First Semester Physics, Major
(Physics 111 or equivalent)

Prerequisite – Calculus I (including definite integration) taken as pre- or co-requisite; must be transferable.

Required Supporting Documents – The following documentation must be included with the transfer request:

- Course Syllabus (include course number and name)
- Lab Syllabus
- Examples of Assessment – Comprehensive final **or** up to 5 examples of course assessment including tests and quizzes. The example assessments should be representative of the way conceptual understanding and mathematics is integrated into the class.
- Description of Mathematics Expectations – As part of the Learning Outcomes or as a separate section detail the types of mathematical calculations the students are expected to perform.

Description: Students learn introductory principles of physics using calculus and vector algebra. The course covers kinematics and dynamics in one, two, and three dimensions, including linear and rotational motion; Newton's three laws of motion; Newton's law of gravitation; energy and momentum; conservation laws for energy, momentum, and angular momentum; equilibrium; periodic motion; and orbital motion. Topics of fluid mechanics; wave motion and sound; and basic thermodynamics may be covered but are not required. **This class is appropriate for students wishing to matriculate in physical science or engineering disciplines.**

Student Assessment: Students completing a transferable course are expected to have demonstrated both a conceptual/qualitative understanding of the above topics and a quantitative capability to solve problems utilizing principles from these topics. This understanding and capability must be demonstrated by solving problems which contain elements both familiar and unfamiliar to the student and which require the student to utilize his understanding of these principles (as opposed to simply memorizing given scenarios and procedures). This includes carefully reading the problem, converting the problem statement to an appropriate representation including pictures/graphs and the appropriate mathematical variables and relationships, and answering specified questions using proper logical, algebraic and calculus procedures. It is also expected that students have obtained significant experience in the solution of problems which require solving multiple parts together with multiple concepts. Students are also expected to develop and demonstrate a facility with hands-on laboratory work that employs these principles and procedures.

Time-on-Task: The transferable course is expected to meet for at least five face-to-face hours per week with six face-to-face hours suggested. Of this time, two or more of the hours must meet in the laboratory setting. Students are expected to complete hands-on activities and experiments in the laboratory setting. The students are also expected to complete substantial out-of-class work in the form of homework (or equivalent) to develop qualitative and quantitative reasoning and problem solving skills beyond the in-class learning experience.

Textbook: The material should be taught from a text similar to Sears & Zemansky's University Physics (14th Edition) by Young and Freedman or Foundations of Physics - Halliday & Resnick by Jearl Walker. Many other texts are appropriate; the primary attribute of an equivalent text is the coverage of the material with both an integrated use of calculus and the use of vector algebra.

Coverage To meet the 70% alignment requirement all topics with (*) must be covered. The other topics may be covered but are not required for transferability.

MECHANICS (Young & Freedman (14th Edition) Table of Contents)

1. *Units, Physical Quantities, and Vectors
2. *Motion Along a Straight Line
3. *Motion in Two or Three Dimensions
4. *Newton's Laws of Motion
5. *Applying Newton's Laws
6. *Work and Kinetic Energy
7. *Potential Energy and Energy Conservation
8. *Momentum, Impulse, and Collisions
9. *Rotation of Rigid Bodies
10. *Dynamics of Rotational Motion
11. *Equilibrium & Elasticity (static equilibrium must be covered; tress, strain, & elasticity may be covered)
12. Fluid Mechanics
13. *Gravitation
14. *Periodic Motion

WAVES/ACOUSTICS

15. Mechanical Waves
16. Sound and Hearing

THERMODYNAMICS

17. Temperature and Heat
18. Thermal Properties of Matter
19. The First Law of Thermodynamics
20. The Second Law of Thermodynamics

Learning Goals:

1. To develop a qualitative understanding of motion (linear and rotational), forces, laws of conservation; and to be able to apply this understanding to real-world settings.

2. To develop analytical reasoning and quantitative problem solving skills that allow the analysis (using vector algebra and calculus) of physical systems in motion or in equilibrium. Students should be able to analyze systems experiencing changing forces in multiple dimensions. This includes carefully reading the problem, converting the problem statement to an appropriate representation including pictures/graphs and the appropriate mathematical variables and relationships, and answering specified questions using proper logical, algebraic and calculus procedures.

3. To use laboratory equipment to explore the behavior of physical systems. The students should be able to perform experiments that investigate the qualitative behavior of systems and experiments that collect numerical data. From numerical data, students should be able to quantitatively analyze the data to demonstrate physical principles, extract physical parameters, test models, and refine models. The students should understand the role of error in experimentation and be able to assess that error.

Template for Course Inventory

Please fill out the following table and submit attachment(s). Approved courses must be resubmitted every 5 years. Please resubmit before the 5 year renewal if substantial revisions are made to the course.
Please attach the following materials:

- Current working syllabus and lab syllabus that contains instructional goals and/or objectives
- Comprehensive final; in the absence of a comprehensive final no more than 5 sample assessments (student exercises, quizzes, exams, or other assessments).

Course #			
Course Title			
Beginning Term (when is/was it first offered?)	If more than five years, check box ☐		
	If less than five years, enter date:		
Credit Hours (including the entire course, lecture/lab)	Lecture:		
	Lab:		
Co-/Pre-requisite (test scores for placement)		Test	Score
	Pre-req:		
	Co-req:		
Successor Course:			
Catalog Description			
All Textbook(s)/Lab Manual	ISBN: Title: Publisher: Author: Edition: Copyright Year:	ISBN: Title: Publisher: Author: Edition: Copyright Year:	

Indicate the typical percentage of time spent on each learning outcome/topic	**Learning Objective**	**% Time**
	1. *Units, Physical Quantities, and Vectors	
	2. *Motion Along a Straight Line	
	3. *Motion in Two or Three Dimensions	
	4. *Newton's Laws of Motion	
	5. *Applying Newton's Laws	
	6. *Work and Kinetic Energy	
	7. *Potential Energy and Energy Conservation	
	8. *Momentum, Impulse, and Collisions	
	9. *Rotation of Rigid Bodies	
	10. *Dynamics of Rotational Motion	
	11. *Equilibrium and Elasticity. The topic of the conditions for static equilibrium must be covered.	
	12. *Periodic Motion	
	13. *Gravitation	
Non-essential topics (may not be covered at all)	14. Fluid Mechanics	
	15. Mechanical Waves	
	16. Sound and Hearing	
	17. Temperature and Heat	
	18. Thermal Properties of Matter	
	19. The First Law of Thermodynamics	
	20. The Second Law of Thermodynamics	

Name of individual submitting:_____

Email address:_____

Please contact WVHEPC, Academic Affairs with questions