

Fiscal Unit/Academic Org	Geological Sciences - D0656
Administering College/Academic Group	Arts And Sciences
Co-administering College/Academic Group	Mathematical And Physical Sci
Semester Conversion Designation	Converted with minimal changes to program goals and/or curricular requirements (e.g., sub-plan/specialization name changes, changes in electives and/or prerequisites, minimal changes in overall structure of program, minimal or no changes in program goals or content)
Current Program/Plan Name	Geological Sciences
Proposed Program/Plan Name	Earth Sciences BA
Program/Plan Code Abbreviation	GEOLSCI-BA
Current Degree Title	Bachelor of Arts

Credit Hour Explanation

Program credit hour requirements		A) Number of credit hours in current program (Quarter credit hours)	B) Calculated result for 2/3rds of current (Semester credit hours)	C) Number of credit hours required for proposed program (Semester credit hours)	D) Change in credit hours
Total minimum credit hours required for completion of program		40	26.7	30	3.3
Required credit hours offered by the unit	Minimum	40	26.7	24	2.7
	Maximum	40	26.7	30	3.3
Required credit hours offered outside of the unit	Minimum	0	0.0	0	0.0
	Maximum	0	0.0	0	0.0
Required prerequisite credit hours not included above	Minimum	40	26.7	30	3.3
	Maximum	40	26.7	30	3.3

Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

Program Learning Goals

- Students will be able to critically read and evaluate Earth Science literature.
- Students will be able to present Earth Science information in a clear and logical manner, both orally and in writing.
- Students will be able to apply knowledge of Earth Science data, and the applications of these data, to understand the dynamic physical, chemical, and biological processes of the Earth and its history.
- Students will be able to apply knowledge of appropriate techniques, field methods, field mapping, and numerical methods to measure, portray, analyze, and interpret Earth Science data in specific subdisciplines.
- Students will be able to identify Earth Science problems and to develop solutions.
- Students will be able to apply knowledge of modern applications from chemistry, physics, biology, mathematics, statistics, and computing to the solution of Earth Science problems.

Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

Is this a degree program (undergraduate, graduate, or professional) or major proposal? Yes

Does the degree program or major have an assessment plan on file with the university Office of Academic Affairs? Yes

Summarize how the program's current quarter-based assessment practices will be modified, if necessary, to fit the semester calendar.

No modifications are planned or required.

Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

Pre-Major

Does this Program have a Pre-Major? No

Attachments

- Earth Sciences BA Semester Proposal Attach2.doc: Earth Sci B.A. Attachment 2
(Program Proposal. Owner: Krissek, Lawrence Alan)
- Earth Sciences BA Semester Proposal Attach3.doc: Earth Sci B.A. Attachment 3
(Curricular Map(s). Owner: Krissek, Lawrence Alan)
- Earth Sci BA EXAMPLE 4 YEAR PLANS.doc: Earth Sci B.A. Example 4 yr plans
(Other Supporting Documentation. Owner: Krissek, Lawrence Alan)

Comments

Workflow Information

Status	User(s)	Date/Time	Step
Submitted	Krissek, Lawrence Alan	01/05/2011 05:08 PM	Submitted for Approval
Approved	Krissek, Lawrence Alan	01/05/2011 05:09 PM	Unit Approval
Pending Approval	Andereck, Claude David	01/05/2011 05:09 PM	College Approval

LETTER FROM PROGRAM-OFFERING UNIT

DATE: 5 January 2011

TO: NMS, ASC, and OAA Reviewers

FROM: Lawrence Krissek, Associate Director for Administration, School of Earth Sciences (Acting Director, 23 December 2010 to ~15 January 2011)

on behalf of W. Berry Lyons, Director, School of Earth Sciences

SUBJECT: Conversion of Geological Sciences undergraduate programs (B.S., B.A., and minors) from quarters to semesters

At the undergraduate level, the School of Earth Sciences presently offers a B.S. in Geological Sciences, a B.A. in Geological Sciences, and a minor in Geological Sciences with 6 tracks: Archeology and Anthropology, Economic Geology, Environmental Studies, Geochemistry, Geophysics, and Mineralogy and Petrology. During the conversion to semesters, we request that the names of all our programs be changed from Geological Sciences to Earth Sciences, so that the names of our degree and minor programs match the name of our School. This detail was not included at the time the School of Earth Sciences was established, so the quarter-to-semester conversion provides an opportunity to establish uniformity between the name of our unit and the names of our undergraduate programs.

In addition to changing the names of our undergraduate degrees and minors, the extent of change during the quarter-to-semester conversion ranges from minimal (for the B.A. and the existing minor tracks) to a significant re-envisioning (for the B.S., where 4 tracks are proposed, and for the minor, with the addition of 2 new tracks). The conversion of our graduate programs will be addressed in a separate letter.

The process that developed the conversions proposed here was led by Prof. Larry Krissek, the SES Associate Director for Administration and chair of the SES Curriculum Committee. Because of the importance of this conversion, the process used the entire faculty as a committee-of-the-whole, with additional input from students, alumni, and potential employers of our graduates. Information from benchmark institutions and from a survey of curricular requirements at 150+ Earth Science/Geological Science departments in the U.S. also was used to guide our discussions.

Beginning in Winter 2010, faculty were informed of the developing boundary conditions (particularly the credit hours required for a degree, and the new General Education requirements) for semester-based degree programs and minors at faculty meetings and via e-mail, and were encouraged to think creatively about the form and content of our undergraduate programs under semesters. The primary focus of discussions within SES was the B.S. program, since the B.S. is the degree taken by the vast majority of our students and is the degree that prepares students for careers as professional earth scientists.

As a result of changes within our faculty in the past decade, combined with the establishment of the School of Earth Sciences, the range of topics considered by our faculty and students has broadened significantly beyond the traditional geological sciences. This breadth of content and interests is not reflected in our present B.S. curriculum, so our discussions quickly focused on whether to establish tracks within our B.S. program. After extensive discussions in small groups and at several faculty meetings, the faculty voted – on 4 March 2010 – to explore the development of tracks within our B.S. program.

Ad hoc faculty “working groups” subsequently developed plans for 4 tracks within our B.S. – Geological Sciences, Earth System Science, Geophysics, and Petroleum Geology and Geophysics. The proposals for the first 3 tracks were discussed at several faculty meetings during Spring 2010, and these tracks were approved by near-unanimous faculty vote at a faculty meeting on 9 June 2010. The proposal for the Petroleum Geology and Geophysics track was developed by another ad hoc “working group” during Summer 2010, was discussed extensively by e-mail during August and September 2010, and was approved by a unanimous vote at a faculty meeting on 7 October 2010.

Conversion of our B.A. was discussed at several faculty meetings and by small groups during Spring 2010, with the conclusion that our existing B.A. should be converted with relatively minimal changes. This conversion proposal was approved by unanimous vote at a faculty meeting on 9 June 2010.

Conversion of our undergraduate minors also was discussed at several faculty meetings and by small groups during Spring 2010. In addition to concluding that the 6 existing tracks should be converted with relatively minimal changes, the faculty also agreed that we should institute 2 additional tracks: 1) a more generalized Earth Sciences track, and 2) a track in Paleontology. The conversion proposal for the 6 existing tracks and the new Earth Sciences track was approved by a unanimous vote at a faculty meeting on 9 June 2010; the proposal for the new track in Paleontology was approved unanimously by e-mail vote in late June. The conversion proposal for the Environmental Studies track subsequently underwent minor revision, and the revised proposal for that track was approved by a unanimous vote at a faculty meeting on 7 October 2010.

The details of these conversions are included in the appropriate program templates and proposals. Please contact us if you have any questions.

Thank you for your attention to these proposals.

W. Berry Lyons
Professor and Director
School of Earth Sciences

Lawrence Krissek
Professor and Associate Director for Administration
School of Earth Sciences

PROGRAM RATIONALE STATEMENT

The date of the last significant revision of the Geological Sciences (now Earth Sciences) B.A. major program was in the 1990s.

The proposed changes to the B.A. in Earth Sciences are minimal; perhaps the most significant proposed change is in the name of the degree, from Geological Sciences to Earth Sciences. This name change is proposed so that the name of the degree matches the name of our unit; the name change also is appropriate given the fact that our faculty, research areas, course offerings, and student interests have broadened from the traditional Geological Sciences to the more-encompassing Earth Sciences. We are requesting this name change for all degrees (B.S., B.A., minors, and graduate degrees) presently named “Geological Sciences”.

In terms of content, two changes are proposed relative to our quarter-based B.A. The first is a limit on the number of 2000-level Earth Science credits that can be counted toward the major. Our faculty agree that this will require our B.A. students to complete a more challenging and rigorous program of Earth Science coursework than has sometime been the case in the past. The second change is the addition of an option to count no more than 6 units of coursework at the 3000-level and above outside Earth Sciences toward this degree. Adding this option will benefit students by allowing them to build a stronger base in the supporting sciences, or by allowing them to incorporate components outside the traditional sciences (e.g., economics, public policy, political science). This will allow each student to prepare better for employment and/or graduate school in his/her area of interest, especially if that area of interest falls outside the traditional Geological Sciences. This option will also improve program quality by allowing students to take advantage of strong courses outside the School of Earth Sciences.

**LIST OF SEMESTER COURSES, EQUIVALENT QUARTER COURSES, & CURRICULAR
MAP**

Segment of major program	Quarter course #	Quarter course name	Quarter credit hours	Semester course number	Semester course name	Semester units	Learning outcomes and levels
Preparation for major							
	Chem 121	General Chemistry 1	5	Chem 1210	General Chemistry 1	5	F1
	Chem 122	General Chemistry 2	5				
	Math 151	Calculus 1	5	Math 1151	Calculus 1	5	F1
	Bio 113	Energy Transfer and Development	5	Bio 1113	Energy Transfer and Development	4	F1
	Bio 114	Form, Function, Diversity, and Ecology	5	Bio 1114	Form, Function, Diversity, and Ecology	4	F1
	Earth Sci 121	The Dynamic Earth	5	Earth Sci 1121	The Dynamic Earth	4	C1, D1, E1, F1
	Earth Sci 122	Earth through Time	5	Earth Sci 1122	Earth through Time	4	C1, D1, E1, F1
	Stat 145, 245 or Earth Sci 245	Data Analysis	5	Earth Sci 2245	Introductory Data Analysis for Earth and Environmental Sciences	4	B1, D1, E1, F1
Major Program							
		Minimum of 40 credit hours in Earth Sciences at 200-level and above, excluding Earth Sci 580 and Earth Sci 583.	40	2000-level	Minimum of 30 semester units in Earth Sciences and other approved fields, with maximum of 10 units at the 2000-level in Earth Sciences and a maximum of 6 units at the 3000-level and above outside Earth Sciences. Coursework outside Earth Sciences is subject	30	A1, B2, C2, D2, E2, F2

				3000-level and above	to approval by an Earth Sciences advisor. Earth Sci 4580 cannot be used toward the B.A. in Earth Sciences. A maximum of 3 units of internship (x191), research (x998, x999) and/or individual study (x193) can be counted toward the major.		A2-3, B2-3, C2-3, D2-3, E2-3, F2-3

Learning outcomes:

- A) Students will be able to critically read and evaluate Earth Science literature.
- B) Students will be able to present Earth Science information in a clear and logical manner, both orally and in writing.
- C) Students will be able to apply knowledge of Earth Science data, and the applications of these data, to understand the dynamic physical, chemical, and biological processes of the Earth and its history.
- D) Students will be able to apply knowledge of appropriate techniques, field methods, field mapping, and numerical methods to measure, portray, analyze, and interpret Earth Science data in specific subdisciplines.
- E) Students will be able to identify Earth Science problems and to develop solutions.
- F) Students will be able to apply knowledge of modern applications from chemistry, physics, biology, mathematics, statistics, and computing to the solution of Earth Science problems.

Level of treatment: 1 = beginning, 2 = intermediate, 3 = advanced

SEMESTER ADVISING SHEET

STUDENT NAME: _____ ID _____

EARTH SCIENCES

B.A. Checklist	Semester (Au, Sp, Su)	Year	Credits	Grade
EarthSci 1121:	_____	_____	4	_____
EarthSci 1122:	_____	_____	4	_____
Biology 1113:	_____	_____	4	_____
Biology 1114:	_____	_____	4	_____
Chemistry 1210:	_____	_____	5	_____
Math 1151:	_____	_____	5	_____
EarthSci 2245:	_____	_____	4	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci _____:	_____	_____	_____	_____
² EarthSci or _____:	_____	_____	_____	_____
² EarthSci or _____:	_____	_____	_____	_____

²Complete 30 semester units in Earth Sciences and other approved fields, with maximum of 10 units at the 2000-level in Earth Sciences and a maximum of 6 units at the 3000-level and above outside Earth Sciences. Coursework outside Earth Sciences is subject to approval by an Earth Sciences advisor. Earth Sci 4580 cannot be used toward the B.A. in Earth Sciences. A maximum of 3 units of internship (x191), research (x998, x999) and/or individual study (x193) can be counted toward the major.

QUARTER ADVISING SHEET

STUDENT NAME: _____ ID _____

GEOLOGICAL SCIENCES

B.A. Checklist **Qtr (Au, Wi, Sp, Su)** **Year** **Credits** **Grade**

EarthSci 121: _____ _____ _____ 5 _____

EarthSci 122: _____ _____ _____ 5 _____

Biology 113: _____ _____ _____ 5 _____

Biology 114: _____ _____ _____ 5 _____

Chemistry 121: _____ _____ _____ 5 _____

Chemistry 122: _____ _____ _____ 5 _____

Math 151: _____ _____ _____ 5 _____

¹Stats 145 or EarthSci 245: _____ _____ _____ 5 _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

²EarthSci _____: _____ _____ _____ _____

¹Circle one

²Complete 40 credit hours of Earth Science at the 200 level or higher. If each course is 5 credits, this will be 8 courses. More than 8 blanks are provided in case some of the courses are fewer than 5 credits.

TRANSITION POLICY

Students who began their degree under quarters will not be penalized as we move to semesters, either in terms of progress towards their degree or their expected date of graduation. Arrangements will be made for individual students on a case-by-case basis by advisors within Earth Sciences, but we anticipate few complications because of the flexibility provided by the structure of our B.A. program, combined with the anticipated regularity and variety of 2000-, 3000-, 4000-, and 5000-level course offerings within SES. Few of these upper-level courses occur within well-defined sequences, so a student should be able to move easily between individual upper-level courses within SES. In addition, students have the opportunity to take upper-level courses outside SES, which provides additional paths for timely progress toward completion. As a result, we do not see the need for any bridge courses in Earth Sciences.

Earth Sciences B.A. Semester Curriculum map

Courses	Goal A: Earth Sci literature	Goal B: Present Earth Sci information	Goal C: Earth Sci processes and history	Goal D: Collect, analyze, interpret Earth Sci data	Goal E: Identify Earth Sci problems and solutions	Goal F: Apply other sciences to Earth Sci problems
Chem 1210						Beginning
Math 1151						Beginning
Bio 1113						Beginning
Bio 1114						Beginning
Earth Sci 1121			Beginning		Beginning	Beginning
Earth Sci 1122			Beginning		Beginning	Beginning
Earth Sci 2245		Beginning		Beginning	Beginning	Beginning
Earth Sci 2000- level courses (if taken)	Beginning	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Earth Sci courses at 3000- level and above	Intermedi ate and Advanced	Intermediate and Advanced	Intermediate and Advanced	Intermediate and Advanced	Intermediate and Advanced	Intermediate to Advanced
Courses outside Earth Sci at 3000- level and above (if taken)						Intermediate to Advanced

EXAMPLE 4 YEAR PLANS, EARTH SCIENCES B.A.

Years 1 & 2 -- Quarters

Yr 1 Autumn	Winter	Spring
Writing 1 5 cr. Math 151 (GEC) 5 cr. Language 1 5 cr. ASC Survey 1 cr. Total = 16 cr.	Language 2 5 cr. Writing 2 5 cr. Chem 121 5 cr. Total = 15 cr.	Language 3 5 cr. Chem 122 5 cr. Social Sci 1 5 cr. Total = 15 cr.
Yr 2 Autumn	Winter	Spring
Social Sci 1 5 cr. Bio 113 (GEC) 5 cr. Language 4 5 cr. Total = 15 cr.	Social Sci 2 5 cr. Earth Sci 245 (GEC) 5 cr. Earth Sci 121 (GEC) 5 cr. Total = 15 cr.	Earth Sci 122 (GEC) 5 cr. A&H 1 5 cr. Bio 114 5 cr. Total = 15 cr.

Years 3 & 4 – Semesters

Yr 3 Autumn	Spring
A&H 2 3 cr. Historical Study 1 3 cr. Earth Sci Upper-level 1 4 cr. Earth Sci Upper-level 2 4 cr. Free Elective 3 cr. Total = 17 cr.	Historical Study 2 3 cr. Earth Sci Upper-level 3 4 cr. Earth Sci Upper-level 4 4 cr. GEC Breadth 1 3 cr. Total = 14 cr.
Yr 4 Autumn	Spring
GEC Breadth 2 3 cr. Earth Sci Upper-level 5 4 cr. Earth Sci Upper-level 6 4 cr. Free Elective 4 cr. Total = 15 cr.	Issues of Contemp. World 3 cr. Earth Sci Upper-level 7 4 cr. Earth Sci Upper-level 8 4 cr. Free Elective 4 cr. Total = 15 cr.

91 quarter credits (~60 semester units) + 61 semester units = 121 semester units total.

32 credits of Earth Science upper-level coursework (or other approved upper-level coursework).

All requirements of quarter-version GEC met.

Years 1 – 4 in semesters

Yr 1	Autumn		Spring
Writing 1	3 cr.	Writing 2	3 cr.
Language 1	3 cr.	Language 2	3 cr.
Math 1151(GE)	5 cr.	Chem 1220	5 cr.
Chem 1210	5 cr.	Arts	3 cr.
ASC Survey	1 cr.		
Total = 17 cr.		Total = 14 cr.	
Yr 2	Autumn		Spring
Literature	3 cr.	Language 4	3 cr.
Bio 1113 (GE)	4 cr.	Bio 1114	4 cr.
Earth Sci 1121 (GE)	4 cr.	Earth Sci 1122 (GE)	4 cr.
Language 3	3 cr.	Earth Sci 2245 (GE)	4 cr.
Total = 14 cr.		Total = 15 cr.	
Yr 3	Autumn		Spring
Historical Study	3 cr.	Social Science 2	3 cr.
Social Science 1	3 cr.	Culture/Ideas or Historical Study	3 cr.
Earth Sci Upper-level 1	4 cr.	Earth Sci Upper-level 3	4 cr.
Earth Sci Upper-level 2	4 cr.	Earth Sci Upper-level 4	4 cr.
		Open Option 1	3 cr.
Total = 14 cr		Total = 17 cr.	
Yr 4	Autumn		Spring
Open Option 2	3 cr.	Earth Sci Upper-level 7	4 cr.
Earth Sci Upper-level 5	4 cr.	Earth Sci Upper-level 8	4 cr.
Earth Sci Upper-level 6	4 cr.	Free Elective	3 cr.
Free Elective	5 cr.	Free Elective	4 cr.
Total = 15 cr.		Total = 15 cr.	

Total = 121 semester credits, with all semester-version GE requirements met and 32 semester credits of upper-level Earth Science coursework (or other approved upper-level coursework).