

**CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS**

**NEW COURSE PROPOSAL**

DATE DECEMBER 6, 2006  
PROGRAM AREA PHYSICS

**1. Catalog Description of the Course.** *[Follow accepted catalog format.]*

Prefix PHYS Course# 103 Title HOW THINGS WORK Units (3)

3 hours lecture per week

☐ Prerequisites

☐ Corequisites

Description Introduces the concepts behind everyday objects and experiences. Concentrates on ideas and on familiar scenarios. Designed to excite students' interests in science while conveying a substantial understanding of our everyday world.

☒ Gen Ed

☐ CR/NC

☐ Repeatable for up to units

Categories B1

☐ Lab Fee Required

☒ A - Z

Total Completions Allowed

**2. Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS # (filled in by Dean)
Lecture	3	1	24	<input checked="" type="checkbox"/>	
Seminar				<input type="checkbox"/>	
Laboratory				<input type="checkbox"/>	
Activity				<input type="checkbox"/>	HEGIS

**3. Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

This is a general education course available to non-Physics majors.

**Learning Objectives.**

Upon completion of the course, the student will be able to:

- explain the basic concepts and principles of physics.
- describe more clearly their everyday world.
- discuss physics concepts and provide examples and demonstrations.
- apply deductive logic to problem solving.
- outline the role of physics in other disciplines, and apply their understanding to these disciplines.
- search and retrieve practical information.
- organize and express ideas clearly and convincingly in oral and written forms.

The course does not meet the University Writing and/or Language requirements.

**4. Is this a General Education Course** YES ☒ NO ☐

If Yes, indicate GE category and attach GE Criteria Form:

**A (English Language, Communication, Critical Thinking)**

A-1 Oral Communication ☐

A-2 English Writing ☐

A-3 Critical Thinking ☐

**B (Mathematics, Sciences & Technology)**

B-1 Physical Sciences ☒

B-2 Life Sciences – Biology ☐

B-3 Mathematics – Mathematics and Applications ☐

B-4 Computers and Information Technology ☐

**C (Fine Arts, Literature, Languages & Cultures)**

C-1 Art ☐

C-2 Literature Courses	<input type="checkbox"/>
C-3a Language	<input type="checkbox"/>
C-3b Multicultural	<input type="checkbox"/>
<b>D (Social Perspectives)</b>	<input type="checkbox"/>
<b>E (Human Psychological and Physiological Perspectives)</b>	<input type="checkbox"/>
<b>UD Interdisciplinary</b>	<input type="checkbox"/>

**5. Course Content in Outline Form.** *[Be as brief as possible, but use as much space as necessary]*

The course will cover broad topics with demonstrations, computer simulations and fun class participation. Students will participate in the planning of the course by identifying additional topics or problems to consider. The core topics will include:

Sound, musical instruments and singing  
 Light, color, optical equipment, digital cameras, CDs  
 Fluids, buoyancy, hot air balloons, airplanes, golf balls  
 Electricity, modern electronic gadgets, motors, AC/DC  
 Heat, cooking, solar energy, home insulation, dogs' panting  
 Motion, spinning ice skaters, baseball catchers, fireworks  
 Energy, natural resources, engines, hybrid cars  
 Nuclear medicine, nuclear weapons, nuclear energy

Does this course overlap a course offered in your academic program? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Does this course overlap a course offered in another academic area? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Signature of Academic Chair of the other academic area is required on the consultation sheet below.

**6. Cross-listed Courses (Please fill out separate form for each PREFIX)**

List Cross-listed Courses

Signature of Academic Chair(s) of the other academic area(s) is required on the consultation sheet below

Department responsible for staffing: Physics

**7. References.** *[Provide 3 - 5 references on which this course is based and/or support it.]*

Robert March: Physics for Poets. (McGraw-Hill) 4th Edition  
 W. Thomas Griffith: The Physics of Everyday Phenomena (McGraw Hill) 4th Edition  
 Louis A. Bloomfield: How Things Work (John Wiley & Sons) 3rd Edition  
 Paul Hewitt: Conceptual Physics (Addison-Wesley) 8th Edition  
 John Barrow : Theories of Everything - the quest for ultimate explanation. (Vintage 1991).  
 Richard Feynman: The Character of Physical Law. (MIT Press)  
 Lawrence Krauss: Fear of Physics. (Basic Books 1993)

**8. List Faculty Qualified to Teach This Course.**

Dr. Geoff Dougherty  
 Dr. Greg Wood

**9. Frequency.**

a. Projected semesters to be offered: Fall ☒ Spring ☐ Summer ☐

**10. New Resources Required.** YES ☐ NO ☒

If YES, list the resources needed and obtain signatures from the appropriate programs/units on the consultation sheet below.

- a. Computer (data processing), audio visual, broadcasting needs, other equipment)
- b. Library needs
- c. Facility/space needs

**11. Will this new course alter any degree, credential, certificate, or minor in your program? YES ☐ NO ☒**

If, YES attach a program modification form for all programs affected.

Dr. Geoff Dougherty  
Proposer of Course

8/28/2006  
Date

## Request for GE Approval

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Course Title	PHYS 103 How Things Work
Units	3
Lab	No
New	Yes

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GE Category	B1 Physical Sciences -- Chemistry, Physics, Geology, and Earth Sciences
Submitter	Dougherty, Geoffrey
Submission Date	09-01-2006
Status	Approved

### Criteria Justifications

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- Promote the understanding and appreciation of the methodologies of math or science as investigative tools and the limitations of mathematical or scientific endeavors

The course will present the scientific principles describing how everyday phenomena work. Basic scientific concepts relating to sound, vision, light, motion, gravity, heat, and momentum will be examined. The scientific approach to evaluating technical areas will be discussed, particularly regarding fundamental theories like energy and angular momentum that are applicable throughout the universe and are the basis for our very existence. The scientific method of observe, hypothesize, test, evaluate and repeat will be explored. Demonstrations, hands-on experiments, computer simulations and models will validate theories. Uncertainties in current knowledge, like the nature of gravity, will be presented.

- Present mathematical or scientific knowledge in a historical perspective and the influences of math or science on the development of world civilizations, both past and present

The historical background of past and current physical theories, and their utility and accuracy, will be addressed from the time of the ancient Greeks up until today. Historical changes in the understanding of how things work will be discussed. Current theories will be examined and compared to earlier historical notions. The course will examine how technology is inherently linked to advances in societies.

- Apply inductive and deductive reasoning processes and explore fallacies and misconceptions in the mathematical or scientific areas

Historical misconceptions on how things work will be explored. Critical reasoning skills will be used to expand knowledge from one example for a particular physical concept to many others. Recognizing the scientific principles in various applications will be a major focus. Observational skills necessary for the scientific method will be honed. The fallacies in ancient logic, and even recent logic, used to explain objects, forces and motion in the universe will be examined.

- Present the principles and concepts of the physical sciences and the physical universe

Scientific principles and concepts, and their applications to everyday life, will be discussed. The major conservation laws, like conservation of energy, conservation of momentum and conservation of angular momentum, will form the basis for understanding how things work. The universality of physics concepts across many seemingly diverse areas will be explored. For example, the physical laws governing how an airplane flies also govern how a baseball player pitches a baseball. The connection between water waves, sound and musical instruments will be explored with guitars, pianos, trumpets, and pipe organs. The many aspects of vision will be examined, from why we see color to rainbows and blue skies and soap bubbles and peacock feathers. The mysteries of electricity and magnetism and their ubiquitous use in today's world from TVs to computers will be uncovered, along with the technology of zeros and ones in the digital world. Every person greets the physical world every morning -- and knowing how things work will expand their horizon bringing science and technology into their everyday experiences.

## Approvals

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Program Chair

Date

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Curriculum Committee Chair

Date

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Dean

Date

