

General Education Course Proposal

Proposed Course: Phys 10 Conceptual Physics Units 4
Prefix No. Title

Department: PHYSICS School: NATURAL SCIENCES

GE Category (Indicate one category only):

Foundation: A1___; A2___; A3___; B4___
Breadth: B1 X; B2___; C1___; C2___; D___; E___
Integration: B___; C___; D___; International/Multicultural___

Existing Course X; Revised Course ___; New Course ___

Course Included in Current GE Program X

New courses require the Undergraduate Course Proposal form in addition to this form.

Revised courses require the Undergraduate Course Change Request in addition to this form.

Proposed catalog description: Limit course description to 40 words using succinct phrases. Include prerequisites, limitations, lecture/lab hours. Indicate former course number, e.g., (Former Biol 105)

Prerequisites: Math 45 or concurrently. Basic ideas of physics and their relationship to the everyday environment. Physical phenomena, misconceptions, terminology, scientific method, metric system. Memorable demonstrations in lecture, household-related experiments in the lab.
(3 lecture, 2 lab hours)

Enrollment limit per section: 120

Expected number of sections per semester – Year 1 2; Year 3 2

Attachments:

1. A statement presenting the ways in which this course meets the Specifications provided in the appropriate section of the General Education Policy as well as in the Policies for Inclusion and Evaluation of General Education Courses.
2. A statement of elements common to all sections of this course, identifying content, objectives, required student activities, grading policy, representative texts, and an approximate schedule for the course. Required student activities include such things as papers, research projects, homework, laboratory and/or studio performance, recitations, participation, attendance, and exams.
3. A typical syllabus for a particular offering of the course.
4. Any special cost factors associated with this course.

Approval for Inclusion in General Education

M. J. Zudis 3/4/98
Department Chair Date

W. Hamner 3/13/98
School Curriculum Committee Date

W. W. Way 3/13/98
School Dean Date

Redmond 12/15/98
General Education Subcommittee Date

Brandt Kehoe 12/22/98
Associate Provost Date

1/14/98

Attachment # 2: General Syllabus

PHYS 10—Conceptual Physics
4 units
Prerequisite: Math 45 or concurrently

SYLLABUS

Semester, Year
Schedule #12345
Lecture hours
Lecture room

Catalogue description: Basic ideas of physics and their relationship to the everyday environment: Physical phenomena, misconceptions, terminology, scientific method, metric system. Memorable demonstrations in lecture, household-related experiments in the lab. (3 lecture, 2 lab hours)

General Education: This course meets General Education requirements. For students with catalogs 1998-99 or earlier, it meets the requirement for BREADTH, Division 1. For all other students, it meets the requirement for BREADTH, Area B1.

Instructor: Name

Office: Instructor's office; Phone: Instructor's phone number
email: Instructor's email address

Department: MCL 169; Phone 278-2371

Office Hours: Instructor's office
hours (Min: 5/week)

Textbook: Paul G. Hewitt, *Conceptual Physics*, 8th. Ed., Addison-Wesley

Course Objective: "*Defeating the widespread physics anxiety*"

1. Observation and interpretation of physical phenomena
2. Identification and elimination of misconceptions
3. Proper terminology for physical quantities
4. Scientific methods
5. Introduction of and familiarization with the metric system

Course Topics: Misconceptions, Friction, Inertia, Metric, Speed, Acceleration, Ramp, Free Slide, Free Fall, Newton's laws of motion, Forces, Fall with friction, Tension force, Projectile motion, Angle-range relation, Kepler's law of planetary motion, Satellites, Gravity, Distinction between mass and weight, Black holes, Rotational motion, Torque, Centripetal force, Center of mass, Stability, Impulse, Momentum, Forms of energy, Energy conversions, Work, Power, Potential energy, Conservation of energy, Kinetic energy, Temperature, Molecules, Thermal expansion, Water and ice, Transfer of thermal energy, Conduction, Convection, Radiation, Thermal inertia, Thermal engines.

Homework: Doing your homework will give you important feedback to your understanding of the material and will prepare you for the exams. This instructor's homework policy is ...

Exams: Exams test memory, understanding and mastery of the material. The instructor's exam policy is ...

Lab: During the weekly two-hour lab session in MCL 264 you do the assigned activities and record your observations and conclusions in your lab manual. The lab instructor will sign off your lab manual at the end of each session. Occasional home projects are due the next lab session.

Term paper: A 2000-word term paper is due during the semester. Three drafts must be submitted in the lab sections as announced in the schedule. For more details see the write-up *Term Paper*.

Cheating and plagiarism will be dealt with according to University Policy (see *Schedule of Courses*). Tape recording of lectures is allowed. If you have a **disability** affecting your performance in this course, please let me know so that accommodation can be made. If you **miss a class**, make certain you get class notes from another student. It is your responsibility to remain informed about schedule changes, homework solutions, etc.

Weighting:

Homework	Instructor's policy
Exams	Instructor's policy
Other	Instructor's policy
Lab	15%
Term paper	15%
	100%

Letter Grade:

Instructor's policy

TERM PAPER

A 2000-word (about 7 double-spaced typed pages) term paper is due during the semester. In order for the instructor to provide guidance and feedback, three drafts must be submitted in the lab sections as announced in the schedule.

The 1st draft, due in Lab 7, must have (1) an outline of the paper, (2) a written introduction to the topic, (3) a bibliography of references at the end, and (4) a photocopy of one page from your major reference (clearly labeled). The draft will be returned with comments and suggestions for development and improvement.

The 2nd draft, *with the 1st draft attached*, is due in Lab 10. The 2nd draft must be the complete 2000-word paper along the outline of the 1st draft. The outline should *not* be repeated in the 2nd draft, as its purpose was only to structure the paper. Mistakes or deficiencies, noted by the instructor on the 1st (attached) draft, should be corrected and the comments for development and improvement should be followed. If not, points will be taken off correspondingly. The 2nd draft will be returned in Lab 11 with comments for further improvement.

The 3rd draft, *with the 2nd draft attached*, is the finished paper and is due in Lab 12. Points will be taken off if suggested improvements, noted by the instructor on the 2nd draft, were not made.

PLAGIARISM, a prime academic sin, is when the *exact words* or *trivially rearranged words* from a literature source are used without attribution, that is, without quoting the source. If several students have identical or almost identical term papers, obtained by copying from one another, then all those students will get no credit for their term papers and the procedure of plagiarism (which may lead to expulsion from college, see catalog) may be invoked.

A GRADE of maximum **15 points** can be obtained for the term paper, depending on STYLE (correct spelling, correct punctuation and clear syntax) and FORMAT (title [=topic] of term paper, course, author [=your name], bibliography at the end, and one photocopied page of the major reference (with source clearly labeled)). Points will be taken off for deficiencies in style and format of the final (= 3rd) draft and for failures to make corrections as noted on previous drafts.

SUGGESTED TOPICS (use the library)

- Biography of a great physicist (Kepler, Galileo, Newton, Bernoulli, Lagrange, Pascal, Carnot, Clausius, Helmholtz, Kelvin, Hertz, Poincaré, Planck, Einstein, Heisenberg, Schrödinger, ...)
- History of the metric system, see *Am. J. Phys.* **57**, 988-992 (1998).
- Misconceptions about motion, see *Psychology Today* **18**, 52 (1984), *Am. J. Phys.* **53**, 1043-1065 (1985), *Phys. Teach.* **27**, 383 (1989)

Attachment # 3: Typical Syllabus

PHYS 10—Conceptual Physics
4 units
Prerequisite: Math 45 or concurrently

SYLLABUS

Spring 1998
Schedule #25351 / #25362
MW 1410—1525 / MW 1745—1900
Room: MCL 162

Catalogue description: Basic ideas of physics and their relationship to the everyday environment: Physical phenomena, misconceptions, terminology, scientific method, metric system. Memorable demonstrations in lecture, household-related experiments in the lab. (3 lecture, 2 lab hours)

General Education: This course meets General Education requirements. For students with catalogs 1998-99 or earlier, it meets the requirement for BREADTH, Division 1. For all other students, it meets the requirement for BREADTH, Area B1.

Instructor: Dr. Manfred Bucher
Office: MCL 261; Phone: 278-2357
email: manfredb@csufresno.edu
Department: MCL 169; Phone 278-2371

Office Hours: T 11-12 & 3-4,
Th 2-4, F 2-3

Textbook: Paul G. Hewitt, *Conceptual Physics*, 8th. Ed., Addison-Wesley

Course Objective: "Defeating the widespread physics anxiety"

1. Observation and interpretation of physical phenomena
2. Identification and elimination of misconceptions
3. Proper terminology for physical quantities
4. Scientific methods
5. Introduction of and familiarization with the metric system

Homework: Doing your homework will give you important feedback to your understanding of the material and will prepare you for the exams. You should turn in HW from the HW&Lab manual on the assigned due days at the beginning of class. Mark your answers on Scantron Form 882 and write your name (*1st name 1st*), Phys 10, set number, and class hour (but not your ID number and date) on the form. An answer&explanation key will be posted on the left bulletin board outside MCL 168. Late HW will not be accepted. Your graded HW will be returned to you but no credit will be given. HW contributes only indirectly to your grade as it (1) prepares you for the exams and (2) some exam questions will be selected from the HW. For more details see the write-up *How to study in PHYS 10*.

Exams: The mini exam, two midterm exams, and the comprehensive final exam are scheduled on p. 1. For each exam you need a Scantron Form 882, a #2 pencil and a plastic eraser. On the day of each exam, seating/version charts will be posted by the doors to the classroom. Exams are without textbook and without notes. If you have to miss one exam (except the final exam) for emergency reasons, then you will be automatically given the weighted average score of all your other exams—determined at semester end—for the missed exam.

Lab: During the weekly two-hour lab session in MCL 264 you do the described activities and record your observations in the HW&Lab manual. The lab instructor will sign off your lab manual at the end of each session. Occasional home projects are due the next lab session.

Term paper: A 2000-word term paper is due during the semester. Three drafts must be submitted in the lab sections as announced in the schedule. For more details see the write-up *Term Paper*.

Cheating and plagiarism will be dealt with according to University Policy (see *Schedule of Courses*). Tape recording of lectures is allowed. If you have a **disability** affecting your performance in this course, please let me know so that accommodation can be made. If you **miss a class**, make certain you get class notes from another student. It is your responsibility to remain informed about schedule changes, homework solutions, etc.

Weighting:

Homework	0%
Mini Exam	5%
Midterm Exams (2)	40%
Final Exam	25%
Lab	15%
Term paper	15%
	<hr/>
	100%

Letter Grade:

90% ≤	A ≤ 100%
77% ≤	B < 90%
64% ≤	C < 77%
50% ≤	D < 64%
	F < 50%

Attachment #3, continued

<u>Monday</u>	<u>Wednesday</u>	<u>Lab</u>
Jan 26, 1998	Jan 28, 1998	None
Introduction to PHYSICS 10	Metric, Speed, Acceleration	<i>this</i>
<u>Misconceptions, Friction, Inertia</u>	<u>Assignment: Set 1</u>	<u>week</u>
Feb 2, No HW due	Feb 4, Due: Set 1	Lab 1
Ramp, Free slide	Free fall	Dist.
<u>Assignment: Set 2</u>	<u>Assignment: Set 3</u>	<u>p. 100</u>
Feb 9, Due: Set 2	Feb 11, Due: Set 3	Lab 2
N's law of inertia	Forces, N's law of acceleration	Accel.
<u>Assignment: Set 4</u>	<u>Assignment: Set 5</u>	<u>p. 105</u>
	Feb 18, Due: Sets 4 & 5 (→ two boxes)	Lab 3
	Fall with friction	Forces
	<u>Assignment: Set 6</u>	<u>p. 110</u>
Feb 23, No HW due	Feb 25, Due: Set 6	Lab 4
Mini Exam on material of Sets 1-3	N's action=reaction law, Tension force	Action
<u>Assignment: Review 1</u>	<u>Assignment: Set 7</u>	<u>p. 113</u>
March 2, Due: Review 1	March 4, Due: Set 7	Lab 5
Projectile motion, Angle-Range Rel.	Kepler's laws	Projctl.
<u>Assignment: Set 8</u>	<u>Assignment: Set 9</u>	<u>p. 115</u>
March 9, Due: Set 8	March 11, Due: Set 9	Lab 6
1st Exam on material	Satellites, Gravity	K laws
<u>covered in Sets 2-6 & Review 1</u>	<u>Assignment: Set 10</u>	<u>p. 118</u>
March 16, No HW due	March 18, Due: Set 10	Lab 7
Mass ≠ Weight, Black holes	Rot. axis, Rot. speed, Rot. inertia	Gravity
<u>Assignment: Set 11</u>	<u>Assignment: Set 12</u> <i>Term paper → 1st draft</i>	
March 23, Due: Set 11	March 25, Due: Set 12	Lab 8
Torque, Centripetal force	Center of Mass (CoM), Stability	Rotat.
<u>Assignment: Set 13</u>	<u>Assignment: Set 14</u>	<u>p. 128</u>
March 30, Due: Set 13	April 1, Due: Set 14	Lab 9
Impulse, Momentum	Forms of Energy, E conversions	CoM
<u>Assignment: Review 2</u>	<u>Assignment: Set 15</u>	<u>p. 135</u>
April 13, Due: Review 2	April 15, Due: Set 15	Lab10
Work, Power, Pot. E (PE)	Conservation of Energy, Kin. E (KE)	Stabil.
<u>Assignment: Set 16</u>	<u>Assignment: Set 17</u> <i>Term paper → 2nd draft</i>	
April 20, Due: Set 16	April 22, Due: Set 17	Lab11
2nd Exam on material	Temperature, Molecules	PG&E
<u>covered in Sets 7-14 & Review 2</u>	<u>Assignment: Set 18</u>	<u>p. 144</u>
April 27, No HW due	April 29, Due: Set 18	Lab12
Thermal expansion	Water and Ice	Thermo
<u>Assignment: Set 19</u>	<u>Assignment: Set 20</u> <i>Term paper → fnl draft</i>	
May 4, Due: Set 19	May 6, Due: Set 20	No
Therm. energy & transfer; Assign: Set 21	Conduction, Convection, Radiation	Lab
May 11, Due: Set 21	May 13	No
Thermal inertia, Thermal engines	Final Review	Lab
Final Exam for 2:10 class:	on Wed, May 20, from 3:30-5:30 PM	
Final Exam for 5:45 class:	on Wed, May 20, from 8:00-10:00 PM	
on material covered in Sets 15-21 + comprehensive questions on the most important concepts from the whole semester.		

Attachment #3, continued

How to study in PHYSICS 10: Lecture, Homework, Exams

Come to class regularly. If you have to miss class, get notes from a friend. The purpose of the LECTURE is to present the basic principles of physics and their practical applications. I will make every effort to do this in a clear and understandable way. To this end I will use many demonstrations and visual aids, and also continuous feedback—posing check questions to class for immediate acclamation answers—to make sure you are able to follow. My intent is that you feel confident when you leave the classroom rather than being confused and feeling frustrated. However, such confidence does not mean that you deeply understand everything about the subject and all its implications. It merely means that you were able to follow my lecture. With due attention in lecture, you should be able to acquire sufficient basic knowledge in the subject, so that no recourse to textbook reading is necessary.

Real understanding of a subject is achieved only if the basic principles, exemplified in lecture by the simplest cases possible, can be transferred to similar, but somewhat different or more involved cases. Such understanding will be tested in exams. How can you get there? Within a few days after each lecture, and with the subject still fresh in memory, you should attempt the assigned HOMEWORK (HW). Some HW questions simply ask for definitions or repetition of lecture material. If you cannot answer them, you need to consult your lecture notes. Other questions will expose you to alternate aspects of the material. Try to see how they relate to the lecture. If you cannot see any relation, then you have not really understood the lecture material and need to review it. Frequently you may see some relation but still feel uncertain. This is quite normal and typical in the process of learning. Such uncertainty helps you scrutinize the lecture material more and thereby enhance it. If the uncertainty persists, then give the best answer you can think of and put a question mark in your manual—a reminder to address the question in your study group and to check the posted explanation key.

Do HW regularly. First, look which TOPICS the HW is on. Review your lecture notes on these topics. Then CLOSE your notes (exams will be without notes and without book). Read the questions and answer them YOURSELF by selecting from the multiple choice answers. Write your choice in the MARGIN of the question page (so that you can cover it with a sheet in a later review) and not on the ... space of the questions. Transfer your answers on a SCANTRON 882 form. Use a #2 pencil and a PLASTIC eraser. You do need a PLASTIC eraser. If you don't already have one, then buy one. (Regular rubber erasers, and also *dirty* plastic erasers, leave dark smudges that can't be removed—and will be rubbed in deeper—so the Scantron machine will "see" two answers and mark them wrong. On your Scantron form write your NAME ("1st name 1st")*, PHYS 10, and SET #, and the class HOUR (DON'T write your social security number, since it is not necessary here and actually hampers your grader in sorting the forms.) Turn in your Scantron form (into the HW collection box) on the due day at the BEGINNING of class. The graded Scantron form will be returned in the HW return stand no more than a week later. With all questions that you marked WRONG, read (study, possibly copy) the correct answer and explanation from the posted ANSWER/EXPLANATION KEY on the bulletin board outside MCL 168. Go to the bulletin board no later than one week after the HW was due because old answer keys must be removed when the board is full. Don't wait until shortly before exam day in checking the bulletin board as old answer keys may not be posted anymore.

*A 1-point penalty will be taken off if you don't write your 1st name 1st on the Scantron.)

EXAMS will be in the same format as HW. They will consist of questions similar to those in HW but also of questions requiring transfer of the basic principles to similar, new situations. If you have attempted HW on your own, then exams should not come as big a surprise. On the other hand, if you never have done HW on your own, then you are setting yourself up for surprises and possibly mental blocking in exams. In studying for an exam you should at least go over the questions that you got wrong in your HW. Answer them again with the solutions covered. Then answer ALL HW questions again with the solutions covered. Try to outguess your teacher: How could he modify a HW question to create an exam question? (For instance by changing numbers.) How could he make an exam question from a lab activity? Outguessing your teacher is particularly suitable in STUDY GROUPS.

TERM PAPER

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SUGGESTED TOPICS (use the library)

- Biography of a great physicist (Kepler, Galileo, Newton, Bernoulli, Lagrange, Pascal, Carnot, Clausius, Helmholtz, Kelvin, Hertz, Poincaré, Planck, Einstein, Heisenberg, Schrödinger, ...)
- History of the metric system, see Am. J. Phys. **57**, 988-992 (1998).
- Misconceptions about motion, see Psychology Today **18**, 52 (1984), Am. J. Phys. **53**, 1043-1065 (1985), Phys. Teach. **27**, 383 (1989)