

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 BS Geology
(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 Geological Sciences
Proposed new name for revised or new major / minor / concentration / academic unit
(if applicable)

Revising or Deleting:

Undergraduate major / Concentration: Revising BS Geology 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 geological sciences curriculum, including geology and earth science education, support 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 geological 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 at least one field related experience.

Identify other units affected by the proposed changes:

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

The Department of Biological Sciences is affected in terms of a potential, relatively small, increase in the number of students in the BISC207 course. We have estimated this number as a maximum total of fifteen students (i.e., five students from each of our three proposed revised majors (BA Geological Sciences, BS Geological Sciences and BS Earth Science Education). 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 revisions to the core courses in geology will also impact the Environmental Science concentration in Geosciences. The notification to the Department of Geography and the Director of the Environmental Sciences program of the proposed change to our BS major and the support of the Director for our revision 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 revision to the current BS degree in Geology. The revision involves a name change from its current BS in Geology to BS in Geological Sciences. The proposed name better reflects the broad scope of discipline topics that are taught and researched by our Departmental faculty, and it aligns the degree with our Department name (Geological Sciences).

The revision also involves curriculum changes to major and supporting science requirements that are intended to: 1) better prepare students for the content of each course by more strategically sequencing and integrating courses, 2) make the program more flexible for students by consolidating the core required courses and allowing more elective credits within the discipline, and 3) allow the program to grow by more efficiently using faculty and laboratory space resources.

The revised curriculum does not change the total number of credits required for graduation (124) and it requires essentially the same number of credits in the discipline (45 credits) as the existing program (45-46 credits) and the same number of supporting science and mathematics credits (30 credits). The proposed changes are in how the 45 and 30 credits are distributed. First, entry-level majors will now be required to take a core course introducing them to the study of Earth's history and the evolution of Earth's biota over geologic time (GEOL110). We have proposed that the existing GEOL110 course be modified to add a one credit laboratory experience. This will allow for greater in-depth, inquiry-based, "hands-on" activities to be included. Second, the revised program requires 6 geology core courses (24 credits), 1 geology field experience course and 5-6 geology elective courses (21 credits) instead of the current 9 geology core courses and 3 geology elective courses. This change will allow students greater flexibility in tailoring their upper-level courses within the discipline to their interests. Third, within the supporting science and mathematics requirements, students will be required to take at least one biology course (BISC207) along with one chemistry course (CHEM103) and one physics course (PHYS201) and one additional course chosen from BISC208, CHEM104, and PHYS202. 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. In the current program, students are required to take two chemistry (CHEM103 and 104) and two physics (PHYS201 and 202) courses and no biology.

If this proposed revision is approved, the existing BS in Geology concentrations in Paleobiology, Coastal and Marine Geoscience, and Geophysics will be disestablished. With greater flexibility built into the revised BS in Geological Sciences program, the concentrations will no longer be necessary.

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 SCIENCE
MAJOR: ~~GEOLOGY~~

<u>UNIVERSITY REQUIREMENTS</u>	<u>CREDITS</u>
ENGL110	3
First Year Experience (FYE)	0-4
Breadth Requirements *fulfilled by college breadth requirements below	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~~

SIDE-BY-SIDE COMPARISON
Underlined to be added

PROPOSED

DEGREE: BACHELOR OF SCIENCE
MAJOR: GEOLOGICAL SCIENCES

<u>UNIVERSITY REQUIREMENTS</u>	<u>CREDITS</u>
ENGL110	3
First Year Experience (FYE)	0-4
<u>University Breadth Requirements</u>	12
Discovery Learning Experience (DLE) (<u>fulfilled by Field Experience Major Requirement</u>)	3
Multicultural 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. Note: GEOL401 is recommended to fulfill this requirement.

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.

Breadth Requirements:

Satisfied by completing courses (minimum grade of C-) that are listed within the four categories of the University and/or College of Arts & Sciences Breadth Requirements.
A course may be applied toward more than one requirement (i.e., College Breadth Requirements and Major Requirements), but the credits are counted only once toward the total credits for graduation.

	<u>CREDITS</u>
Creative Arts and Humanities	<u>3</u>
History and Cultural Change	<u>3</u>
Social and Behavioral Sciences	<u>3</u>
Mathematics, Natural Sciences, and Technology	<u>4</u>

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.

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.

MAJOR REQUIREMENTS

One of the following:

- GEOL 107 General Geology 4
- or
- ~~GEOL 105/GEOL 115 Geologic Hazards and Their Human Impact and Laboratory~~ 4
- or
- ~~GEOL 113 Earth Science~~ 4

and

- GEOL 300 Earth's Materials I: Minerals 4
- ~~GEOL 302 Earth's Materials II: Rocks~~ 4
- GEOL 303 Earth's Surface I: Surficial Processes 4
- GEOL 304 Earth's Surface II: Stratigraphy 4
- GEOL 305 Earth's Lithosphere I: Structural Geology and Plate Tectonics 4
- ~~GEOL 306 Earth Lithosphere II: Field Geology~~ 4
- ~~GEOL 307 Earth's History I: Paleobiology~~ 4
- ~~GEOL 308 Earth's History II: Earth System Science~~ 4

Geology Electives 9-10
 (GEOL 385 or any 400-level or other GEOL courses approved in writing by department, including field courses taken as transfer work)

A minimum grade of C- is required any GEOL courses that count for the major.

MATH 241/MATH 242 Analytic Geometry and Calculus A and B 8

CHEM 103/CHEM 104 General Chemistry 8

PHYS 201/PHYS 202 Introductory Physics I and II 8

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

Geology Field Experience 3-6

An approved geology field experience in which the student integrates the components of his or her geologic studies in an experiential learning environment. Experience MUST include data collection, manipulation of data sets and reports/field notes. This requirement could be fulfilled by a senior thesis, internship, field camp, study abroad experience and/or a research experience so long as the above criteria are met. Note: this course must satisfy the Discovery Learning Experience Requirement.

Geology Electives 15-18

GEOL 385 or any 400-level or above GEOL or MAST courses approved by the department. See your advisor for the list of approved courses. Courses that are used to satisfy the Geology Field Experience Requirement cannot be used to satisfy the Geology Electives Requirement.

NOTE: A minimum grade of C- is required in each of the above Major Requirement courses (including the Geology Field Experience and Geology Electives courses). The total number of credits for these courses must be at least 45.

MATH 241/MATH 242 Analytic Geometry and Calculus A and B 8

BISC 207 Introductory Biology I 4

CHEM 103 General Chemistry 4

PHYS 201 Introductory Physics I 4

~~Two of the following: _____ 6-8~~

~~GEOG 250 Computer Methods in Geography _____~~

~~GEOG 372 Geographic Information Systems~~

~~GEOG 471 Advanced Geographic Information Systems~~

~~FREC 480 Geographic Information Systems in Natural
Resource Management~~

~~MATH 243 Analytic Geometry and Calculus C~~

~~MATH 302 Ordinary Differential Equations~~

~~Or other courses as approved in writing.~~

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

One of the following:

BISC 208 Introductory Biology II 4

CHEM 104 General Chemistry 4

PHYS 202 Introductory Physics II 4

Two additional quantitative or analytical science, _____ 6-8
mathematics, or engineering courses. Contact your
academic advisor for the Department's list of approved
courses.

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 McGeary Date 1/18/12
Dean of College Nancy M. Gargan Date 1/18/12
Chairperson, College Curriculum Committee Mohsen Badily 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: Tue, 11 Oct 2011 14:05:27 -0400 (EDT)

From: <smcgeary@UDel.Edu>

Subject: New Geology curriculum

To: rlduncan@udel.edu

Cc: tfontana@udel.edu, smcgeary@udel.edu

Dear Randall,

As I mentioned to you, the Geological Sciences faculty have been working on a significant revision to our undergraduate degree programs. I attach below the side-by-side old vs new descriptions of our three degree programs.

The revisions will require the approval of the Department of Biological Sciences. Specific changes that

we propose that would affect your department are:

1. Geology B.S. and Geology B.A. majors would be required to take BISC 107 (and CHEM 103 and PHYS 201). BISC 108 would not be required but would be one of three second science courses that they can choose from.
2. Earth Science Education would become a B.S. degree and students would therefore be required to take 3 out of 6 listed courses that include BISC 107 and BISC 108. (The current BISC 195 requirement would be dropped.)

We anticipate that this would add at most 15-20 students to BISC 107 in any given year.

We plan to submit our new curriculum to the Faculty Senate this year. I would be glad to meet with you or the most relevant person in Biological Sciences to discuss this at any time. Thanks, Sue

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

Attachment: Side by Side BS Geology.pdf (276k bytes) [Open](#)

Attachment: Side by Side BA Geology.pdf (277k bytes) [Open](#)

Attachment: Side by Side BS Earth Science Education.pdf (280k bytes) [Open](#)

Date: Fri, 2 Dec 2011 15:59:02 -0500 (EST)
From: <dlevia@UDel.Edu>
Subject: Support of revision to Geological Sciences major
To: smcgeary@UDel.Edu

Dear Sue,

I am writing to acknowledge my support of the proposed revisions to the Geological Sciences major.

Yours sincerely,
Del Levia
Director, Environmental Science and Environmental Studies Programs

Delphis F. Levia, Ph.D.
Associate Professor of Ecohydrology
Director of Environmental Science & Environmental Studies
Associate Chair, Department of Geography
Secondary Appointment, Plant & Soil Sciences

University of Delaware
Newark, DE 19716-2541, USA
E-mail: dlevia@udel.edu
Tel: (302) 831-3218; Fax: (302) 831-6654

Date: Tue, 11 Oct 2011 13:41:57 -0400 (EDT)
From: <smcgeary@UDel.Edu>
Subject: New Geology curriculum
To: Del Levia <dlevia@UDel.Edu>, Tracy DeLiberty <tracyd@UDel.Edu>
Cc: smcgeary@udel.edu

Dear Tracy and Del,

As you have no doubt heard, the Geological Sciences faculty have been working on a significant revision to our undergraduate degree programs. I attach below the side-by-side old vs new descriptions of our three degree programs.

Motivation:

- 1) Improve undergraduate education and preparation and provide more flexibility.
- 2) More completely involve all the faculty in the curriculum.

For the Geology B.S. degree, there are 4 major differences.

1. The required courses are now sequenced, which means they will be taught annually.
2. We have reduced the number of specific required courses (from 9 to 6) but have increased the number of required electives.
3. Our supporting sciences now include Biology.
4. We have eliminated all concentrations.

For the Earth Science Education degree, we propose to make it a B.S. degree rather than a B.A. degree – they will be taking all 6 of the specific required geology courses and more supporting math and science. They will no longer take GEOG 101 but will have more GEOG options at the 200-300 level.

We will continue to teach GEOL 105 every semester. GEOL 107 will most likely move to the fall semester to be followed by a new lab course on Earth history (GEOL 110).

Although we are not specifically requiring any new Geography or Environmental Science/Studies courses for the BS or BA that you would need to officially sign off on, we will be including several Geography courses in our list of potential quantitative/analytical courses. Also, the Earth Science Ed revisions may actually require Geography's formal approval – I'll have to check with John Madsen.

We plan to submit our new curriculum to the Faculty Senate this year. It would be helpful to have a letter of support from the Geography Department and/or Environmental programs to attach if you feel able to endorse our plan. (I could probably write a rough draft for you if that would help timewise.) I would be glad to meet with either of you or anyone else in Geography to discuss this at any time. Thanks, Sue

Dr. Susan McGeary
Chair
Geological Sciences
College of Earth, Ocean, and Environment

University of Delaware
Newark, DE 19716

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Attachment: Side by Side BS Earth Science Education.pdf (280k bytes) [Open](#)

FACULTY SENATE RESOLUTION FOR MAJOR AND DEGREE NAME CHANGE:

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

WHEREAS, as part of this revision it is proposed that the name of the major and of its Bachelor of Science degree be changed from Geology to Geological Sciences, and

WHEREAS, the proposed name better reflects the broad scope of geological topics that are taught, and are the focus of research, by the Departmental faculty, and

WHEREAS, the proposed name aligns the major and degree with the name of the Department, be it therefore

RESOLVED, that, effective the beginning of the 2012 Fall semester, the name of the Geology major and the Bachelor of Science degree in Geology be changed to the major in Geological Sciences and the Bachelor of Science degree in Geological Sciences.