OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	Fall 1993
COURSE REVISED IMPLEMENTATION DATE:	January 2012
COURSE TO BE REVIEWED:	October 2015
(six years after UEC approval)	*(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 105	**Science / Physics**	**5**
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Heat, Waves and Optics

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

Though suitable for all science students, this course is of particular interest to students taking biology and chemistry. Topics include thermodynamics, waves, geometric and wave optics, and electric circuits. This course can be taken by students who only need one non-calculus physics course, and already have Physics 11, or can be the second half of a full-year non-calculus program. The course can also be used in combination with Physics 111 as an entry into a UFV physics major, although PHYS 111 and 112 is the preferred route.
Note: Both PHYS 101 and PHYS 105 are often required for transfer.

PREREQUISITES: One of (Principles of Mathematics 12, Pre-Calculus 12, MATH 095, or MATH 110) and one of (Physics 11, PHYS 083, or PHYS 100); or one of Physics 12, PHYS 093, PHYS 101, or PHYS 111.

COREQUISITES:

PRE or COREQUISITES:

SYNONYMOUS COURSE(S):

(a) Replaces: **PHYS 102**

(b) Cross-listed with:

(c) Cannot take: for further credit.

SERVICE COURSE TO: *(department/program)*
Biology and Chemistry

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; Revised Joss Ives**		
Department Head:	**Norm Taylor**	Date approved:	**April 2011**
Supporting area consultation (Pre-UEC)		Date of meeting:	**April 8, 2011**
Curriculum Committee chair:	**Norm Taylor**	Date approved:	**May 13, 2011**
Dean/Associate VP:	**Ora Steyn**	Date approved:	**June 3, 2011**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**October 28, 2011**

LEARNING OUTCOMES:

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

- Analyze circuits consisting of multiple resistive elements in series and parallel.
- Use graphical and mathematical representations to describe simple harmonic motion, an important type of oscillation.
- Apply the principle of interference to determine the resulting wave shapes from overlapping waves in systems that involve sound waves, light waves or waves on a string.
- Solve sound and light problems that involve concepts such as intensity and the Doppler shift.
- Use ray optics to solve problems consisting of the reflection and/or refraction of light.
- Analyze systems consisting of lenses in combination including eye glasses and microscopes.
- Identify which of the three processes of heat exchange are dominant in a given physical situation; calculate rate of heat transfer.
- Solve calorimetric problems involving temperature changes and phase changes.
- Analyze situations using the laws of thermodynamics.
- Analyze devices which convert heat into work (heat engines) or use work to remove heat from a system (refrigerators and air conditioners).

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

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

METHODS OF OBTAINING PRIOR LEARNING ASSESSMENT RECOGNITION (PLAR):

☒ Examination(s) ☐ Portfolio assessment ☐ Interview(s) ☒ Other (specify): Evidence of appropriate laboratory skills.

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

Walker, *Physics*, Pearson
Knight, Jones and Field, College Physics, Pearson
Cutnell and Johnson, Physics, Wiley

SUPPLIES / MATERIALS:

Fully-equipped physics lab.

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

Assignments	15%
Midterm(s)	20%
Laboratory work	15%
Final exam	40%
Quizzes	5%
Final project	5%

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

Weeks 1 & 2 – Chapter 21 – Electric Current and Direct-Current Circuits
Week 3 – Chapter 13 – Oscillations About Equilibrium
Week 4 – Chapter 14 – Waves and Sound
Week 5 – Chapter 25 – Electromagnetic Waves
Weeks 6 & 7 – Chapter 26 – Geometrical Optics
Week 8 – Chapter 27 – Optical Instruments
Week 9 – Chapter 28 – Physical Optics: Interference and Diffraction
Week 10 & 11 – Chapter 16 – Temperature and Heat
Week 12 – Chapter 17 – Phase and Phase Changes
Week 13 – Chapter 18 – The Laws of Thermodynamics

Laboratory Experiments
Experiment 1 – Introduction to the Lab
Experiment 2 – Ohm's Law
Experiment 3 – Resistors in Series and Parallel
Experiment 4 – Standing Waves on a Wire
Experiment 5 – Standing Waves in an Air Column
Experiment 6 – Thin Lenses
Experiment 7 – Interference and Diffraction
Experiment 8 – Grating Spectrometer
Experiment 9 – Specific Heat of a Metal and Heat of Fusion of Water
Experiment 10 – Electrical Equivalent of Heat