OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	September 1993
COURSE REVISED IMPLEMENTATION DATE:	January 2014
COURSE TO BE REVIEWED: *(six years after UEC approval)*	January 2020 *(month, year)*

OFFICIAL UNDERGRADUATE 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 – see course syllabus available from instructor

PHYS 112	Science/Physics	5
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Electricity and Magnetism

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course follows PHYS 111 and is designed for students who are planning to continue their studies in physics or any of the other sciences. Topics include electric fields, Gauss's law, electric potential, circuits, Kirchhoff's laws, magnetic fields, magnetic induction, and finally, a study of Maxwell's equations. The laboratory portion of the course uses experiments to reinforce the theory covered in class.

PREREQUISITES: MATH 111 and one of (PHYS 111, PHYS 105 with a B, or PHYS 101 with a B+).

COREQUISITES:

PRE or COREQUISITES: ~~One of MATH 112, MATH 118, or PHYS 111 with an A.~~
One of MATH 112 or MATH 118. Note: The Physics department will waive this requirement for students with an A in PHYS 111.
(Updated Nov. 2018)

SYNONYMOUS COURSE(S):

(a) Replaces:

(b) Cross-listed with:

(c) Cannot take: for further credit.

SERVICE COURSE TO: *(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:

OTHER:

Maximum enrolment: **36**

Expected frequency of course offerings: annually

(every semester, annually, every other year, etc.)

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

Course designer(s):	**Tim Cooper**		
Department Head:	**Derek Harnett**	Date approved:	**May 15, 2013**
Campus-Wide Consultation		Date of meeting:	**n/a**
Curriculum Committee chair:	**David Fenske**	Date approved:	**June 21, 2013**
Dean/Associate VP:	**Lucy Lee**	Date approved:	**June 21, 2013**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**September 27, 2013**

LEARNING OUTCOMES:

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

- demonstrate their understanding of the fundamental laws of electricity and magnetism, and learn how to apply the theory to solve related problems in introductory electromagnetism.
- use and investigate fundamental electromagnetism and introductory analog electronics using modern apparatus, and interpret the data obtained.
- demonstrate an understanding for the order of magnitude of physical quantities in real electromagnetic and electronics experiments.
- continue to develop their "error consciousness", i.e. assigning numerical values for different types of uncertainties in data, and use these numbers to calculate the uncertainties in values in electronics and electromagnetism experiments.
- use calculus in their solutions, up to and including using Maxwell's equations in integral form.
- understand the meaning of a Gaussian surface, Amperian and Faraday's loops and be able to use them to solve for the electric and magnetic field in symmetric charge/current distributions.
- use calculus and Kirchhoff's Rules to solve for quantities in simple R, RC, RL and LC circuits.
- explain the connection between flux and field for both electric and magnetic fields.

METHODS: *(Guest lecturers, presentations, online instruction, field trips, etc.)*

This course will be presented using lectures and laboratory experiments. Films or other audio-visual aids may be used where appropriate. Problems will be assigned on a regular basis which are to be handed in and marked. Problems that require the use of calculus will be emphasized. Close coordination will be maintained between laboratory and classroom work. Computer-assisted learning programs will be used to increase the understanding of the concepts being studied.

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☒ Examination(s) ☐ Portfolio assessment ☐ Interview(s)

☒ Other (specify): Evidence of skill equivalent to the lab part of the course

TEXTBOOKS, REFERENCES, MATERIALS: *[Textbook selection varies by instructor. Examples might be:]*

Young and Freedman, *University Physics*, 12th ed. (UFV edition), Pearson, 2008
References:
F. Beuche, *Introduction to Physics for Scientists and Engineers,* 3rd ed., McGraw-Hill, 1980
F. Sears & M. Zemansky, *University Physics*, 5th ed., Addison Wesley, 1979
R. Serway, *Physics for Scientists and Engineers*, Holt, Rinehart and Winston, 1993
Halliday/Resnick/Walker, *Fundamentals of Physics*, 6th edition extended, John Wiley & Sons, Toronto, 2000

SUPPLIES / MATERIALS:

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

Assignments	10%
Midterm	20%
Laboratory work	15%
Final exam	45%
Quizzes	10%

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

1. Coulomb's Law, electric field, potential, capacitance, Gauss' Law
2. Electric current, electromotive force, Ohm's Law, Joule's Law, Kirchhoff's Laws, RC time constant
3. Magnetic field, currents, force on a moving charge
4. Sources of magnetic field, Bio Savart Law, Ampere's Law, and production of B fields
5. Magnetic induction, induction, induced emf, Faraday's Law, Lenz's Law, mutual inductance, energy in a magnetic field
6. Maxwell's Equations, E and B waves, energy in E/m waves
7. Introduction to time varying electric and magnetic fields and behaviour of AC circuits