

Library Resource Form Required

Submission Deadlines: Fall - October 11, 2005 Spring - February 14, 2006

TITLE Program changes to Physical Science

Sponsor(s) David Klassen, Physics & Astronomy e-mail: klassen@rowan.edu
Robert Newland, Chemistry & Biochemistry e-mail:
e-mail:

DEPARTMENT Chemistry & Biochemistry and Physics & Astronomy
College LAS

If **LAS** -check: History/Humanities Social/Behavioral Sciences
 X Math/Science

X **UNDERGRADUATE** **GRADUATE**

DESCRIBE:

 New Degree Program New concentration, specialization, track
 New Major New Minor
 New Certificate of Graduate Study Program (COGS & COGA)
X Major changes of degree requirements/major/minor or certificate program
 Changes to College name, School, Department, or Degree
 Quasi curricular change

Signatures Required: representing approval before submission to Office of the Senate

Department Chair: *Jeffrey H. ...* Date: 2-10-06
Department CURRICULUM Chair: *Robert Newland* Date: 4/10/06
Academic DEAN: *...* Date: 2-13-06

COLLEGE CURRICULUM COMMITTEE: Open Hearing Date:
Approved: *[Signature]*
Not Approved:

Signature: College Curriculum Chair
Signature: SENATE CURRICULUM CHAIR *[Signature]*
Date: 4/12/06

Comments:

Signature: Executive Vice President/Provost: *[Signature]*
Date: 5/11/06
Approved:
Not Approved:

Signature: REGISTRAR *[Signature]*
Date: 5/25/06
Course Description Received & Approved
Hegis Taxonomy & Course #

Notification Forward:
 SCC CHAIR Academic Dean
 IR Department Chair
 CAP VP/Student Affairs
 Registrar Other-



Department of Physics & Astronomy

Major Change of Degree Requirements Program Changes to Physical Science

1. Details:

- (a) Multiple changes requested in the requirements and course distribution in the Physical Science program and its two specializations (see summary table on p. 4).

From:

- General Science (specialization title)
- “An approved Astronomy, Atmospheric Science, or Oceanography course” in common core and “Choose one of an approved Geology course, Investigations in Physical Geography, or an approved Biology course” in General Science specialization
- Biology I or II [0401.100 or 101]
- “An approved 300+ level Physics or Chemistry” in General Science specialization
- “An approved course leading to certification or minor” (both) in General Science specialization

To:

- Physics (specialization title)
- “An approved course from Astronomy, Atmospheric Science, Geology or Investigations in Physical Geography” in common core; “Approved Physics Elective” to Physics specialization
- Geology I [2206.130]
- “Approved 300+ level Physics” in Physics specialization
- “Approved Career Track course” (two instances) in common core

Other:

- Move Astronomy & Astrophysics [1911.241] from common core to Physics specialization
- Remove Physical Chemistry Lab I [1908.402] from Chemistry specialization

- (b) *Sponsors:* David Klassen (Physics & Astronomy) and Bob Newland (Chemistry & Biochemistry)

2. Rationale:

- (a) *Need:* The Physical Science degree program was originally designed with the needs of students seeking secondary education certification in mind. At that time, the State only had certifications in Chemistry, for teaching that subject, and Physical Science for teaching chemistry, physics, or general (physical) science courses. Thus our two specializations - one titled Chemistry and the other titled General Science.

Since then there has been a major change in the State requirements for certification which dropped the physical science breadth in favor of chemistry or physics depth. The current requirement is that students seeking certification in physical science must have 30 sh in Chemistry and 15 sh in Physics, or vice versa.

However, it has recently come to our attention, based on feedback from graduates, that the State does not recognize some of our courses as “physics”, and did not count them as such for certification. Specifically, the State classifies Introduction to Astronomy [1911.120] as “earth science”: we can only assume that most of our other Astronomy courses (e.g. Exploration of the Solar System [1911.221]).

Methods and Techniques in Modern Astronomy [1911.231], and our four Astronomy Research courses) would also be classified as “earth science” instead of “physics”. Thus, in its default form, our students are not guaranteed of meeting State certification requirements. Since students planning on teaching high school are the largest population for this major, we feel it is imperative that we make the above changes.

We have reorganized the program so that the Common Core will provide students with 16 sh of both Chemistry and Physics as well as (with the Gen Ed) providing a good general, physical science breadth. The specializations will then contain the remaining ~15 sh of Chemistry or Physics needed for certification. For this reason we propose changing the title of the “General Science” specialization to “Physics” specialization to reflect its new content. Thus, a student majoring in Physical Science: Chemistry will have 30 sh of Chemistry courses, 15 sh of Physics courses, and some breadth in other earth- and/or space-sciences. A student majoring in Physical Science: Physics will have 30 sh of Physics courses, 15 sh of Chemistry courses, and some breadth in other earth- and/or space-sciences. Both students would then be eligible for certification in Physical Science. A summary (i.e. as it would appear in the catalog) of what the reorganized program looks like is shown in the table below on page 4. A description of the changes, and their justification, follows.

Because of the astronomy classification noted above, our current degree program does not meet the State’s requirement of 30 sh of physics courses. Since physical science breadth is stressed less by the State, we propose to combine our two physical science “choice” breadth requirements into one which then makes room for another physics course. Thus, “An approved Astronomy, Atmospheric Science, or Oceanography course” in Common Core and “Choose one of an approved Geology course, Investigations in Physical Geography, or an approved Biology course” in General Science specialization will become “An approved course from Astronomy, Atmospheric Science, Geology or Investigations in Physical Geography” in common core and “Approved Physics Elective” in the Physics specialization. The topic of Oceanography is dropped since there has not been a faculty line in this area for many years and our departments have no plans on reviving oceanography courses. The additional physics course is a physics elective since many of our upper level courses are taught only once per year.

Since there is no life sciences requirement for Physical Science certification, we propose to change the Biology I or II [0401.100 or 101] Gen Ed LAB requirement to Geology I [2206.130]. This adds a course in earth sciences which provides additional general, physical science breadth for students who could likely teach general science or earth science in a middle school or high school. With the physical science breadth now covered by adding Geology, along with the previous changes, we propose to move Astronomy & Astrophysics [1911.241] to the Physics specialization—the State does count this course as “physics” for purposes of certification since the physics content is noted in its title.

The necessary Chemistry hours for certification in the Physics specialization are covered in the Common Core so that no additional chemistry courses are required within its upper level requirements. We therefore propose to change the requirement of “An approved 300+ level Physics or Chemistry course” to simply “An approved 300+ level Physics course”. Previously, General Science specialization students who wanted to satisfy the State certification requirements had to be sure to take a physics course and not a chemistry course. This change eliminates any possible confusion between major requirements and certification requirements.

We propose to remove the Physical Chemistry Lab I [1908.402] from the Chemistry specialization. This course is more suitable for the student desiring a career in research chemistry. By eliminating this course requirement, the Chemistry and the Physics specializations will be more directly parallel in their requirements—that is, they will both contain only four courses (≈ 15 sh).

Lastly, we propose to move (from the General Science specialization to the core) and rename the two “approved course leading to certification or minor” requirements. The new requirement will be “Approved

Career Track course”. Our proposed change to these slots is a continuation of the recognition that there are many possible career tracks a student may wish to pursue with a degree in Physical Science which may not have a minor or certification attached to them. To facilitate and encourage these tracks, we count 6-8 sh of science oriented courses from these tracks within the Physical Science degree program. We have previously published for our students a guide of these Career Tracks and a listing of courses they may want to consider in order to best meet those goals. Since the inception of these tracks, many of them have become concentrations or minors in other programs that will be used to fulfill our Career Tracks.

We currently have developed five (5) such tracks: K-12 Teaching (double major with Education), Medical Technologist (Pre-med concentration), Environmental Science (Environmental Studies concentration), Technical Writing (minor in Journalism), and Marketing or Technical Representative (18-24 sh of courses in Business and related topics). Students who do not want to take one of these suggested tracks will be encouraged to design one of their own in consultation with their advisor. Between the 9 sh of Gen Ed Non-Program Courses, the 12-17 sh of Free Electives, and these 6-8 sh of Career Track courses, students can easily fit almost any minor or concentration or be well on their way to a double major.

- (b) *Curricular Effect:* The changes in this proposal directly impact three areas: The Department of Biological Sciences, the Department of Geography & Anthropology, and the B.A. in Education: K-12 Subject Matter managed by the Department of Secondary Education/Foundations of Education in the College of Education. In the first two, we are removing a Biology requirement and adding a Geology requirement. This will only amount to about five (5) students per year so that the impact to these courses is minimal.

The impact on students double majoring with a B.A. in Education is also minimal since it only makes changes to our program and no changes in how these courses will fit within the B.A. in Education. In essence it only changes the courses counted among the Free Electives of the B.A. Education. Additionally, it changes one course within the Gen Ed Science & Math bank of the Physical Science program which is also effectively an elective for the Education program. In order to facilitate the work they will have to do at the State level, we have included updated program requirements sheets for the B.A. in Education combined with the B.S. in Physical Science for both specializations on pages 5 and 6. These sheets are based upon previous versions developed by the Secondary Education/Foundations of Education department in consultation with the departments of Chemistry & Biochemistry and Physics & Astronomy.

While our Career Track guides will point to concentrations and minors in other departments and colleges, the impact upon them will be insignificant due to the fact that nearly all of the students in this program plan to teach (high school) after graduation.

Attached are letters of consultation from affected programs beginning on page 7.

3. *Results of Consultations:*

Greg Hecht, *Department of Biological Sciences* — see attached

Dick Scott, *Department of Geography & Anthropology* — see attached

Frank Orlando, *Department of Secondary Education/Foundations of Education* — No Response

**Education: K–12 Subject Matter B. A. with Physical Science: Chemistry B. S. Program
Degrees and Certification Advising Guide**

General Education			60 sh
Communications	9 sh	Science and Mathematics	8 sh
College Composition I	3	Geology I ^{PS}	4
College Composition II	3	Calculus I ^{PS}	4
Public Speaking	3		
Social and Behavioral Sciences	6 sh	Artistic and Creative Experience	3 sh
Characteristics of Knowledge Aquisition ^{EGE}	3	Music or Art History or Appreciation ^R	3
M/G choice	3		
History, Humanities, and Languages	6 sh	Non-Program Courses	28 sh
History of American Education ^{EGE}	3	Human Exceptionalities ^{EGE}	3
LIT choice	3	Literacies in Today's World ^{EGE}	3
		Adolescent Development	3
		Philosophy of Science (WI) ^{R, PS}	3
		Intro Sci Prog or Comp Sci & Prog ^{PS}	3
		An approved course from Astronomy, Atmo- spheric Science, Geology or Investigations in Physical Geography ^{PS}	3-4
		Calculus II ^{PS}	4
		Choice	5-6
Major Requirements	33 sh	Free Electives	46–47 sh
Teaching: An Introduction to the Profession	3	Physics of Current Technologies ^P	4
Teaching in Learning Communities I	2	Physics I (w/Calc.) ^P	4
Teaching in Learning Communities II	2	Physics II (w/Calc.) ^P	4
Teaching Literacy	3	Modern Physics ^P	4
Teaching and Learning A w/ Practicum	4	Chemistry I ^C	4
Differentiating Instruction Inclusion	2	Chemistry II ^C	4
Teaching and Learning B w/ Practicum	4	Organic Chemistry I ^C	4
Teaching Students of Ling/Cul Diversity	1	Quantitative Analysis ^C	4
Clinical Practice in Subject Matter Ed	10	Organic Chemistry II ^C	4
Clinical Seminar: Subject Matter	1	Physical Chemistry I ^C	3
Technology in Education	1	Biochemistry ^C	4
		An approved Chemistry Elective ^C	3-4
Total Credits Needed			139–140 sh

^R Recommended only

^P Physics course: major requirement for Physical Science degree. Total of 30–32sh in physics out of 30sh required for certification.

Chemistry course: major requirement for Physical Science degree. Total of 16sh in chemistry out of 15sh required for certification.

^{PS} Other Physical Science degree requirement.

^{EGE} Ed College Gen Ed course.

Side-by-side Comparison of Changes: Current to Proposed Program

From:	To:
General Education — 44	General Education — 44
Biology I or II [0401.100 or 101] — 4	Geology I [2206.130] — 4
Common Core — 43-44	Common Core — 45-48
Astronomy & Astrophysics [1911.241] — 4	Calculus II [1701.131] — 4
Calculus II [1701.131] — 4	Physics of Current Technologies—RS [1902.140] — 4
Chemistry I [1906.100] — 4	Physics I w/Calculus [1902.200] — 4
Chemistry II [1906.101] — 4	Physics II w/Calculus [1902.201] — 4
Organic Chemistry I [1907.200] — 4	Modern Physics [1902.300] — 4
Quantitative Analysis [1909.250] — 4	An approved course from Astronomy, Atmospheric Science, Geology or Investigations in Physical Geography — 3-4
Physics of Current Technologies—RS [1902.140] — 4	Chemistry I [1906.100] — 4
Physics I (w/Calculus) [1902.200] — 4	Chemistry II [1906.101] — 4
Physics II (w/Calculus) [1902.201] — 4	Organic Chemistry I [1907.200] — 4
Modern Physics [1902.300] — 4	Quantitative Analysis [1909.250] — 4
An approved Astronomy, Atmospheric Science, or Oceanography course — 3-4	Approved Career Track course: — 3-4
	Approved Career Track course: — 3-4
Specializations	Specializations
<i>Chemistry — 16-17</i>	<i>Chemistry — 14-15</i>
Organic Chemistry II [1907.201] — 4	Organic Chemistry II [1907.201] — 4
Physical Chemistry I [1908.400] — 3	Physical Chemistry I [1908.400] — 3
Physical Chem Lab I [1908.402] — 2	Biochemistry [1907.348] — 4
Biochemistry [1907.348] — 4	Approved Chemistry Elective — 3-4
Chemistry Elective — 3-4	
<i>General Science — 17-20</i>	<i>Physics — 14-16</i>
An approved 300+ level Physics — 3-4	Astronomy & Astrophysics [1911.241] — 4
An approved 300+ level Physics or Chemistry — 3-4	Approved 300+ level Physics — 4
Choose one of an approved Geology course, Investigations in Physical Geography, or an approved Biology course — 4	Approved 300+ level Physics — 3-4
An approved course leading to certification or minor — 3-4	Approved Physics Elective — 3-4
An approved course leading to certification or minor — 3-4	
Free Electives — 12-17	Free Electives — 12-17
Total — 120	Total — 120

**Education: K–12 Subject Matter B. A. with Physical Science: Physics B. S. Program
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General Education			60 sh
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		Adolescent Development	3
		Philosophy of Science (WI) ^{R, PS}	3
		Intro Sci Prog or Comp Sci & Prog ^{PS}	3
		An approved course from Astronomy, Atmo- spheric Science, Geology or Investigations in Physical Geography ^{PS}	3–4
		Calculus II ^{PS}	4
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Teaching Students of Ling/Cul Diversity	1	Quantitative Analysis ^C	4
Clinical Practice in Subject Matter Ed	10	Astronomy & Astrophysics ^P	4
Clinical Seminar: Subject Matter	1	Approved Physics Elective ^{P,*}	3–4
Technology in Education	1	An approved 300+ level Physics ^{P,*}	3–4
		An approved 300+ level Physics ^{P,*}	3–4
Total Credits Needed			140–141 sh

^R Recommended only

^P Physics course; major requirement for Physical Science degree. Total of 30–32 sh in physics out of 30 sh required for certification.

^C Chemistry course; major requirement for Physical Science degree. Total of 16 sh in chemistry out of 15 sh required for certification.

^{PS} Other Physical Science degree requirement.

^{EGE} Ed College Gen Ed course.

* At least one of these three must be 4 sh to make the 30 sh requirement.

Gregory Hecht <hecht@rowan.edu>
Re: The draft Proposal
January 25, 2006 4:56:17 PM EST
David Klassen <klassen@rowan.edu>
Gregory Hecht <hecht@rowan.edu>

MEMO TO: David Klassen
From: Gregory Hecht

Re: Physical Science curriculum proposal

David --

Thank you for consulting with the Biological Sciences Department regarding your curricular proposal entitled "Program Changes to Physical Science." Since our Biology core courses are oversubscribed, this proposal will actually help us achieve some control over our enrollment situation. Even though this is not the intended benefit of the proposal, we do view it as something that will have a positive effect on our Department.

Our Dept fully supports the proposal.

Sincerely,

Gregory B. Hecht, Ph.D.
Interim Chairperson
Associate Professor of Microbiology
& Molecular Biology
Department of Biological Sciences
Rowan University
201 Mullica Hill Road
Glassboro, NJ 08028
Office: Science Hall 130D
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(856) 256-4834 (office, phone mail)
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Fax: (856) 256-4478
hecht@rowan.edu
<http://users.rowan.edu/~hecht>
<http://www.rowan.edu/biology>
On 1/23/06 12:42 PM, "David Klassen" <klassen@rowan.edu> wrote:

Greg,

Here's a draft of the proposal we discussed earlier today.

- Dave

--

David R. Klassen
Department of Physics & Astronomy
Rowan University
201 Mullica Hill Road
Glassboro, NJ 08028-1701

voice: 856-256-4391
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Department of Geography and Anthropology

January 30, 2006

Dr. David Klassen, Chair
Department of Physics and Astronomy
Rowan University
Glassboro, Nj 08028

Dear David:

Our department has reviewed your proposal and can give it our wholehearted support. We believe that the changes you propose will provide an enhanced program for students seeking to teach science in the schools. One concern I had was with the increased number of students in the geology and physical geography classes. Dr. Lemaire assures me that there will be adequate capacity for the additional students.

If you require further information, please feel free to contact me.

Sincerely yours,

A handwritten signature in cursive script that reads "Richard A. Scott".

Richard A. Scott, Ph.D.
Professor of Geography and Chair



March 3, 2006

Dr. David Klassen
Department of Physics and Astronomy
Rowan University
Glassboro, NJ 08028

Dear Dr. Klassen:

As the certification officer for Rowan University, it is my pleasure to support the changes you are proposing in the Physical Science major in order to better serve Rowan students in general, and Teacher Candidates in particular. The clear identification of physics courses will provide a service for any of our Candidates who wish to pursue K-12 subject matter certification in your discipline.

I would like to clarify one additional point however. While this proposal does serve to smooth the path for some prospective teachers, I would renew the call for your department to explore the possibility of initiating a B.A. program in an effort to recruit higher numbers of teachers in the science disciplines. This issue is particularly salient for Candidates pursuing middle school certification, as there is currently no pure science option available for those wishing to serve that unique population of students. In pursuing this goal, I recommend considering a program which mirrors the highly successful model developed by the Mathematics Department

Thank you for your continued efforts on behalf of the Rowan Teacher Candidates.

Sincerely yours,

D. Mark Meyers
Associate Dean/Certification Officer
College of Education

ROWAN UNIVERSITY SENATE
COLLEGE CURRICULUM COMMITTEE WORKSHEET

PART I: INFORMATION								
COLLEGE NAME (circle one)	BUS	COM	ED	ENG	FPA	LAS-HUM	LAS-M/S X	LAS-SBS
Date of Hearing	3 March 2006							
Type of Hearing (circle one)	OPEN X	CLOSED						
SCC Proposal #	05 – 06 – 838							
Proposal Title	Program changes to Physical Science							
Sponsor(s) in Attendance	Klassen, Newland							
PART II: COMMON PROBLEMS REVIEWED						Sponsor's Initials	College Chairperson's Initials	
Consultation letters attached							DRK	
Library form completed by librarian (not sponsor)							N/A	
Prerequisites consistent (initial page and catalog description)							N/A	
Course title consistent throughout proposal							N/A	
Catalog description – on separate page – complete with HEGIS, credits, and prereqs (with HEGIS)							N/A	
All courses throughout proposal identified with correct title and HEGIS numbers							DRK	

PART III: COMMITTEE DECISION

- Pass with NO CHANGES
- Passed – Return to Sponsor for MINOR CHANGES
- Tabled w/SUGGESTED MINOR CHANGES
- NOT APPROVED

HEARING SUMMARY:
