

Glassboro State College Senate Curriculum Committee

Approval Form

Proposal Title: CONCEPTUAL PHYSICS

Sponsor(s) Karen Magee Sauer Dept.: Physical Sciences Ext. 6338

Check one: Course Specialization Concentration Minor Achievement Certificate
 Certification Program Major Program Minor Change

(please name deletion or credit/catalog changes)

Undergraduate

Graduate

 Credit Hours

Step 1 (Department)

Approved 2-5-92
Date

Not Approved
C. W. Schultz
Dept. CC Chairperson

Reviewed 2-5-92
Date

C. W. Schultz
Dept. Chairperson

Step 2 (Receipt)

SCC# 91-92-62

Proposal Received _____
Date

Donna Hathaway
SCC Chairperson

Step 3 (School CC)

Reviewed 6 March 1992

Approved
 Not Approved

Comments: *what impact does this new course have on existing course Physics 210 # 112-110. Should Physics 210 be deleted?*

J. [Signature]
School Curr Comm Chairperson

Step 4 (Academic Dean)

Comments:

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

Reviewed _____
Date

[Signature]
Signature, Dean of School

Step 5 (SCC)

Open Hearing 4/1/92 Approved by Senate Curriculum Committee 4/1/92
Date Date

Returned to sponsor(s) for the following reasons:

Step 6 (Senate)

Presented to Senate [Signature]
Date

Approved Not Approved

Notification to Executive Vice-President/Provost [Signature]
Date

[Signature]
Signature, SCC Chairperson

Step 7 (Executive V.P./Provost)

Received _____

Date

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 24 Aug 92

Date

Hegis Taxonomy and Course Number assigned 1902-150

B7 Kelvey for DB

Signature Registrar

24 Aug 92

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.¹ 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 from "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
- II. Properties of Matter: Atomic Nature, Solids, Liquids, Gases
- III. Heat: Temperature, Thermal Expansion, Transmission of Heat, Change of State
- IV. Sound & Light: Vibration and Waves, Sound, Light, Color, Optics
- V. Electricity & Magnetism: Electrostatics, Electric Field and Potential, Electric Current, Electric Circuits. Magnetism, Electromagnetic Induction
- 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.



GLASSBORO STATE COLLEGE

Curriculum and Instruction: Elementary/Early Childhood Education Department

Glassboro, New Jersey 08028-1758 (609) 863-6363

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,

A handwritten signature in cursive that reads "Robert Blough".

Robert Blough, Ed.D.
Professor of Education

RB/djb

GSC SENATE

FEB 7 1992

RECEIVED



GLASSBORO STATE COLLEGE

Dean of Liberal Arts & Sciences

Glassboro, New Jersey 08028-1772 (609) 863-5342

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

GSC SENATE

FEB 7 1992

RECEIVED



GLASSBORO STATE COLLEGE

School of Business Administration
Accounting/Finance Department

Glassboro, New Jersey 08028-1748
(609) 863-6028

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,

Thomas Michael

Thomas A. Michael

GSC SENATE

FEB 10 1992

RECEIVED



GLASSBORO STATE COLLEGE

School of Fine and Performing Arts

Glassboro, New Jersey 08028-1777 (609)863-7363

Office of the Dean

GSC SENATE

FEB 14 1992

February 7, 1992

RECEIVED

TO: Karen Magee-Sauer, Asst. Professor, Physical Sciences
FROM: Donald L. Gephardt, 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.

jmm

DLG




GLASSBORO STATE COLLEGE

School of Education
and Related Professional Studies

Glassboro, New Jersey 08028-1760 (609) 863-5241

Office of the Dean

GSC SENATE

FEB 14 1992

RECEIVED

February 5, 1992

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

Dear Dr. ^{Karen} 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,

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 the proposed course: CONCEPTUAL PHYSICS and have compared its contents and methodology the 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.

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:

The goal of this course is to expose students with a non-science background to physics. The students will experience 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.