

A Proposal for Transfer of the Undergraduate Geological Sciences Program to the Rosenstiel School of Marine and Atmospheric Science

Submitted to the A&S Faculty

March 2017

Introduction

The Departments of Geological Sciences in the College of Arts & Sciences and Marine Geosciences in RSMAS are two units that have been traditionally collaborating in teaching the undergraduate major and minor programs in Geological Sciences, which are currently housed in the College of Arts & Sciences. Given the small size of the two departments and their common disciplinary foundation, it is evident that merging the two departments under a single unit will enhance the educational and research mission of the university.

Degree Programs

The Department of Geological Sciences offers three undergraduate degree major programs and two double major programs. (See Appendix). It also offers a minor.

- Bachelor of Science (B.S.) in Geological Sciences
- Bachelor of Arts (B.A.) in Geological Sciences
- Five-year Master of Science Program (M.S.)
- Geological Sciences/Marine Science (Double Major)
- Geological Science/Ecosystem Science and Policy (Double Major)

- Minor in Geological Sciences

The Proposal

The following three motions will be presented for discussion and vote:

1. Transfer the administrative and degree-granting responsibilities for the majors and minor of Geological Sciences from the Faculty in the College of Arts and Sciences to the Marine Geosciences (MGS) Faculty of the Rosenstiel School.
2. Merge the A&S Department of Geological Sciences operations under the MGS Department at RSMAS.
3. Allow faculty of the Department of Geological Sciences the freedom to decide where they want to have their tenure line housed.

This proposal does not call for the creation of new undergraduate programs. Rather, it proposes a transfer of administration and responsibility for the existing Geological Sciences programs from the College of Arts & Sciences to Marine Geosciences in RSMAS. To allow for smooth transition, undergraduate majors/minor who are currently enrolled will be grandfathered under the current undergraduate bulletin.

Upon transfer to Marine Geosciences in RSMAS, the RSMAS faculty will accept responsibility for the program, including curriculum development and implementation, student advising, as well as staffing of all courses, laboratories and field experiences required by the program.

It is anticipated that laboratory instruction and most courses for the major will continue to take place on the Coral Gables campus under the supervision/direction of Marine Geosciences.

Rationale

A year ago, the Department of Geological Sciences had three tenure track (TT) faculty members; two of those were full time within A&S, while the third was a joint appointment with RSMAS (24% in A&S and 76% in RSMAS). Teaching of the undergraduate major was accomplished with the assistance of 3.5 lecturer/senior lecturer positions. This academic year, one of the full-time TT faculty received transfer of his tenure line from A&S to RSMAS. The faculty member, who holds the joint appointment, is currently serving as program officer at NSF, and he is on leave from the University. Consequently, the department will be left with a single tenure-track faculty member in 2017-18.

Bringing Geological Sciences and Marine Geosciences (two relatively small departments) together within a single unit will enable synergies that would help both the undergraduate and graduate programs. It will also allow for additional curricular innovation by integrating graduate education, presently housed at RSMAS, with the undergraduate program. It will provide the undergraduate majors with broad access to research experiences, where faculty members, graduate and undergraduate students work together with common scientific goals. Marine Geosciences faculty are recognized nationally and internationally for their scholarship. Marine Geosciences ranks in the top quartile by Academic Analytics, and US News and World Report ranks the unit in the top 20 in the country.

Appendices

- Letter of commitment from Marine Geosciences (MGS)
- List of MGS & GSC Faculty with associated expertise
- GSC Majors/Minors from the Bulletin



Peter
Swart

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Memorandum

From: Peter K. Swart (Chair Department of Marine Geosciences)

To: Faculty of Arts and Sciences

Date: 4/7/2017

The faculty of the Department of Marine Geosciences (MGS) reaffirms a decision made previously and enthusiastically agrees to the transfer of the Geological Sciences Program (GSC) from the Coral Gables Campus to RSMAS along with the existing resources associated with the program. Given the current importance of global change issues it is important to maintain a strong program in the Earth Sciences at the University of Miami and we feel that this move will accomplish this goal. At the same time we wish to maintain the strong ties and contacts with other departments in the College of Arts and Sciences that have helped make this program a success.

The Department of Marine Geosciences consists of 10 tenure track faculty with a wide range of expertise in marine as well as broader geological disciplines. The faculty in MGS are research active and teach in a number of undergraduate and graduate programs at RSMAS and at the Coral Gables Campus.

We feel it will be important that the new program maintains a rigorous undergraduate program that fulfills the requirements for professional geological certification in the State of Florida. We therefore do not intend to change any requirements of the undergraduate degrees following the transfer of the program to RSMAS. While the undergraduate courses will continue to be taught on the Coral Gables Campus, we foresee increased opportunities for upper level undergraduates to be involved in research and graduate courses being offered at the RSMAS campus. Field courses have been a hallmark of the undergraduate program and we wish to continue these in the new department. Our ultimate goal will be to continue offering a world-class undergraduate program in Geological Sciences, expand the major, add new faculty and attract additional undergraduates to the University of Miami.

We look forward to working with the College of Arts and Sciences to assure the future success of this program.

Marine Geosciences Tenure-Track Faculty

Name =====	Rank =====	Research Area =====
Falk Amelung	Professor	Active Volcanism and Tectonics InSAR, Remote sensing
Keir Becker	Professor	Marine Geophysics
Gregor Eberli	Professor	Seismic Stratigraphy
James Klaus	Associate Professor	Reef Coral Communities Geomicrobiology of Coral Reef Systems
Guoqing Lin	Associate Professor	Earthquake relocation, Seismic Velocity Volcano Seismology
Larry Peterson	Professor	Micropaleontology, Paleoceanography
Ali Pourmand	Associate Professor	Applications of Isotope and Organic Geochemistry
Sam Purkis	Professor	Carbonate Depositional Environments
Pamela Reid	Professor	Carbonate Sedimentology
Peter Swart	Professor	Isotope Geochemistry Paleoclimatology Geology

Geological Sciences Tenure-Track Faculty

Name =====	Rank =====	Research Area =====
Harold Wanless	Professor	Sedimentology, Coastal Geology, Environmental Geology

Geological Sciences

<http://www.as.miami.edu/geology>

Dept. Code: GSC

Introduction

Geological Sciences is concerned with Planet Earth, its origin, evolution, structure, internal and surface processes, mineral resources, environmental preservation, global dynamics, paleoclimate reconstruction, and life history. Geologists use their knowledge of chemistry, biology, physics and mathematics to solve Earth problems.

Educational Objectives

Geological Sciences undergraduates are prepared for careers in industry as well as graduate study in geosciences, the environmental sciences, and marine sciences. Career paths include research and teaching, as well as employment in the petroleum and mineral industries and in industries and government organizations concerned with energy resources, geodynamics, the marine environment, conservation, and climate change.

Degree Programs

The Department of Geological Sciences offers three undergraduate degree major programs and two double major programs:

- Bachelor of Science (B.S.)
- Bachelor of Arts (B.A.) in Geological Sciences
- Five-year Master of Science Program (M.S.)
- Geological Sciences/Marine Science (Double Major)
- Geological Science/Ecosystem Science and Policy (Double Major)

For the Geoscience Graduate Program please see the Department of Marine Geosciences (p. 680) at the RSMAS campus.

Double Major

Double majors are offered in cooperation with the Marine and Atmospheric Science Program and the Ecosystem Science and Policy Program.

Marine Science (MSC)

This program consists of a major in the Geological Sciences and a major in Marine Science. Interested students should read the information under Marine and Atmospheric Science in this Bulletin and contact the Marine Science office (184 Cox Science or 305-284-2180) for details.

Ecosystem Science and Policy (ECS)

This program consists of a major in Geological Sciences and a major in Ecosystem Science and Policy (ECS). Interested students should read the information under ECS in this bulletin and contact the ECS office (058 Cox).

Departmental Honors

Honors in Geological Sciences may be earned by students in good standing within the University Honors program. In addition to their general requirements, a student must have an overall GPA of 3.0 or better, and also perform research beginning prior to their senior year, resulting in a written Honor's Thesis and oral defense approved by the student's thesis advisor.

Writing and Communications Requirement

To satisfy the College of Arts and Sciences writing and communications requirement in the discipline, students majoring in Geological Sciences should take at least two of the following courses (GSC 114, GSC 310, GSC 462, GSC 560).

Majors in Geological Sciences

- B.S. in Geological Sciences (p. 131)
- B.A. in Geological Sciences (p. 130)

Minor in Geological Sciences

- Geological Sciences (p. 134)

Joint Degrees in Geological Sciences

- Five Year B.S./M.S. in Geological Sciences and Marine Geology (p. 133)

B.A. in Geological Sciences Curriculum Requirements

The B.A. in Geological Sciences is recommended for science oriented students who plan to use an understanding of Earth systems in their professional careers but desire a broader liberal arts education or are pursuing a dual major outside the sciences. B.A. students must complete a core curriculum of 24-27 credit hours including:

Select two of the following:		6-7
GSC 102	Evolution of the Biosphere (GSC 111 Strongly Preferred)	
	or GSC 1 Earth System History	
GSC 103	Evolution of the Modern Earth's Environment (or GSC 120 series) (GSC 110 Strongly Preferred)	
	or GSC 110 The Earth System	
GSC 114	Earth Processes Lab	2
GSC 260	Earth Materials	4
GSC 360	Depositional and Diagenetic Systems	4

GSC 482	Field Methods	2
Select eight additional credit hours at the 300 – 500 level with a grade of C- or better and with an overall GPA of 2.0		8
Students are strongly encouraged to take:		
GSC 580	Summer Field Geology	
GSC 231	Field Study of Reef Systems Through Time	
Additional Required Courses		
ENG 105	English Composition I	3
ENG 106	English Composition II	3
MTH 108	Precalculus Mathematics II	3
Arts and Humanities Cognate		9
People and Society Cognate		9
Minor		15
Language Requirement		3-9
Electives		49
Total Credit Hours		120-127

The requirements for a minor in Ecosystem Science and Policy can be found here (p. 116).

Suggested Plan of Study

This is a guide and is not meant to take the place of the advice of your major advisor; you should consult with them before making any changes.

This example course plan is for a freshman geology major (BA) with a minor in Ecosystem Science and Policy.

Course	Title	Credit Hours
Year One		
Fall		
GSC 110	The Earth System	3
GSC 114	Earth Processes Lab	2
ENG 105	English Composition I	3
MTH 108	Precalculus Mathematics II	3
Language 101 Course		3
Credit Hours		14
Spring		
GSC 111	Earth System History	4
GSC 204	Environmental Statistics	3
ECS 111	Introduction to the Earth's Ecosystem	3
ECS 112	Field Problems in Ecosystem Science and Policy	2
ECS 202	Seminar Series in Contemporary Environmental Issues II	1
Language 102 Course		
Arts and Humanities Cognate		3
Credit Hours		16
Year Two		
Fall		
GSC 260	Earth Materials	4
GSC 360	Depositional and Diagenetic Systems	4
CHM 111	Principles of Chemistry I	3
CHM 113	Chemistry Laboratory I	1

Language 211 Course		3
	Credit Hours	15
Spring		
GSC 240	Introduction to Marine Geology	3
GSC 380	Paleontology and Stratigraphy	4
GSC 482	Field Methods	2
Arts and Humanities Cognate		3
People and Society Cognate		3
	Credit Hours	15
Summer		
GSC 580	Summer Field Geology	4
	Credit Hours	4
Year Three		
Fall		
ENG 107	English Composition II: Science and Technology	3
BIL 150	General Biology	4
Arts and Humanities Cognate		3
Arts and Humanities Cognates		3
	Credit Hours	13
Spring		
GSC 231	Field Study of Reef Systems Through Time	2
GSC 440	Igneous and Metamorphic Petrology	4
GSC 480	Structural Geology	4
ECS 301	Tools for Environmental Decision-Making: The Quantitative Perspective	3
People and Society Cognate		3
	Credit Hours	16
Year Four		
Fall		
GSC 410	Environmental Geochemistry	3
CSC 120	Computer Programming I	4
GSC 561	Colloquium - Current Topics in the Geosciences	1
GEG 310	Geographic Information Systems I	3
ECS 113	Introduction to Environmental Policy	3
	Credit Hours	14
Spring		
GSC 462	Earth's Ancient Atmospheres, Climates, And Sea Levels	3
ECS 372	Special Topics in Ecosystem Science and Policy	3
ECS 572	Special Topics in ECS	3
People and Society Cognate		3
Elective		3
	Credit Hours	15
	Total Credit Hours	122

B.S. in Geological Sciences Curriculum Requirements

The B.S. in Geological Sciences is recommended as preparation for graduate school and careers in professional research and science teaching. As described in sections 3 and 4 below, a B.S. in Geological Science requires a strong foundation in mathematics and several applied sciences.

Core Curriculum¹

GSC 110	The Earth System	3
GSC 114	Earth Processes Lab	2
GSC 111	Earth System History	4
GSC 260	Earth Materials	4
GSC 360	Depositional and Diagenetic Systems	4
GSC 380	Paleontology and Stratigraphy	4
GSC 410	Environmental Geochemistry	3
	or GSC 420 Geophysics	
GSC 440	Igneous and Metamorphic Petrology	4
GSC 480	Structural Geology	4
GSC 482	Field Methods	2
GSC 561	Colloquium - Current Topics in the Geosciences	1

Summer Field Course for B.S. Candidates

GSC 580	Summer Field Geology ²	4
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Calculus

Select one of the following:

MTH 161	Calculus I	
	& MTH 162 and Calculus II	
MTH 171	Calculus I	
	& MTH 172 and Calculus II	

Select one of the following computer science or statistics course:

CSC 120	Computer Programming I	
CSC 210	Computing for Scientists	
MTH 224	Introduction to Probability and Statistics	
PSY 292	Introduction To Biobehavioral Statistics For Non-Majors	
SOC 211	Quantitative Methods for Sociologists	
EPS 553	Introductory Statistics	

Chemistry

CHM 111	Principles of Chemistry I	3
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Recommended Courses:

CHM 112	Principles of Chemistry II	
CHM 113	Chemistry Laboratory I	
CHM 114	Chemistry Laboratory II	

College Physics

PHY 101	College Physics I	
	& PHY 102 and College Physics II	

Recommended Courses in lieu of College Physics:

PHY 205	University Physics I	
	& PHY 206 and University Physics II	

Complete the "Required Areas of Study" of the College (see under COLLEGE OF ARTS AND SCIENCES in this Bulletin)

Minor

Select a Minor from the following:		15
Anthropology		
Biology		
Chemistry		
Computer Science		
Ecosystem Science and Policy		
Marine and Atmospheric Science		
Mathematics		
Physics		
Additional Required Courses		
ENG 105	English Composition I	3
ENG 106	English Composition II	3
Arts and Humanities Cognate		9
People and Society Cognate		9
Language Requirement		3-9
Electives		17
Total Credit Hours		120-127

¹ Must complete with a grade of C- or better and with an overall GPA of 2.0.

² The field course (GSC 580) is required for B.S. students and encouraged for others in order to gain practical experience in the skills of observation, interpretation, measuring, sampling, mapping and report writing. This requirement, when completed, has proven to be a strong asset when applying for graduate work or employment.

The requirements for a minor in Ecosystem Science and Policy can be found here (p. 116).

The requirements for a minor in Chemistry can be found here. (p. 92)

Suggested Plan of Study

This is a guide and is not meant to take the place of the advice of your major advisor; you should consult with them before making any changes.

This example plan is for a freshman geology major (BS) with a chemistry minor. The suggested plan of study exceeds 120 credits in order to meet the basic course requirements for professional geoscientist licensing that is overseen by the National Association State Boards of Geology (ASBOG).

Course	Title	Credit Hours
Year One		
Fall		
GSC 110	The Earth System	3
GSC 114	Earth Processes Lab	2
ENG 105	English Composition I	3
MTH 161	Calculus I	4
Language 101 Course		3
Credit Hours		15
Spring		
GSC 111	Earth System History	4
GSC 204	Environmental Statistics	3
GSC 231	Field Study of Reef Systems Through Time	2
MTH 162	Calculus II	4

Language 102 Course		3
Credit Hours		16
Year Two		
Fall		
GSC 260	Earth Materials	4
GSC 360	Depositional and Diagenetic Systems	4
CHM 111	Principles of Chemistry I	3
CHM 113	Chemistry Laboratory I	1
Language 211 Course		3
Credit Hours		15
Spring		
GSC 380	Paleontology and Stratigraphy	4
GSC 482	Field Methods	2
CHM 112	Principles of Chemistry II	3
CHM 114	Chemistry Laboratory II	1
Arts and Humanities Cognate		3
Arts and Humanities Cognate		3
Credit Hours		16
Summer		
GSC 580	Summer Field Geology	4
Credit Hours		4
Year Three		
Fall		
GSC 420	Geophysics	3
ENG 107	English Composition II: Science and Technology	3
PHY 101	College Physics I	4
CHM 201	Organic Chemistry I (Lecture)	3
CHM 205	Organic Chemistry Laboratory I	1
Arts and Humanities Cognate		3
Credit Hours		17
Spring		
GSC 440	Igneous and Metamorphic Petrology	4
GSC 480	Structural Geology	4
PHY 102	College Physics II	4
People and Society Cognate		3
Credit Hours		15
Year Four		
Fall		
GSC 410	Environmental Geochemistry	3
GSC 490	Senior Thesis	3
GSC 561	Colloquium - Current Topics in the Geosciences	1
CHM 202	Organic Chemistry II (Lecture)	3
CHM 206	Organic Chemistry Laboratory II	1
People and Society Cognate		3
Credit Hours		14
Spring		
GSC 240	Introduction to Marine Geology	3
GSC 462	Earth's Ancient Atmospheres, Climates, And Sea Levels	3

GSC 491	Senior Thesis	3
GSC 550	Hydrogeology	3
People and Society Cognate		3
	Credit Hours	15
	Total Credit Hours	127

* **Other Suggested Electives:**

ECS 572, ECS 301, BIL 150, CSC 120, CSC 210, GEG 310

Suggested Plan of Study (Change of Major)

This plan is for transfer students and students beginning Geology major in the spring of their sophomore year.

This is a guide and is not meant to take the place of the advice of your major advisor; you should consult with them before making any changes.

This course plan is for transfer or change-of-major from another STEM major after the sophomore year, some general requirements fulfilled. Geology major (BS) with Ecosystem Science and Policy minor.

Course	Title	Credit Hours
Year One		
Fall		
ENG 105	English Composition I	3
MTH 161	Calculus I	4
BIL 150	General Biology	4
Language 101 Course		3
	Credit Hours	14
Spring		
ENG 106	English Composition II	3
MTH 162	Calculus II	4
GSC 111	Earth System History	4
GEG 310	Geographic Information Systems I	3
Language 102 Course		3
	Credit Hours	17
Year Two		
Fall		
GSC 110	The Earth System	3
CHM 111	Principles of Chemistry I	3
CHM 113	Chemistry Laboratory I	1
ECS 111	Introduction to the Earth's Ecosystem	3
Language 211 Course		3
People and Society Cognate		3
	Credit Hours	16
Spring		
CHM 112	Principles of Chemistry II	3
CHM 114	Chemistry Laboratory II	1
ECS 112	Field Problems in Ecosystem Science and Policy	2
GSC 204	Environmental Statistics	3
Arts and Humanities Cognate		3
People and Society Cognate		3
	Credit Hours	15

Year Three

Fall

GSC 114	Earth Processes Lab	2
GSC 360	Depositional and Diagenetic Systems	4
PHY 101	College Physics I	4
ECS 113	Introduction to Environmental Policy	3
Arts and Humanities Cognate		3

Credit Hours 16

Spring

GSC 231	Field Study of Reef Systems Through Time	2
GSC 380	Paleontology and Stratigraphy	4
GSC 482	Field Methods	2
PHY 102	College Physics II	4
ECS 572	Special Topics in ECS (Scanning Electron Microscopy)	3

Credit Hours 15

Summer

GSC 580	Summer Field Geology	4
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Credit Hours 4

Year Four

Fall

GSC 260	Earth Materials	4
GSC 410	Environmental Geochemistry	3
GSC 462	Earth's Ancient Atmospheres, Climates, And Sea Levels	3
GSC 561	Colloquium - Current Topics in the Geosciences	1
ECS 201	Seminar Series in Contemporary Environmental Issues I	1
People and Society Cognate		3

Credit Hours 15

Credit Hours 15

Spring

GSC 440	Igneous and Metamorphic Petrology	4
GSC 480	Structural Geology	4
ECS 301	Tools for Environmental Decision-Making: The Quantitative Perspective	3
ECS 372	Special Topics in Ecosystem Science and Policy	3

Arts and Humanities Cognate 3

Credit Hours 17

Total Credit Hours 129

Five Year B.S./M.S. in Geological Sciences and Marine Geology

A 5-year B.S./M.S. in Geological Sciences and Marine Geology allows qualified students to complete a master's degree in one year of study beyond the B.S.

The B.S. degree in Geological Sciences is offered through the Department of Geological Sciences in the College of Arts and Sciences. The Master of Science (M.S.) degree in Marine Geology and Geophysics is offered through the Division of Marine Geology and Geophysics in the Rosenstiel School of Marine and Atmospheric Science (RSMAS).

Undergraduate requirements are listed under the B.S. degree above with the Honors option. By the beginning of their junior year students should have obtained a graduate faculty advisor, selected an approved topic for research, and begun work on their senior thesis as preparation for the M.S. In the senior year, students will increase their focus on graduate courses and work closely with their graduate faculty advisor. Contact the Geological Sciences chair at the departmental office (305-284-4253) for more information.

Minor in Geological Sciences

GSC 110	The Earth System	3
GSC 111	Earth System History	4
GSC 260	Earth Materials	4
GSC Courses 110 or higher		5
Total Credit Hours		16

- * The minor in Geological Sciences consists of 16 credit hours in courses numbered 110 or higher.
- ** A minimum grade of "C-" must be earned in each course with an overall GPA of 2.0.