electric displacement vector, permittivity, susceptibility, dielectric constant, stored energy in a dielectric medium

MAGNETOSTATICS: Lorenz Force law, properties of a B field, Ampere's Law, Biot-Savart Law, magnetic flux, torque on a current loop, forces on isolated charges, curl, Hall effect, divergence and curl, magnetic vector potential.

MAGNETISM IN MATTER: magnetic contribution of matter, the three magnetic vectors (H, B. and M), paramagnetism, diamagnetism, ferromagnetism.

ELECTRODYNAMICS: electromotive force, induction, Maxwell's Equations, displacement current, propagation of energy and momentum by electromagnetic waves, Poynting vector.

LABORATORY EXPERIMENTS:

1. A simple AC curcuit
2. A damped AC circuit
3. Forced LRC and resonance in an AC circuit
4. Millikan Experiment (2 periods)
5. Diodes
6. Digital logic circuits
7. Magnetic forces
8. Magnetic moments (2 periods)