

# UNIVERSITY FACULTY SENATE FORMS

## Academic Program Approval

This form is a routing document for the approval of new and revised academic programs. Proposing department should complete this form. For more information, call the Faculty Senate Office at 831-2921.

Submitted by: John Madsen phone number x1608

Department: Geological Sciences email address jmadsen@udel.edu

Date: 11/30/11

Action: Revise Major  
(Example: add major/minor/concentration, delete major/minor/concentration, revise major/minor/concentration, academic unit name change, request for permanent status, policy change, etc.)

Effective term 12F  
(use format 04F, 05W)

Current degree BA Earth Science Education  
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed change leads to the degree of: BS  
(Example: BA, BACH, BACJ, HBA, EDD, MA, MBA, etc.)

Proposed name: BS Earth Science Education  
Proposed new name for revised or new major / minor / concentration / academic unit  
(if applicable)

### Revising or Deleting:

Undergraduate major / Concentration: Revising BA Earth Science Education Major  
(Example: Applied Music – Instrumental degree BMAS)

Undergraduate minor: \_\_\_\_\_  
(Example: African Studies, Business Administration, English, Leadership, etc.)

Graduate Program Policy statement change: \_\_\_\_\_  
(Must attach your Graduate Program Policy Statement)

Graduate Program of Study: \_\_\_\_\_  
(Example: Animal Science: MS Animal Science: PHD Economics: MA Economics: PHD)

Graduate minor / concentration: \_\_\_\_\_

**Note: all graduate studies proposals must include an electronic copy of the Graduate Program Policy Document, highlighting the changes made to the original policy document.**

**List new courses required for the new or revised curriculum. How do they support the overall program objectives of the major/minor/concentrations)?**

(Be aware that approval of the curriculum is dependent upon these courses successfully passing through the Course Challenge list. If there are no new courses enter “None”)

GEOL202 Earth’s Materials – 4 credits. This course will replace existing GEOL300 and GEOL302 courses and integrates some of the content in these courses. This new course will study earth materials including the chemistry, structure, and formation of Earth’s minerals and rocks, in the context of major rock- and sediment-forming processes.

GEOL203 Surficial Processes – 4 credits. This course will replace the existing GEOL303 course and integrates most of the content of 303. This new course will investigate the processes and history of near-surface geologic environments of the Earth and human impacts on surficial environments.

**Explain, when appropriate, how this new/revised curriculum supports the 10 goals of undergraduate education: <http://www.ugs.udel.edu/gened/>**

The curriculum in earth science education supports the 10 goals of undergraduate education in the following ways. 1) Courses in the major require that students communicate effectively in verbal and written forms. 2) Students will need to use information technologies and quantitative reasoning and critical thinking skills. 3) Students will be asked to integrate in-class learning in solving real-life problems. 4) Students will understand the impact of humans on the environment and vice versa locally and globally. 5) Students will work and learn independently and collaboratively, integrating content in sub-disciplines in the earth sciences with perspectives and diverse ways of thinking that underlie the search for knowledge. 6) Students will explore environmentally related ethical questions and implications of individual and societal choices on individuals, communities, and the planet. 7) Students will develop intellectual curiosity, confidence, and understand the need for lifelong engagement in learning. 8) Students will develop an integrated, international perspective regarding countries, populations, and their geologic setting. 9) Students will integrate and demonstrate classroom skills and knowledge in a student teaching experience.

**Identify other units affected by the proposed changes:**

(Attach permission from the affected units. If no other unit is affected, enter “None”)

With the proposed revisions to the supporting science and mathematics courses, the Department of Biological Sciences is affected in terms of a potential, relatively small, increase in the number of students in the BISC207 course. The notification and subsequent approval of our request to have some of our majors enroll in the BISC207 course is included with this document. Our students will be advised to take the course in the spring semester to limit the impact on Biological Sciences.

The proposed revisions also affect courses in Geography, Food and Resource Economics, and Marine Studies. **\*\*\*NOT YET INCLUDED IN DOCUMENT\*\*\*** The notification and subsequent approval of our request to have Earth Science Education majors enroll in these courses is included with this document.

### **Describe the rationale for the proposed program change(s):**

(Explain your reasons for creating, revising, or deleting the curriculum or program.)

We propose a major revision to the current Bachelor of Arts (BA) degree in Earth Science Education that would result in a change of the degree to a Bachelor of Science (BS) in Earth Science Education. The revision involves curriculum changes to the major that results in an increase in the number and the level of science-content courses that will be required. This revision is being proposed in response to national and international calls to improve the preparation of future secondary-level science, technology, and mathematics (STEM) teachers. At the University-level within the framework of NCATE evaluation, the Secondary Science Education community continues to explore ways to improve and strengthen our majors. This proposed revision is part of that effort. The changes will align the Earth Science Education program with the proposed modifications of the BS and BA degrees in the Department of Geological Sciences.

The revised curriculum does not change the total number of credits required for graduation (124) or the courses and number of credits (27) that are required in the education (EDUC and SCEN) component of the degree. In proposing a more science-content oriented degree, the number of courses required to fulfill the College of Earth, Ocean and the Environment's Breath Requirements has been reduced by 3 (1 course reduction from Group A, B, and C, respectively). This level of breadth requirements is equivalent to that required for our current BS degree in Geology (and the proposed revision of that degree to a BS in Geological Sciences).

In terms of the earth science content requirements, several changes are proposed. 1) Earth Science Education (ESE) majors would be required to take the core geology courses (GEOL107, 110, 202, 203, 304, 305) that are being proposed for the BA and BS degrees in Geological Sciences. This core removes some redundancies in terms of content (i.e., GEOL105/115, GEOL107, and GEOG101 have overlaps in content coverage) and includes ESE majors in the cohort of students pursuing studies in the geological sciences. This inclusion is important in terms of establishing a learning community in our discipline. 2) To allow more flexibility in the selection of courses that cover topics in conservation, climate/water, and oceanography, the revised program provides students with the opportunity to select from lists of courses rather than having only one course satisfy requirements (i.e., GEOG235 or 236 to satisfy the conservation requirement; GEOG320 or 451 or 458 to satisfy the climate/water requirement; MAST200 or 482 to satisfy the oceanography requirement). 3) To further strengthen the earth science-content in this proposed BS degree, 3 additional science courses (9-11 credits) are required. 1 of these courses is in the field of Geographic Information Systems (GIS) (GEOG372 or FREC480). The other 2 courses are at the 300-level or above in geology (GEOL), geography (GEOG), and/or marine studies (MAST). 4) Within the supporting science requirements, the option of taking introductory biology courses with labs (BISC207 and BISC208) has been added. Students will be encouraged to take 1 course from biology (BISC207), chemistry (CHEM103) and physics (PHYS201). This revision is a reflection of a greater national emphasis in geoscience programs on Earth systems science, including the biosphere with the geosphere, hydrosphere, and atmosphere in our understanding of Earth processes. Currently, CHEM103 and PHYS201 and 202 are required.

### **Program Requirements:**

(Show the new or revised curriculum as it should appear in the Course Catalog. If this is a revision, be sure to indicate the changes being made to the current curriculum and **include a side-by-side comparison** of the credit distribution before and after the proposed change.)

Side-by-side comparisons for the proposed revision are shown on the following pages.

SIDE-BY-SIDE COMPARISON  
Strike-through to be eliminated

**CURRENT**

**DEGREE: BACHELOR OF ARTS**  
**MAJOR: EARTH SCIENCE EDUCATION**

<u>UNIVERSITY REQUIREMENTS</u>	<u>CREDITS</u>
ENGL110	3
First Year Experience (FYE)	0-4
Breadth Requirements *fulfilled by college breadth requirements <del>below</del>	12
Discovery Learning Experience (DLE)	3
Multi-cultural Courses	3

**COLLEGE REQUIREMENTS**

**Second Writing Requirement** (minimum grade of C-) 3

A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated on the registrar's course search page.

**Foreign Language** (minimum grade of D-) 0-12

Completion of the intermediate-level course (107 or 112 or 214) in a given language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

**COLLEGE BREADTH REQUIREMENTS**

~~These requirements apply to all College of Earth, Ocean & Environment Bachelor of Arts degrees. College breadth courses when combined with University breadth courses must represent at least two departments or appropriate instructional units in each category.~~

~~If the grade earned is sufficient, a course may be applied toward more than one requirement (e.g., breadth and major requirements), but the credits are counted only once toward the total credits for graduation. If all but one course in a group has been taken in one department or program, a course cross-listed with that program will not satisfy the distribution requirement.~~

\*note: 3 credits in each category below can be used to fulfill the University Breadth requirement

Group A: Creative Arts and Humanities 9  
Understanding and appreciation of the visual and performing arts, of aesthetic forms, designs, or

SIDE-BY-SIDE COMPARISON  
Underlined to be added

**PROPOSED**

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: EARTH SCIENCE EDUCATION**

<u>UNIVERSITY REQUIREMENTS</u>	<u>CREDITS</u>
ENGL110	3
First Year Experience (FYE)	0-4
Breadth Requirements *fulfilled by College Breadth Requirements	12
Discovery Learning Experience (DLE) *fulfilled by <u>EDUC 400 Major Requirement</u>	3
Multicultural Courses *fulfilled by <u>EDUC 419 Major Requirement</u>	3

**COLLEGE REQUIREMENTS**

**Second Writing Requirement** (minimum grade of C-) 3

A second writing course involving significant writing experience including two papers with a combined minimum of 3,000 words to be submitted for extended faculty critique of both composition and content. This course must be taken after completion of 60 credit hours. Appropriate writing courses are normally designated on the registrar's course search page.

**Foreign Language** (minimum grade of D-) 0-12

Completion of the intermediate-level course (107 or 112 or 214) in a given language. Number of credits needed and initial placement will depend on number of years of high school study of foreign language. Students with four or more years of high school work in a single foreign language may attempt to fulfill the requirement in that language by taking an exemption examination.

**COLLEGE BREADTH REQUIREMENTS**

If the grade earned is sufficient, a course may be applied toward more than one requirement (e.g., breadth and major requirements), but the credits are counted only once toward the total credits for graduation.

\*note: 3 credits in each category below can be used to fulfill the University Breadth requirement

Group A: Creative Arts and Humanities 6  
Understanding and appreciation of the visual and performing arts, of aesthetic forms, designs, or craftsmanship, or of literary, philosophical, and intellectual traditions. Courses may focus on a single aesthetic form or intellectual tradition, or cross-cultural comparisons.

Group B: History and Cultural Change 6  
Understanding of the sources and forces of historical changes in ideas, beliefs, institutions, and cultures. Courses may address social, cultural, intellectual, economic, technological, artistic, scientific, and political development, changes in a discipline, or globalization and its effects.

craftsmanship, or of literary, philosophical, and intellectual traditions. Courses may focus on a single aesthetic form or intellectual tradition, or cross-cultural comparisons.

- Group B: History and Cultural Change 9  
 Understanding of the sources and forces of historical changes in ideas, beliefs, institutions, and cultures. Courses may address social, cultural, intellectual, economic, technological, artistic, scientific, and political development, changes in a discipline, or globalization and its effects.
- Group C: Social and Behavioral Sciences 9  
 Understanding of the behavior of individuals and social groups in the context of their human and natural environments. Courses emphasize the empirical findings, applications, and methods of the social and behavioral sciences.
- Group D: Mathematics, Natural Sciences, and Technology 10  
 Understanding of fundamental and/or applied concepts and phenomena from mathematics, logic, natural or physical sciences, and technology including quantitative reasoning and methods used to approach and solve problems. Courses taken to fulfill this category (university and college breadth) must include a minimum of one course with an associated laboratory.

**MAJOR REQUIREMENTS**

- ~~GEOL 105/GEOL 115 Geologic Hazards and Their Human Impact and Laboratory~~ 4
- GEOL 107 General Geology 4
- GEOL 300 Earth's Materials I: Minerals 4
- GEOL 303 Earth's Surface I: Surficial Processes 4
- ~~GEOL 306 Earth Lithosphere II: Field Geology~~ 4
- ~~GEOG 101 Physical Geography~~ 3
- GEOG220 Meteorology 3
- GEOG 235 Conservation of Natural Resources 3
- One of the following 3  
~~GEOG 343 Climatic Geomorphology~~  
 or  
~~GEOG 255 Applied Climatology~~
- and
- PHYS 133 Astronomy 4
- PHYS201/202 Introductory Physics I and II 8
- CHEM 103 General Chemistry 4
- ~~BISC 195 Biological Evolution~~ 3
- MATH 221 Calculus I 3
- MAST 200 The Oceans 3

A grade of C- or better is required in ~~BISC 195~~, MAST 200, PHYS 133, and SCEN 491 and all of the required EDUC, GEOG, and GEOL courses.

- Group C: Social and Behavioral Sciences 6  
 Understanding of the behavior of individuals and social groups in the context of their human and natural environments. Courses emphasize the empirical findings, applications, and methods of the social and behavioral sciences. NOTE: 3 credits of this requirement are satisfied by GEOG235 or GEOG236 Major Requirement.
- Group D: Mathematics, Natural Sciences, and Technology 7  
 Understanding of fundamental and/or applied concepts and phenomena from mathematics, logic, natural or physical sciences, and technology including quantitative reasoning and methods used to approach and solve problems. Courses taken to fulfill this category (university and college breadth) must include a minimum of one course with an associated laboratory. NOTE: These credits are satisfied by Major Requirements.

**MAJOR REQUIREMENTS**

- GEOL 107 General Geology 4
- ~~GEOL 110 Earth History~~ 4
- ~~GEOL 202 Earth's Materials~~ 4
- GEOL 203 Surficial Processes 4
- GEOL 304 Sedimentology and Stratigraphy 4
- GEOL 305 Structural Geology and Tectonics 4
- GEOG 220 Meteorology 3
- PHYS 133 Astronomy 4
- One of the following 3  
 GEOG 235 Conservation of Natural Resources  
 or  
GEOG 236 Conservation: Global Issues
- One of the following 3  
GEOG320 Water and Society  
 or  
GEOG 451 Microclimatology  
 or  
GEOG458 Paleoclimatology
- One of the following 3-4  
GEOG 372 Introduction to GIS  
 or  
FREC 480 Geographic Information Systems in Natural Resource Management
- One of the following 3  
 MAST 200 The Oceans  
 or  
MAST 482 Introduction to Ocean Sciences

One of the following 3-4  
 MATH 221 Calculus I  
 or  
 MATH 241 Analytic Geometry and Calculus

Two additional GEOL, MAST, or GEOG courses 6-8  
 at the 300-level or above.

12 credits from the following 12  
 NOTE: BISC 207, CHEM 103, and PHYS 201 are recommended.  
There are co- and/or pre-requisites for all of the courses listed below.

BISC 207 Introductory Biology I	4
BISC 208 Introductory Biology II	4
CHEM 103 General Chemistry	4
CHEM 104 General Chemistry	4
PHYS 201 Introductory Physics I	4
PHYS 202 Introductory Physics II	4

and

EDUC 413 Adolescent Development and Education	4
Psychology	
EDUC 414 Teaching Exceptional Adolescents	3
EDUC 419 Diversity in Secondary Education	3
EDUC 420 Reading in the Content Area	1
EDUC 400 Student Teaching	9
SCEN 491 Teaching Science in Secondary Schools	4
SCEN 492 Student Teaching Seminar: Secondary Science	3

A grade of C- or better is required in PHYS 133 and all of the required EDUC, GEOG (or FREC), GEOL, MAST and SCEN courses.

To be eligible to student teach, Earth Science Education students must have an overall GPA of 2.50 or higher with an earth science content GPA of 2.75 or higher. The earth science content GPA is calculated from grades received in PHYS 133 and the required GEOG (or FREC), GEOL, and MAST courses. They must also pass a teacher competency test as established by the University Council on Teacher Education. Students must consult with the teacher education program coordinator to obtain the student teaching application and other information concerning student teaching policies.

**ELECTIVES**

After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF 124

and

EDUC 413 Adolescent Development and Education	4
Psychology	
EDUC 414 Teaching Exceptional Adolescents	3
EDUC 419 Diversity in Secondary Education	3
EDUC 420 Reading in the Content Area	1
<del>EDUC 430 Classroom Management in Schools</del>	<del>1</del>
EDUC 400 Student Teaching	9
SCEN 491 Teaching Science in Secondary Schools	4
SCEN 492 Student Teaching Seminar: Secondary Science	3

To be eligible to student teach, Earth Science Education students must have an overall GPA of 2.50 with a GPA of 2.75 in ~~BISC 195~~, MAST 200, PHYS 133 and their geology and geography courses. They must also pass a teacher competency test as established by the University Council on Teacher Education. Students must consult with the teacher education program coordinator to obtain the student teaching application and other information concerning student teaching policies.

**ELECTIVES**

After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree.

CREDITS TO TOTAL A MINIMUM OF 124

**ROUTING AND AUTHORIZATION:** (Please do not remove supporting documentation.)

Department Chairperson Susan M'Geary Date 1/18/12  
Dean of College Nancy M. Gargan Date 1/18/12  
Chairperson, College Curriculum Committee Moham Badiy Date 1/18/12  
Chairperson, Senate Com. on UG or GR Studies \_\_\_\_\_ Date \_\_\_\_\_  
Chairperson, Senate Coordinating Com. \_\_\_\_\_ Date \_\_\_\_\_  
Secretary, Faculty Senate \_\_\_\_\_ Date \_\_\_\_\_  
Date of Senate Resolution \_\_\_\_\_ Date to be Effective \_\_\_\_\_  
Registrar \_\_\_\_\_ Program Code \_\_\_\_\_ Date \_\_\_\_\_  
Vice Provost for Academic Affairs & International Programs \_\_\_\_\_ Date \_\_\_\_\_  
Provost \_\_\_\_\_ Date \_\_\_\_\_  
Board of Trustee Notification \_\_\_\_\_ Date \_\_\_\_\_

**SUPPORTING DOCUMENTATION:**

**Date:** Thu Nov 17 08:07:54 EST 2011  
**From:** "Randall Duncan" <rlduncan@UDel.Edu> [Add To Address Book](#) | [This is Spam](#)  
**Subject:** RE: Geology curriculum revision  
**To:** "David C. Usher" <dusher@UDel.Edu>, <smcgeary@UDel.Edu>  
**Cc:** "David W. Smith" <dwsmith@UDel.Edu>, <jmadsen@UDel.Edu>

Sue,

My apologies for not responding to your earlier e-mail. I've looked through my inbox and can't seem to find it, but Dave has updated me on your request. As he discussed with you, BISC207 is undergoing some major changes in the next couple of years that will make it easier to accommodate programs that will require this course. After discussing this with Dave this morning, we can make room for the 15 students that will require the course for your major in it's current format if you can advise them to take it in the spring semester. If you are agreeable to this stipulation, I would gladly approve your request.

Please let me know if you have any questions or concerns.

Best regards,  
Randy

Randall L. Duncan, Ph.D.  
Professor and Chairman  
Department of Biological Sciences  
University of Delaware  
Newark, DE 19716  
(Tel) 302.831.4296  
(Fax) 302.831.1033

"After a certain high level of technical skill is achieved, science and art tend to coalesce in aesthetics, plasticity, and form. The greatest scientists are always artists as well."

Albert Einstein

\*\*\*\*\*

**Date:** Mon Dec 5 09:06:49 EST 2011  
**From:** Tracy DeLiberty <tracyd@UDel.Edu> [Add To Address Book](#) | [This is Spam](#)  
**Subject:** Re: Approval for GEOG courses in revision to Earth Science Education major  
**To:** John Madsen <jmadsen@UDel.Edu>

John,

The Geography Faculty formally meet and reviewed the changes proposed in the Earth Science program. We are all supportive of these changes and feel the selection of geography course as part of the undergraduate



program are critical to a solid earth science education. We welcome having your Earth Science education students in our courses and look forward to working with them.

Tracy

--

Dr. Tracy DeLiberty  
Associate Professor & Chair  
Pearson Hall, Room 216  
Department of Geography  
University of Delaware

tracyd@udel.edu  
(302)831-4084  
(302)831-6654 FAX

On 12/1/11 9:22 AM, John Madsen wrote:

> Hi Tracy,

>

> We will be proposing a revision to our BA in Earth Science Education degree that will result in it be changed to a BS in Earth Science Education. A DRAFT of the proposal is attached.

>

> In terms of GEOG courses, it involves removing GEOG101 as one of the requirements (too much redundancy with GEOL105/115, GEOL107, and GEOG101); adding the option of GEOG236 as a major requirement (GEOG235 or GEOG236); removing GEOG343 and GEOG255 (I don't think they are going to be offered anymore?); adding GEOG320, GEOG451 or GEOG458 in place of 343 and 255; and adding GEOG372 as a GIS requirement (GEOG372 or FREC480).

>

> We are hoping that you would approve of these revisions in terms of how it impacts the GEOG courses. If so, could you respond with an e-mail of support? We would like to include it with our Faculty Senate proposal.

>

> Let me know if you have any questions.

>

> Thanks!

> John M.

>

> Dr. John A. Madsen

> Department of Geological Sciences

> University of Delaware

> Newark, DE 19716

> Phone - 302-831-1608

> FAX - 302-831-4158

\*\*\*\*\*

**\*\*\*\*NOTE: WE NEED TO ADD LETTERS FROM FOOD & RESOURCE ECONOMICS, MARINE STUDIES, SECONDARY EDUCATION GROUP, AND UCTE\*\*\*\***

**Date:** Fri Dec 2 14:45:41 EST 2011

**From:** <smcgeary@UDel.Edu> [Add To Address Book](#) | [This is Spam](#)

**Subject:** Revision to Earth Science Education major

**To:** kuse@UDel.Edu, johnmack@UDel.Edu

**Cc:** jmadsen@UDel.Edu

Hello Titus and John,

We are planning to propose a revision to our BA in Earth Science Education degree that will result in it being changed to a BS in Earth Science Education. A DRAFT of the proposal is attached. John Madsen has been leading this effort and is copied on this email.

In terms of the potential impact on FREC, we would like to add a requirement that they take a GIS course - their choice of either GEOG 372 or FREC 480 (from a menu). We anticipate that this might mean an extra 1-3 students in any given year.

We realize that FREC 480 is a well-subscribed course and that resources are limited but are hoping that you will be able to approve of these revisions in terms of how it impacts the FREC course in order to help us strengthen this secondary science education program.. If so, could you respond with an e-mail of support? We would like to include it with our Faculty Senate proposal.

Let me know if you have any questions. Cheers, Sue McGeary

\*\*\*\*\*

Dr. Susan McGeary  
Chair  
Geological Sciences  
College of Earth, Ocean, and Environment  
University of Delaware  
Newark, DE 19716

\*\*\*\*\*

**FACULTY SENATE RESOLUTION FOR CHANGE IN DEGREE:**

WHEREAS, the faculty of the Department of Geological Sciences have undertaken a revision to the curriculum of the Bachelor of Arts degree in Earth Science Education, and

WHEREAS, the proposed revision will better prepare Earth Science Education majors to meet their certification requirements and to become exemplary teachers of secondary-level earth science, and

WHEREAS, in the revision the curriculum has been modified to significantly increase the amount and depth of science content that is required to complete the requirements for the major, be it therefore

RESOLVED, that, effective the beginning of the 2012 Fall semester, students completing the requirements for the revised major in Earth Science Education receive the degree of Bachelor of Science in Earth Science Education.