## Glassboro State College Senate Curriculum Committee

### Approval Form

**Proposal Title:** Conceptual Physics  

**Sponsor(s):** Kevin Major  

**Dept.:** Physical Sciences  

**Ext.:** 638

**Check one:**  
- [ ] Course  
- [ ] Specialization  
- [ ] Concentration  
- [ ] Minor  
- [ ] Achievement Certificate  
- [ ] Certification Program  
- [ ] Major Program  
- [ ] Minor Change  

- [ ] Undergraduate  
- [ ] Graduate  
- [ ] Credit Hours

### Step 1 (Department)

- [ ] Approved  
- [ ] Not Approved  

**Dept. CC Chairperson:**

**Reviewed:**  

**Date:**

**Dept. Chairperson:**

**Date:**

### Step 2 (Receipt)

**SCC#:** 91-92-62  

**Proposal Received:**

**Date:**

**SCC Chairperson:**

### Step 3 (School CC)

**Reviewed:**  

**Date:**

**Comments:**

- [ ] Approved  
- [ ] Not Approved

**School Currr Comm. Chairperson:**

### Step 4 (Academic Dean)

- [ ] Recommend  
- [ ] Not Recommend  
- [ ] Conditionally Recommend (see comments)

**Reviewed:**

**Date:**

**Signature: Dean of School**

### Step 5 (SCC)

**Open Hearing:**  

**Approved by Senate Curriculum Committee:**

**Date:**

**Returned to sponsor(s) for the following reasons:**

### Step 6 (Senate)

**Presented to Senate:**

**Date:**

**Approved**  

**Not Approved**

**Notification to Executive Vice-President/Provost:**

**Date:**

**Signature: SCC Chairperson**
Step 7 (Executive V.P./Provost)

Received __________
If no, reasons are as follows

Approved □ Yes □ No

Student credit hours __________
Faculty load hours __________
Equalized credit hours __________
Official copy and approval sheet filed __________ Date __________
Signature: Executive Vice-President/Provost

Registrar

Approved course description received __________ Date __________
Hegis Taxonomy and Course Number assigned __________ Date __________

Notification forwarded:
□ Senate Curriculum Committee Chairperson
□ Department Chairperson(s)
□ Academic Dean(s)
□ Registrar
□ Sponsor(s)
CONCEPTUAL PHYSICS
General Education Physics Course (with Lab) for the Non-Science Major

Course Title: Conceptual Physics
Sponsor: Dr. Karen Magee-Sauer, Assistant Professor, Physical Sciences
Credit Hours: 4 s.h.
Course Level: Freshman
Curricular Effect: General Education Science course which will satisfy the "Lab" requirement.
Pre-requisites: None
Implementation: Spring 93
Adequacy of resources: The present staffing is adequate. Laboratory space is adequate for at least one section of 24 students and probably more. To offer multiple sections of the course, we may need additional laboratory space. That topic can be best studied once we find out how our present space serves one section.

2. Rationale:

The general education proposal recently passed states that students be required to take a laboratory science. The Physical Sciences Department currently does not offer a laboratory course designed exclusively for the non-science major. This course is intended to help fill that void.

The goal of this course is to expose students with a non-science background to physics. The course will reveal the excitement of physics by examining phenomena of our everyday environment. The historical development of such ideas will be studied as well. Physics will be communicated conceptually rather than mathematically.

Many students are scared off from science at an early state in their education. This course is intended to re-introduce Physics to the non-scientist who in the future will be called upon to form educated opinions and make policy decisions on scientific issues, and perhaps teach science in the elementary schools as well. These tasks should be performed by a scientifically literate person.

This course by no means will turn the student into a "Physicist" or even a "Scientist;" just as a course in Music Appreciation does not turn the student into a "Composer" or "Musician." What the course will do is give the student a deeper understanding and appreciation of science than they would have had otherwise.

James Trefil a professor of Physics from George Mason University writes:

"On the one hand, we have the humanist prejudice. Hasn't it ever struck you as odd that a man who has never read Shakespeare would be considered uneducated, while a man who had never studied Newton or Einstein would not? This sort of attitude is not so uncommon among people who have studied the traditional literary subjects. In some way, science is excluded form "culture," even though the unique contribution of western civilization to human knowledge has been the scientific outlook."

1General Chemistry is a lab course for the non-major, but is presently not being offered.
3. Essence of the Course:
   a. Objectives:
      1. The student will learn how to take a more perceptive view of their physical surroundings by learning the central ideas, principle, and relationships of physics.
      2. The students will learn how to take hands-on approach to learning which will readily transfer to the elementary as well as secondary classrooms.
      3. The student will learn the "scientific method" - both practically and historically.
   b. Topical Outline: The text which will be used initially is Conceptual Physics by Paul Hewitt. It is a respected text for the non-science major. Other possible texts include:
      Physics for Poets, Robert March
      Physics as a Liberal Art, James Trefil
      Invitation to Physics, Ken Greider
      The course will include selected topics from the sections presented in the textbook on:
      I. Mechanics: Motion, Newton's Laws, Momentum, Energy, Gravitation, Rotational Motion, Special Relativity
      III. Heat: Temperature, Thermal Expansion, Transmission of Heat, Change of State
      IV. Sound & Light: Vibration and Waves, Sound, Light, Color, Optics
      VI. Atomic and Nuclear Physics: Atoms and Quanta, Radioactivity, Nuclear Fission and Fusion
      The laboratories will emphasize doing and seeing the physics studied in class. There will be approximately 12 laboratories selected from activities such as (but not limited to):
      1: Free fall: Students will measure their reaction time by catching a ruler that is dropped.
      2: Conservation of Momentum: Collisions
      3: Two-dimensional Motion: Projectiles
      4: Angular Momentum: Gyroscopes, bicycle wheels and rotating platforms
      5: Mechanical Advantage: Pulleys and ramps
      6: Archimedes Principle: Buoyancy
      7: Pressure and Bernoulli's Principle: Barometers and differences in pressure
      8: Sound Waves: Wavelength, frequency, harmonics of sound waves
      9: Color Lab: Filters, Addition, Subtraction of Colors
      10: Polarization: Half-wave, quarter wave filters and light
      11: Optics & the Pinhole Camera
      12: Converging and Diverging Lenses
      13: Electrostatics: Like and Unlike Charges
      14: The Banana Battery
      15: Magnetism: Mapping magnetic fields of permanent magnets and electric currents
      16: Radioactivity: Radon Monitoring, Activity, Half-life
c. Evaluation Procedures:
Students will be evaluated by exams, laboratory write ups, class participation, and a final.

d. Course Evaluations:
The departmental course evaluation form will be used at the end of the course. A mid-term evaluation will also be given to give the students a chance to say what they like and don't like about the course, as well as what they perceive "works" and "doesn't work" with the course.

4. Results of Consultations
a. Dr. Mark Chamberlain, Introduction to Physical Sciences
b. 1. Education School: Dr. Thomas Gallia, Secondary Education
    Dr. Robert Blough, Elementary Education
    2. Dr. Pearl Bartelt, Dean of Liberal Arts and Sciences
    3. Dr. David Kapel, Dean of PERS
    4. Dr. Robert Fleming, Dean of Business Administration
    5. Dr. Donald Gephardt, Dean of Fine and Performing Arts

Catalog Description: **Conceptual Physics**

The goal of this course is to expose students with a non-science background to physics. The course will reveal the excitement of physics by examining phenomena of our everyday environment. The historical development of such ideas will be studied as well. Topics selected for study include Mechanics, Matter, Heat, Sound, Light, Electricity, Magnetism, Atomic, and Nuclear Physics. Physics will be communicated conceptually rather than mathematically.
February 6, 1992

Curriculum Committee
Faculty Senate
Glassboro State College
Glassboro, New Jersey 08028

Dear Committee:

I have read the outline for the proposed course Conceptual Physics which is being sponsored by Dr. Karen Magee-Sauer. This course sounds like an excellent choice for elementary education teachers and I strongly recommend that Dr. Magee-Sauer's proposal be given favorable consideration.

Very truly yours,

Robert Blough, Ed.D.
Professor of Education

RB/djb

GSC SENATE
FEB 7 1992
RECEIVED
MEMORANDUM

TO:       Donna Hathaway,  
           Curriculum Committee Chair

FROM:     Pearl W. Bartelt, Acting Dean

DATE:     February 6, 1992

SUBJECT:  Conceptual Physics

I am happy to support the new course, Conceptual Physics, that is being sponsored by Dr. Karen Magee-Sauer and the Physical Sciences Department.

In an age when science literacy is so important, it is vital to have a course that re-introduces Physics to the non-scientists. All of the students taking this course will have to use science in one capacity or another. Some of the students will be called upon to teach science to elementary school children.

The topical outline coupled with the laboratories will, I feel, give students an exciting scientific experience. I support the course without any reservation.

PWB/jmw

c. Karen Magee-Sauer
February 7, 1992

Karen Magee-Sauer  
Assistant Professor  
Physical Sciences

Dear Karen:

Dean Fleming of the School of Business Administration has asked me, in my capacity as chair of the school’s curriculum committee, to respond to your proposal to present the new course called CONCEPTUAL PHYSICS. I am happy to do so.

Such a course could be of great value to business majors, especially those who wish to be employed in manufacturing. They may well be, in the words of the rationale in your proposal

"the non-scientist who in the future will be called upon to form educated opinions and make policy decisions on scientific issues..."

It is clear that the economic future of our country will be in the hands of those who are capable in science.

I support, on behalf of Dean Fleming and my colleagues, this proposal. We will be sure to include it among recommended courses for our majors.

Yours sincerely,

[Signature]
Thomas Michael

Thomas A. Michael

GSC SENATE  
FEB 10, 1992  
RECEIVED
February 7, 1992

TO: Karen Magee-Sauer, Asst. Professor, Physical Sciences
FROM: Donald L. Gephartd, Dean of Fine and Performing Arts
RE: Course Proposal: Conceptual Physics

I have briefly reviewed your course proposal for Conceptual Physics. I like the objectives for the course, but perhaps it should include a more direct statement--something like: "to learn to think as a physicist." I believe that the "hands-on" approach is good - making the connection between theory and practice is appropriate.

In learning the "scientific method", will this process include a background of how science has evolved through domains of knowledge--from empiricism through rationalism, logical positivism, etc.?

Lastly, I believe section d. Course Evaluations could be improved. Student perception is one aspect of assessment but I believe a more "scientific" approach would include several objective means of assessment--including student opinion. Good luck with the course.

DLG

jmm
February 5, 1992

Dr. Karen Magee-Sauer  
Assistant Professor  
Physical Sciences  
Bosshart Hall  

Dear Dr. Magee-Sauer:

Thank you for sharing your Conceptual Physics course proposal with me. We have needed a non-technical laboratory course like this one in our general education program for years.

I am very impressed with your topical outline and complementary laboratory activities. Its comprehensive scope specifically addresses concepts contributing to scientific literacy. This makes it an especially valuable general education course for prospective teachers.

Your proposal looks great! Please let me know if I can provide and further support.

Best regards,

[Signature]

Thomas J. Gallia, Ed.D.  
Professor of Education  
Glassboro State College Certification Officer

TJG:kaa  

cc: Curriculum Committee
TO: CURRICULUM COMMITTEE
FROM: MARK M. CHAMBERLAIN
REFERENCE: CONCEPTUAL PHYSICS

I have examined the proposed course: CONCEPTUAL PHYSICS and have compared its contents and methodology to the present course Principles of Physical Science. Both courses are designed as General Education courses; both deal with the physical universe but at that point the courses diverge.

The Principles of Physical Science course is strongly "instructor designed". When Wellington Woods taught the course, his emphasis was on astronomy and other aspects of the earth sciences with a lesser emphasis on physics and chemistry. As I teach the course, there is far greater emphasis on chemistry and physics with lesser emphasis on the other physical sciences. Obviously, in one semester it is impossible to cover all aspects of the physical sciences and each instructor works from his/her own disciplinary knowledge base. The course CONCEPTUAL PHYSICS is single focus on one discipline - perhaps "undiluted" is a better term.

Further, Principles of Physical Science is offered without formal laboratory work. Hands-on experience is limited to short periods of work during lecture or to take-home exercises. These experiences demonstrate principles but there is neither time nor space to help the student explore science.

CONCEPTUAL PHYSICS is more tightly conceived, limited to physics, taught by individuals with in-depth education and knowledge of the discipline and, most important, provides a significant laboratory experience.

In the long term, and in accordance with the movement within the General Education program towards laboratory based courses in the sciences, I would hope to see the lecture/demonstration course "Introduction to Physical Sciences" replaced by separate semester or even year-long courses in the specific disciplines. These courses would be truly general education, would be laboratory based and would be better able to present "science" as method as well as outcome. The proposed course CONCEPTUAL PHYSICS is a significant step in this direction.
c. Evaluation Procedures:
Students will be evaluated by exams, laboratory write ups, class participation, and a final.

d. Course Evaluations:
The departmental course evaluation form will be used at the end of the course. A mid-term evaluation will also be given to give the students a chance to say what they like and don't like about the course, as well as what they perceive "works" and "doesn't work" with the course.

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