☒ Undergraduate

Prepared By: Kay Littler
Phone: 4280

REQUEST FOR

ADDITION OF COURSE TO CORE CURRICULUM

College/School: CAS
Department: PHYS

Subject Prefix: PHYS Course Number: 1210 Semester Credit Hours: 3

TCCNS Number (if applicable) 1410 (common course number)

Hours Per Week: 3 Lecture, 3 Lab, ___ Recitation, ___ Other

Title Conceptual Physics

Short Course Title : Conceptual Physics
(maximum 22 characters including spaces)

Category of Core Curriculum course is to be added: Natural Sciences

Catalog Description:

Principles and applications of mechanics, heat, sound, light, electricity and atomic physics for the elementary education major.

Prerequisite(s):

MATH 1100 or higher and interdisciplinary studies (elementary education) major status.

If course is cross-listed, indicate below:

Department: _____ Subject Prefix/Course Number: _____

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Justification for course to be added to Core Curriculum (Include how course would satisfy each exemplary objective.):

1. To understand and apply the scientific method and appropriate technology to the study of natural sciences. **We define the scientific method early in the course and apply it in examples of how science is learned.**

2. To recognize scientific and quantitative methods of inquiry, and to be able to communicate findings, analyses, and interpretations based upon these approaches. **Students use scientific and quantitative methods of inquiry in the lab portion of this course. They conduct laboratory measurements and provide written communications of their findings, analyses, and interpretations throughout the laboratory portion of this course.**

3. To identify and recognize the differences among competing scientific theories. **To accomplish this task, students must understand how models are used to describe the predictions of theories, including their limitations. Models and theories that will be explored include mass-mass interaction, Newton's Theory of Universal Gravitation, and centripetal versus centrifugal forces as they apply to orbital motion.**

A. Explore the natural sciences. **Students explore physical concepts as applied to the everyday world through course assignments and the laboratory. Each laboratory exercise involves an "Exploration Activities" in which students have the opportunity to recognize prior knowledge, to make predictions based on this knowledge, and to test their predictions.**

B. Gain the skills required to explore and test ideas. **Students learn the skills necessary for modeling and testing their predictions for explorations involving two-dimensional motion of matter as well as motion of light.**

C. Be able to locate, evaluate, and organize site information including the use of information technologies. **Students use laboratory motion sensor technology to learn about motion. Using graphs of position vs. time and**

velocity vs. time, student will evaluate these variables, and understand how they relate.

D. Think critically and creatively, learning to apply different systems of analysis. **In the lab, students use both qualitative and quantitative methods of analysis in order to understand the flow of charge in simple circuits. They have to employ critical thinking as they make inferences regarding the flow of charge, a phenomena that is essentially 'invisible.'**

E. Develop problem-solving skills that incorporate multiple viewpoints and differing contexts in their analysis. **Students expand their problem-solving skills through employing different analysis methods for a variety of contexts. Specifically, students analyze qualitatively the magnetic field about magnets, using a very small magnet to detect this field; and then make deductions as to the qualitative nature of the field strength and direction. In another lab, they quantitatively analyze the density of a variety of objects using measurement tools; and then make deductions concerning the relationship between the volume, mass, and density for a variety of objects.**

F. Cultivate intellectual curiosity and self-responsibility, building a foundation for life-long learning. **Physics content in this course is presented in a conceptual manner, and is related to the everyday world of the student. These students are future K-8th grade teacher and they have the opportunity through in class exercises to apply their questions and the course content to the world of the child.**

G. Have the ability to read intelligently, write clearly, and speak well. **During in class discussions, students have the opportunity to discuss assigned "child questions" with each other, and to answer these questions in a short essay format.**

Consultation with University Curriculum Assessment Committee member:
Department: MATH Contact: W. Cherry Date: 5/6/09

New Core Curriculum Requests must include:
Syllabus: ☒ Maximum 4-page syllabus attached
Assessment: ☒ Consultation w/University Curriculum Assessment Committee member in this core component group.
☒ Assessment procedures (criteria to be used in assessing this course) must be attached separately

APPROVED:

Department Chair: _____ Date: 5/6/09
College/School Curriculum Committee Chair: _____ Date: 5/13/09
Dean of College/School: _____ Date: 5/13/09
Core Oversight Committee Chair: _____ Date: _____
University Curriculum Committee (VPAA): _____ Date: _____

PHYS 1210.001

Conceptual Physics

www.phys.unt.edu → courses → 1210

Spring 2009

TENTATIVE SYLLABUS

Ms. K. H. Littler
Phone: 565-4726
e-mail: klittler@unt.edu
Office: Physics Room 209C

Lecture: Physics Room 104; TR 11:00 - 12:20 pm
Office Hours: Mon 10:30-12:00; Tues 1-3 pm;
Wed 10:30-12:00; or by appointment

Prerequisites: Math 1100 College Algebra or equivalent

Text: Conceptual Physics 10th Edition, Paul G. Hewitt, Addison Wesley

Materials
Physics 1210 Laboratory Manual
Calculator with square root (√) and scientific notation
Optional: Practicing Physics Workbook, Paul G. Hewitt, Addison Wesley

Course Content: Physics 1210 is a conceptual physics course designed for the elementary (K-8) education major. This course will guide you in a study of the basic concepts and principles describing our physical world. We will be covering the topics of force & motion, energy, temperature & heat, waves & sound, light, electricity & magnetism, and atomic structure and the laws that govern their nature and behavior. With a good grasp of the concepts of physics, you will gain a better understanding and appreciation of our physical world.

Daily Grade: Your daily grade is based on your attendance and will be taken via a short class participation's "Child's Question of the Day". Your daily grade will be your earned percentage of a total of about 23 possible points (1 point per day).

Homework: **Homework will be assigned weekly and due by 5 pm on the Friday of the week that it is assigned.** Hand your homework into the Phys 1210.001 slot on the second floor of the Physics Bldg. **No late homework will be accepted.** Your homework grade average will be your earned percentage of a total of 140 points (10 points per weekly assignment).

Laboratory: All labs will be conducted through the Physics Instructional Center (PIC), located on the second floor of the Physics building. When attending lab, be certain to bring paper, pencil, calculator, your student ID and close toe shoes. One lab will be done each week, beginning the second week of class. **There are no makeup labs.** Your lab grade will be your earned percentage of 1650 points (150 points per lab).

Exams: There will be three exams and a comprehensive final exam. Examinations are given at the scheduled times. **There are no makeup exams.** Exam questions will be taken from class notes, homework, and the textbook. Understanding of in-class discussions and homework problems are crucial to success in this course.

Grading:

Daily Grade	5
Homework	10
Laboratories	20
Exams	45
Final Exam	20
Total	100

The University of North Texas Physics Department will make reasonable adjustments to ensure equal opportunity for qualified persons with disabilities to participate in all Physics programs and activities. Please see instructor is special accommodations are required.

Core Laboratory Science Objectives:

EEO: Exemplary Objectives

1. To understand and apply the scientific method and appropriate technology to the study of natural sciences.
2. To recognize scientific and quantitative methods of inquiry, and to be able to communicate findings, analyses, and interpretations based upon these approaches.
3. To identify and recognize the differences among competing scientific theories.

OCO: UNT Overarching Core Objectives

A. Explore the natural sciences.
B. Gain the skills required to explore and test ideas.
C. Be able to locate, evaluate, and organize site information including the use of information technologies.
D. Think critically and creatively, learning to apply different systems of analysis.
E. Develop problem-solving skills that incorporate multiple viewpoints and differing contexts in their analysis.
F. Cultivate intellectual curiosity and self-responsibility, building a foundation for life-long learning.
G. Have the ability to read intelligently, write clearly, and speak well.

Physics 1210.001 www.phys.unt.edu → courses → 1210 **Spring 2009**

Date **Lecture Preparation** **Homework** *(due each Friday)*
Laboratory Investigation

Week 1	Jan 20, Tues.	**Course Introduction** Ch. 1 About Science	**Chapter 1** **Re** 10, 11, 20; **Ex** 9	No Lab
	22, Thur.	**Mechanics** Ch. 2 Newton's 1st Law of Motion - Inertia		
Week 2	27, Tues.	Ch. 2 con't	**Chapter 2** **Re** 14, 17; **Ex** 1, 7, 11, 21 **Chapter 3** **Re** 12, 18, 25, 26; **Ca** 4, 8, 12, 16, 20; **Ex** 4, 9 *Optional: PPW pg. 7,8 Free Fall Speed*	Measurement Skills
	29, Thur.	Ch. 3 Linear Motion		
Week 3	Feb 3, Tues.	Ch. 4 Newton's Second Law of Motion Ch. 8 Rotational Motion *(pg* 131, 137, 144-147)	**Chapter 4** **Re** 5, 14, 19, 31, 33; **Ca** 5, 7; **Ex** 2, 3, 9, 41 **Chapter 8** **Re** 1, 23, 24; **Ex** 42, 47 *Optional: PPW pg. 18 #5, pg. 19 #1-4, pg. 21 #1 and pg. 44 #1-5*	Motion
	5, Thur.	Ch. 5 Newtons Third Law of Motion		
Week 4	10, Tues.	Ch. 5 con't	**Chapter 5** **Re** 10, 11; **Ex** 3, 4, 5, 18, 28 **Chapter 6** **Re** 1, 6; **Ca** 2; **Ex** 1, 4, 14 *Optional: PPW pg. 31 #1-4, pg. 37*	Momentum
	12, Thur.	Ch. 6 Momentum *(pages 91-99)*		
Week 5	17, Tues.	**EXAM 1: Chapters 1-6, 8**	**Chapter 7** **Re** 3, 8, 10; **Ca** 3, 8, 11; **Ex** 15, 19, 20, 28, 31	Center of Mass
	19, Thur.	Ch. 7 Energy		
Week 6	24, Tues.	Ch. 9 Gravity *(pages 161-168)*	**Chapter 9** **Re** 3, 13, 14; **Ca** 5; **Ex** 3, 11, 12, 15 **Chapter 10** **Re** 4, 5; **Ex** 2, 5, 13; **Pr** 2 *Optional: PPW pg. 25 #1-3, pg. 55 #1,2 and pg. 58 #2 a, b, c*	Projectile Motion
	26, Thur.	Ch. 10 Projectile Motion *(pages 184-191)*		
Week 7	Mar 3, Tues.	Ch. 11-14 **Properties of Matter** Atomic Nature of Matter *(pg 210-213, 217-223);* Density *(pg 232, 233)*	**Chapter 11** **Re** 1, 9, 11, 12; **Ex** 5 **Chapter 12** **Re** 4; **Ex** 6, 7, 9, 10; **Pr** 1, 2 **Chapter 13** **Re** 2, 3, 7, 17; **Ex** 2, 23, 25 **Chapter 14** **Re** 3, 16, 17; **Ex** 1, 9 *Optional: PPW pg.67 #1-3*	Density
	5, Thur.	Pressure & Buoyancy *(pg 248-257, 268-276)*		
Week 8	10, Tues.	**Heat** Ch. 15 Temperature, Heat, and Expansion	**Chapter 15** **Re** 2, 6, 7, 8, 19, 21, 25; **Ex** 5, 11, 28, 35; **Pr** 2, 3 **Chapter 16** **Re** 3, 7, 19; **Ex** 3, 6, 20, 52, 58 *Optional: PPW pg. 71 #1-4; pg. 73 #1-5*	Heat
	12, Thur.	Ch. 16 Heat Transfer		

R: Review; **E:** Exercises; **Ca:** One-Step Calculations; **Pr:** Problems; **PPW**: Practicing Physics workbook

	Date	Lecture Preparation	Homework	Lab
	Spring Break!			
Week 9	Mar 24, Tues.	Ch. 17 Change of Phase	**Chapter 17** **Re** 3, 7, 26, 27; **Ex** 2, 3, 23, 24, 43	Change of Phase
	26, Thur.	**Sound** Ch. 19 Vibrations and Waves (*pg* 362-373a)		
Week 10	31, Tues.	**EXAM 2: Ch. 7, 9 -14 selections, & 15-17**	**Chapter 19** **Re** 6, 9, 16; **Ex** 4, 6, 9, 21, 31, 37; **Pr** 3, 4 *Optional: PPW pg.81 #1,2; pg. 82 #8,9*	Speed of Sound
	Apr 2, Thur.	Ch. 20 Sound		
Week 11	7, Tues.	Ch. 21 Musical Sounds (*pg* 398-402)	**Chapter 20** **Re** 2, 8, 12; **Ex** 2, 6, 27, 36; **Pr** 4, 9	Electric Current
	9, Thur.	**Electricity & Magnetism** Ch. 22 Electrostatics	**Chapter 21** **Re** 3, 10, 12; **Ex** 4, 7, 13	
Week 12	14, Tues.	Ch. 22 con't	**Chapter 22** **Re** 2, 3, 7, 12; **Ex** 3, 6, 9 **Chapter 23** **Re** 3, 8, 18, 39; **Ca** 6; **Ex** 9, 25, 44; **Pr** 5 *Optional: PPW pg.87 #1,2; pg.93 #5,6*	Simple Electric Circuits
	16, Thur.	Ch. 23 Electric Current		
Week 13	21, Tues.	Ch. 24 Magnetism	**Chapter 24** **Re** 5, 10, 27; **Ex** 1, 7, 13, 20 *Optional: PPW pg.98,99 #1-12; pg.101,102 #2,4*	Magnetic Fields
	23, Thur.	**Light** Ch. 26 Properties of Light		
Week 14	28, Tues.	**EXAM 3: Chapters 19-24**	**Chapter 26** **Re** 9, 20; **Ex** 5, 13, 19, 21; **Pr** 5, 7 *Optional: PPW pg. 103, 104*	Light
	30, Thur.	Ch. 27 Color		
Week 15	May 5, Tues.	Ch. 28 Reflection and Refraction	**Chapter 27** **Re** 8, 14, 16; **Ex** 5, 12, 18	No Lab
	7, Thur.	Review		
		Tuesday May 12, 10:30 am – 12:30 pm Comprehensive Final Exam		

R: Review; **E**: Exercises; **Ca**: One-Step Calculations; **Pr**: Problems; **PPW**: Practicing Physics workbook

Assessment Plan
PHYS 1210

We will assess how well students accomplish the learning objectives with a combination of essay questions administered as in-class activities and laboratory investigations. Each essay question and laboratory investigation targets a specific objective, and collectively they cover all of the objectives.

EEO: Exemplary Objectives

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G. Have the ability to read intelligently, write clearly, and speak well.

The following essays & investigations are examples of how we will assess these objectives. The essays & investigations will be evaluated against the respective objective(s), as indicated below. This will allow us to assess each objective individually over the academic year.

Essay or Investigation	Objectives
Essay 1: Discuss how the scientific method can be used to explore every day phenomena and use it to aid in answering a child's question, such as "Do heavy objects fall faster than lighter objects?"	1 (fall), F (spring)
Essay 2: Describe how sound waves can be used to analyze an object's position and motion (echolocation) and what factors affect their use.	A (fall), G (spring)
Essay 3: Students will answer the child's question: "If Earth's gravity is pulling down on the Moon, why doesn't the Moon fall down?"	3
Investigation 1: Use motion sensor technology to gather and organize data; use this information to investigate the relationship between the position, velocity, and acceleration of an object.	2(fall), C(spring)
Investigation 2: Use a variety of measuring instruments to determine the physical characteristics of objects and be able to qualitatively and quantitatively explore the concepts of density, mass, and volume.	B(fall), E(spring)
Investigation 3: Use both qualitative and quantitative methods of analysis to understand the flow of electric charge in a circuit. Make inferences regarding the flow of electric charge.	D

These essays and investigations will be evaluated by the instructor & teaching assistants using the following rubric:
0 = answer is completely irrelevant or missing
1 = wrong idea, poor explanation
2 = right idea, poor explanation
3 = right idea, right explanation

For each essay question and investigation, teaching assistants will give a summary of scores to the faculty coordinator, who will evaluate the data to determine the extent to which students are mastering the objectives. The coordinator, who oversees the lecture and lab content of the course, will adjust the amount of emphasis given to specific components of the course, as well as strategies for teaching those components, to address any learning deficiencies revealed from the above evaluation. For example, if more than one-third of students received less than a 2 on a given essay question or investigation, that would warrant more attention to the course components covering the associated learning objective. The course will be viewed as meeting each objective if 75% of the students score 2 or higher on each essay or investigation.