General Education Course Proposal

Proposed Course: Phys (Prefix) 2A (No.) General Physics (Title) **Units** 4

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)

Prerequisite: Math 6 or 45 (or concurrently). Topics and concepts in Newtonian mechanics of point particles and rigid bodies, energy, properties of fluids, heat and thermodynamics, waves and sound. (3 lecture, 3 lab hours) (CAN PHYS 2)

Enrollment limit per section: classroom limited
Expected number of sections per semester – Year 1 3 **; Year 3** 3

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. Zuckerman 8/6/98
Department Chair — Date

See Attached
School Curriculum Committee — Date

See Attached
School Dean — Date

Peter Conrad 12/15/98
General Education Subcommittee — Date

Brandt Kehoe 12/22/98
Associate Provost — Date

1/14/98

Attachment 2: Phys 2A

Elements common to all sections of Phys 2A include:

1. Content. All sections cover the topics indicated in the attached syllabus. A summary of common content (topic/broad issues/concepts) and the anticipated timeof student activities devoted to each element during the semester is given below.

(Topic 1) Newtonian kinematics of point particles. Approximately 2 weeks

Topic 1 includes at least all of the folowing:

(a) Concepts of displacement, speed and acceleration.

(b) Mathematical characterization of these concepts as vectors.

(c) Equations of kinematics for constant acceleration and the prediction of physical quantities from given information.

(d) Practical applications: Freely falling bodies and projectile motion.

(Topic 2) Newtonian dynamics of point particles. Approximately 2 weeks

Topic 2 includes at least all of the folowing:

(a) Concepts of force and mass.

(b) Newton's laws as a unifying framework for mechanics.

(c) Special kinds of forces.

(d) Equilibrium and nonequilibrium.

(Topic 3) Work, energy, and conservation of energy. Approximately 1 week

Topic 3 includes at least all of the folowing:

(a) Concepts of work and energy in physics.

(b) The work-energy theorem.

(c) Kinetic and potential energy.

(d) Conservation of energy.

(Topic 4) Impulse, momentum, and conservation of momentum. Approximately 1 week

Topic 4 includes at least all of the folowing:

(a) Concepts of impulse and momentum in physics.

(b) The impulse momentum theorem.

(c) Conservation of momentum.

(d) Collisions.

(Topic 5) Kinematics and dynamics of rigid bodies. Approximately 2 weeks

Topic 5 includes at least all of the folowing:

(a) Angular displacement, speed and acceleration.

(b) Circular motion.

(c) Newton's second law for rotation and torque.

(d) Energy and angular momentum in rotational motion.

(Topic 6) Fluid statics and dynamics. Approximately 2 weeks

Topic 6 includes at least all of the folowing:

(a) Concepts of density and pressure.

(b) Fluid statics: principles of Pascal and Archimedes.

(c) Fluid dynamics: continuity and Bernoulli's equation.

(Topic 7) Heat and thermodynamics. Approximately 2 weeks

Topic 7 includes at least all of the folowing:

(a) Concepts of temperature and heat.

(b) Behavior of solids, liquids and gases under changes of temperature.

(c) Thermal processes and the laws of thermodynamics.

(Topic 8) Simple harmonic motion, waves and sound. Approximately 2 weeks

Topic 8 includes at least all of the folowing:

(a) Ideal spring and Hooke's law.

(b) Elastic potential energy and energy conservation.

(c) Types of waves.

(d) Sound.

(e) Wave phenomena: interference, diffraction.

The common content for all Phys 2A sections is specified in greater detail in the syllabus. The breakdown by individual lecture session is also shown.

2. Objectives. Attachment 1 identifies goals and objectives common to all sections of Phys 2A.

3. Required student activities. All students are expected to turn in homework assignments, typically twice a week. In addition to the usual comprehensive final exam, they take three to four quizzes during the semester. Laboratory activities are identical for all sections, with students working in groups and turning in an individual laboratory report at the end of each period. Participation and attendance is monitored.

4. Text. All sections use College Physics, by J. D. Wilson and A. J. Buffa (Prentice Hall, 1997).

5. Overall evaluation. The FCI test, an evaluation instrument widely used in colleges and universities at the national level in introductory physics courses is administered twice every semester to analyze the performance of students as a function of the lecture section attended. Plans are underway to introduce at least a common reasoning test (to be administered during the first lecture) and final exam for all sections.

6. Grading. The relative weights of the various coursework components are:

i)	Homework	20%
ii)	Laboratory	20%
iii)	Quizzes	30%
iv)	Final Exam	30%

Extra credit may be assigned at the discretion of the instructor. Grades for this course will be assigned on the following basis:

85% - 100%	A
73% - 84.9%	B
60% - 72.9%	C
50% - 59.9%	D
Below 50%	F

PHYSICS 2A: GENERAL PHYSICS

SPRING 1998

1. **GENERAL EDUCATION:** This course meets General Education Requirements. For students with catalogs 1998-99 or earlier, it meets the requirements for BREADTH, Division 1. For all other students, it meets the requirements for BREADTH, Subareas B1, B3. (CAN PHYS 2)

2. **PREREQUISITES:** All students must complete the B4 Quantitative Reasoning requirement or be concurrently registered for precalculus or beyond as a prerequisite for credit in Phys 2A.

3. **INSTRUCTOR:** G. Muñoz, MCL 132 (x4131, e-mail: gerardom@zimmer.csufresno.edu). Office hours: MTWThF 11-12. Additional hours may be arranged by appointment.

4. **TEXT:** J. D. Wilson and A.J. Buffa, *College Physics*, 3rd edition (Prentice Hall, 1997).

5. **HOMEWORK, QUIZZES, FINAL EXAM.**

Homework: A set of problems will be assigned every day and will be due at the beginning of the following class period. I strongly suggest you give the problems your best shot before looking for help. If you are unable to find the solution after a reasonable number of attempts, come see me (or the TA's available in McL 168 during posted hours); I'm sure by now you know that nothing is gained by simply attending a lecture! Consistent work on these assignments is important for several reasons: We all learn by doing, so that new concepts will remain foreign to you until you've become used to them by repeated application of the ideas to different situations; computational problems and conceptual questions in these assignments will try to sharpen your quantitative skills (a *fundamental* aspect of scientific reasoning) as well as your overall conceptual understanding of the subject matter; and finally, you should work hard to finish all assignments simply because the quizzes and the final exam will follow a similar pattern of problems and questions, and because homework will provide a 20% of your grade in this course! If you turn in a homework but find you still have doubts about your solution to a problem, make sure you discuss this problem with me (or a TA) *before you start working on the next assignment.* For your own benefit, turn in a *photocopy* of your assignment. Solutions will be posted regularly near MCL 264, or on the instructor's web sites.

Policy on late homework: **LATE HOMEWORK WILL NOT BE ACCEPTED.** This policy will be strictly enforced, so don't leave the solution of any problem for the last minute!

Quizzes and Final: In addition to a comprehensive final exam (for date and time see your Schedule of Courses), there will be four quizzes, as indicated in the attached 2A Schedule. I will drop the lowest of the four quiz scores before computing your final grade. Unless I specifically indicate otherwise, you will need a Scantron form (882-ES), a calculator and a #2 pencil for every quiz and the final exam. Old exam questions have been placed in the reserve room in the library or the instructor's web site; it will be to your advantage to work through these questions. **If you miss a quiz, you will only be allowed to make it up if I received previous notice of your anticipated absence.** Furthermore, there must be **serious and compelling reasons** for your absence if you expect to be allowed to make up a quiz.

6. **LABORATORY:** Labs are an integral part of this course. You are expected to complete all the assignments, and to be familiar with the appropriate concepts developed in lecture as well as with the objectives and setup before the lab period. Detailed laboratory policy and a schedule will be provided by your lab instructor.

NOTE: Please keep in mind that **an F in the lab automatically means an F in 2A!** If you miss a lab, notify your lab instructor ASAP.

7. **CHEATING AND PLAGIARISM:** University policy maintains that "proven cheating/plagiarism can result in severe penalties and consequences". Your 2A instructors (*lecture and lab*) are determined to enforce that policy. For more information on cheating, plagiarism and other policies and regulations, please refer to the *University Catalog* and your *Schedule of Courses*.

8. **GRADE:** The relative weights of the various coursework components are:

i)	Homework	20%
ii)	Laboratory	20%
iii)	Quizzes	35%
iv)	Final Exam	25%

Grades for this course will be assigned on the following basis:

85% - 100%	A
73% - 84.9%	B
60% - 72.9%	C
50% - 59.9%	D
Below 50%	F

9. **ADDITIONAL NOTES:**

- Tape recording of lectures is allowed.
- If you are a disabled student, be sure to identify yourself to the University and the instructor so that reasonable accommodations for learning and evaluation within the course can be made. Contact Services for Students with Disabilities, Madden Library Room 1049 (278-2811).

WEEK	LECTURE TOPICS	COMMON CONTENT
1	T: Introduction/ reasoning test Th: Math review/Units & Measurement/ Vectors (Ch.1)	Units and dimensions; dimensional analysis. Trigonometry. Addition and subtraction of vectors; components.
2	T: Kinematics in one dimension/Free fall (Ch.2) Th: Kinematics in two dimensions (Ch. 3)	Displacement, speed and velocity, acceleration. Equations of kinematics for constant acceleration. Freely falling bodies. Displacement, velocity and acceleration in two dimensions.
3	T: Kinematics in two dimensions/ Application: projectile motion (Ch. 3) Th: Newton's laws of motion (Ch. 4)	Equations of kinematics in two dimensions. Projectile motion. Concepts of force and mass. Newton's first, second and third laws.
4	T: **QUIZ 1.** Chapters 1 - 3 Th: Applying Newton's laws (Ch. 4)	Weight, normal force, tension force, static and kinetic frictional forces. Equilibrium and nonequilibrium applications of Newton's laws of motion.
5	T: Work and Energy (Ch. 5) Th: Conservation of energy (Ch. 5)	Concept of work. The work-energy theorem and kinetic energy. Gravitational potential energy. Conservative and nonconservative forces. The conservation of mechanical energy. Nonconservative forces and the work-energy theorem. Power.
6	T: Impulse and momentum/Conservation of momentum (Ch. 6) Th: Collisions (Ch. 6)	Concept of impulse. Impulse-momentum theorem. Conservation of linear momentum. Elastic and inelastic collisions. Collisions in one dimension.
7	T: **QUIZ 2.** Chapters 4 - 6 Th: Circular motion: Centripetal acceleration/Angular velocity ω, acceleration α (Ch. 7)	Angular displacement and velocity. Uniform circular motion and centripetal acceleration. Centripetal force. Angular acceleration.
8	T: Gravitation (Ch. 7) Th: Forces and torques/Newton's 2nd law for rotation (Ch. 8)	Newton's law of gravitation. Rigid bodies, translations and rotations. Torque. Newton's second law for rotation and rotational dynamics.
9	T: Equilibrium / Work and energy (Ch. 8) Th: Fluid statics: Pressure /Archimedes' principle (Ch. 9)	Equilibrium and nonequilibrium. Rotational work and energy. Angular momentum. Solids and fluids. Pressure and Pascal's principle. Buoyancy and Archimedes' principle.

10	T: **QUIZ 3.** Chapters 7 - 8 Th: Fluid statics/ Fluid dynamics: Eq. of continuity (Ch. 9)	Fluid statics. Fluid dynamics: streamlines, the equation of continuity.
11	T: Fluid dynamics: Bernoulli's equation/ Applications (Ch. 9) Th: Temperature/ Ideal gases (Ch. 10)	Fluid dynamics: conservation of energy and Bernoulli's equation. Temperature and heat. Temperature scales. Gas laws and absolute temperature.
12	T: Thermal expansion /Kinetic theory of gases (Ch. 10) Th: Specific & Latent heat/Heat transfer (Ch. 11)	Thermal expansion. Kinetic theory of gases, physical meaning of absolute temperature. Specific heat. Phase changes and latent heat. Calorimetry. Heat transfer.
13	T: **QUIZ 4.** Chapters 9 - 11 Th: Thermodynamics (Ch. 12)	Thermal processes. The zeroth, first and second laws of thermodynamics. Heat engines, refrigerators, heat pumps.
14	T: Simple harmonic motion (Ch. 13) Th: Waves (Ch. 13)	Ideal spring and simple harmonic motion. Uniform circular motion and simple harmonic motion. Equations of motion. Elastic potential energy. The pendulum.
15	T: Sound (Ch. 14)	Standing waves, traveling waves. Transverse and longitudinal waves. Periodic waves. Speed of propagation, amplitude, frequency and intensity. Nature of sound. Wave phenomena.