OFFICIAL UNDERGRADUATE COURSE OUTLINE (page 1)

COURSE IMPLEMENTATION DATE:	September 1993
COURSE REVISED IMPLEMENTATION DATE:	September 2013
COURSE TO BE REVIEWED: *(six years after UEC approval)*	May 2012 *(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 111	Science / Physics	5
COURSE NAME/NUMBER	FACULTY/DEPARTMENT	UFV CREDITS

Mechanics

COURSE DESCRIPTIVE TITLE

CALENDAR DESCRIPTION:

This course is intended for students who are planning to study engineering science or life sciences. Topics covered include vectors, kinematics, dynamics, work and energy, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, and gravitation. The object is to understand the fundamental laws of mechanics, to learn how to apply the theory to solve related problems, and to develop a feeling for the order of magnitude of physical quantities in real experiments.
Note: Students cannot take PHYS 100 or PHYS 101 for further credit.

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 Physics 12; or PHYS 093.
~~Note: Students with B.C. Calculus 12, IB Math 12, or AP Calculus 12 A or B should contact the instructor or department head for permission to register.~~ *(Note removed July 2018.)*

COREQUISITES:

PRE or COREQUISITES: MATH 111 highly recommended.
Note: Math 111 with a C or better and MATH 112 are required pre or corequisites for PHYS 112.

SYNONYMOUS COURSE(S):
(a) Replaces:
(b) Cross-listed with:
(c) Cannot take: **PHYS 100 or PHYS 101** for further credit.

SERVICE COURSE TO: *(department/program)*

TOTAL HOURS PER TERM: **105**

STRUCTURE OF HOURS:

Lectures:	**75**	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:

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
TRANSFER CREDIT EXISTS IN BCCAT TRANSFER GUIDE: ☒ Yes ☐ No

Course designer(s):	**G.McGuire; revised T. Cooper**		
Department Head:	**Norm Taylor**	Date approved:	**April 2011**
Supporting area consultation		Date of meeting:	**April 8 2011**
Curriculum Committee chair:	**Norm Taylor**	Date approved:	**December 16 2011**
Dean/Associate VP:	**Ora Steyn**	Date approved:	**January 13, 2012**
Undergraduate Education Committee (UEC) approval		Date of meeting:	**February 3, 2012**

LEARNING OUTCOMES:

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This course is designed for students to use a calculus-based approach to solve physics problems as they apply to science, engineering, and the life sciences. Upon successful completion of this course, students will be able to, among other things:

1. demonstrate their understanding of the fundamental laws of Newtonian mechanics by applying the theory to solve related problems.
2. perform fundamental laboratory experiments in simple mechanics, and interpret the data obtained.
3. estimate the order of magnitude of physical quantities in simple mechanics experiments using basic instrumentation.
4. begin to develop their "error consciousness", i.e. begin to assign numerical values for different types of uncertainties in data, and use these numbers to calculate the uncertainties in values in mechanics experiments.
5. use vectors in conjunction with applied calculus to solve problems in mechanics.
6. solve kinematic and dynamic problems with rotational motion, calculating moments of inertia from the definition and using the parallel axis theorem.
7. calculate the vector gravitational force and potential energy from several point masses and spheres.
8. apply conservation of energy and angular momentum to elliptical orbits and Newton's Second law to circular motion.
9. calculate escape velocity and the time periods of circular orbits.

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 will 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): Course challenge plus evidence of having appropriate laboratory skills

☐ PLAR cannot be awarded for this course for the following reason(s):

TEXTBOOKS, REFERENCES, MATERIALS:

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

Halliday/Resnick/Walker, Fundamentals of Physics, Extended 6th Edition, John Wiley & Sons, Toronto, 2000.

REFERENCES:

1. F. Beuche, Introduction to Physics for Scientists and Engineers, 3rd Edition, McGraw-Hill, 1980.
2. F. Sears & M. Zemansky, University Physics, 5th Edition, Addison Wesley, 1979.
3. R. Serway, Physics for Scientists and Engineers, Holt, Rinehart and Winston, 1993.

SUPPLIES / MATERIALS:

Fully-equipped physics lab.

STUDENT EVALUATION:

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

Assignments	20%
Mid-term	25%
Laboratory work	15%
Final exam	40%

COURSE CONTENT:

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

- Introduction to course: relationship of lecture, tutorials, and laboratories; units and dimensional analysis
- Vectors: vector and scalar quantities, addition, resultant of several vectors, unit vector, dot and cross product
- Kinematics of a Particle: speed and velocity, relative velocity, average velocity, acceleration, rectilinear motion with constant acceleration, projectiles
- Dynamics of a Particle: Newton's laws of motion and applications, friction and motion on an incline
- Momentum: definition, linear momentum, conservation of momentum, impulse
- Work, Energy, and Power: work, kinetic energy, gravitational potential energy, elastic potential energy, equivalence of mass and energy, power
- Conservation of Energy: collisions, types of collisions, conservation of total energy, mechanical energy
- Rotational Kinematics: angular quantities, angular speed and velocity, angular acceleration, tangential quantities, radial acceleration, centripetal force
- Rotational Dynamics: kinematics of pure rotation, centre of mass, torque and rotational inertia, angular momentum, conservation of angular momentum
- Gravitation: law of gravitation, gravitational force and weight, satellite motion, Kepler's laws
- Periodic Motion: Hooke's law, simple harmonic motion, period, displacement, velocity and acceleration for SHM, pendulum and spring motion