

Fiscal Unit/Academic Org School of Earth Sciences - D0656
Administering College/Academic Group Mathematical And Physical Sci
Co-administering College/Academic Group
Semester Conversion Designation Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses)
Current Program/Plan Name Geological Sciences
Proposed Program/Plan Name Earth Sciences
Program/Plan Code Abbreviation GEOLSCI-MS
Current Degree Title Master of Science

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		45	30.0	30	0.0
Required credit hours offered by the unit	Minimum				
	Maximum	45	30.0	30	0.0
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	0	0.0	0	0.0
	Maximum	0	0.0	0	0.0

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

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? No

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.

Program Specialization/Sub-Plan Name Thesis Option ("Plan A") (Existing)
Program Specialization/Sub-Plan Goals
Program Specialization/Sub-Plan Name Non-Thesis Option ("Plan B") (Existing)
Program Specialization/Sub-Plan Goals

Pre-Major

Does this Program have a Pre-Major? No

Attachments

- Earth Sciences M.S. attachment 2_in progress 16 June.doc: Earth Sci MS Program Proposal and Curriculum Map
(Program Proposal. Owner: Krissek, Lawrence Alan)

Comments**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Krissek, Lawrence Alan	06/16/2011 04:40 PM	Submitted for Approval
Approved	Krissek, Lawrence Alan	06/16/2011 04:41 PM	Unit Approval
Pending Approval	Andereck, Claude David	06/16/2011 04:41 PM	College Approval

LETTER FROM PROGRAM-OFFERING UNIT

DATE: 9 June 2011

TO: NMS, Graduate School, and OAA Reviewers

FROM: Lawrence Krissek, Associate Director for Administration, School of Earth Sciences
and
W. Berry Lyons, Director, School of Earth Sciences

SUBJECT: Conversion of graduate programs (M.S. and Ph.D.) in the School of Earth Sciences from quarters to semesters

At the graduate level, the School of Earth Sciences presently offers an M.S. in Geological Sciences (with both a thesis option and a non-thesis option), and a Ph.D. in Geological Sciences. During the conversion to semesters, we request that the names of these programs be changed from Geological Sciences to Earth Sciences, so that the names of these degree 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.

The School of Earth Sciences also offers an M.S. in Geodetic Sciences (with both a thesis option and a non-thesis option) and a Ph.D. in Geodetic Sciences; both the M.S. and the Ph.D. programs will be converted to the semester format. These programs will retain their present names, because of the long history and distinct identity of Geodetic Sciences at Ohio State.

Graduate Programs in Earth Sciences (presently Geological Sciences)

In addition to changing the names of our existing graduate programs in Geological Sciences, the extent of change during the quarter-to-semester conversion ranges from minimal (for the conversion of the M.S. in Geological Sciences to the M.S. in Earth Sciences) to slightly more significant (for the conversion of the Ph.D. in Geological Sciences to the Ph.D. in Earth Sciences, which includes a reduction in credit hour requirements beyond the standard 2/3rds ratio).

The process that developed the conversions proposed here was led by Prof. William Ausich, Associate Director for Graduate Studies in SES. The requirements of the existing graduate programs in Geological Sciences were discussed within the SES Graduate Studies Committee, with input from both faculty and graduate student members. Each member of the Graduate Studies Committee consulted with his/her constituency within SES (i.e., the Earth History Division, the Earth and Planetary Dynamics Division, the Water, Environment, and Climate Division, and the graduate students), so that all faculty and graduate students had the opportunity to provide input to the proposed conversions. In addition, Prof. Ausich held an open forum with all interested graduate students in Autumn 2010, and the plans for program conversion were discussed, as they developed, at several faculty meetings in Autumn 2010.

For the M.S. thesis option, consensus quickly developed that: 1) the quarter credit hour requirements should be reduced by the standard 2/3rds ratio, thereby keeping the semester requirements consistent with the minimum requirements established by the Graduate School; and 2) no new requirements should be added. The motion to convert the M.S. thesis option in this way was approved at a faculty meeting on 17 November 2010, with a vote of 21 in favor, 0 opposed, and 0 abstentions.

For the M.S. non-thesis option, consensus quickly developed to: 1) reduce the quarter credit hour requirements by the standard 2/3rds ratio; and 2) clearly define the courses that satisfy the core requirements and the capstone project. The Earth History Division, the Earth and Planetary Dynamics Division, and the Water, Environment, and Climate Division each identified a set of courses that will serve as core courses for their non-thesis M.S. students, and a new course (Earth Sci 8570) was created to satisfy the capstone requirement. The motion to convert the M.S. non-thesis option in this way was approved at a faculty meeting on 5 May 2011, with a vote of 16 in favor, 0 opposed, and 1 abstention.

For the Ph.D. program in Earth Sciences, discussion primarily focused on the number of graded credit hours to require under semesters. The Geological Sciences Ph.D. requirements for both graded quarter credit hours and total quarter credit hours were not changed several years ago, when the Graduate School reduced its minimum credit hour requirements; as a result, the standard 2/3rds reduction moving to semesters would have kept our requirements well above the minimum set by the Graduate School. Our Ph.D. students are – and will continue to be -- encouraged to take their candidacy exam during their 2nd year, in order to maintain “normal progress” toward their degree. However, an increasing number of them have encountered difficulty meeting our existing requirements for graded and total credit hours because of the combination of: 1) our continued requirement above the minimum established by the Graduate School; 2) the relatively early time when the Ph.D. candidacy exam is taken; and 3) the 3 credit limit for post-candidacy enrollment recently established by the Graduate School. This difficulty has been even more severe for our increasing number of students who enter the Ph.D. program without completing an M.S. first, because these students do not transfer credits – either graded or ungraded -- from their M.S. program.

Because we anticipate that Ph.D. students will continue to face this situation under semesters, it was proposed that the total credit hour requirement be reduced to 80 semester credit hours, in order to match the minimum requirements set by the Graduate School. This motion was approved by unanimous faculty vote on 17 November 2010. The remaining vote considered whether to set the minimum graded credit hour requirement at 30 semester credit hours or at 34 semester credit hours; at the faculty meeting of 17 November 2010, the vote was 12 in favor of 30 semester credit hours, 8 in favor of 34 semester credit hours, and 1 abstention. As a result, the semester version of our Ph.D. program requires a minimum of 30 graded semester credit hours, and a minimum of 80 semester credit hours.

Graduate Programs in Geodetic Sciences

The graduate programs in Geodetic Sciences are being significantly re-envisioned during conversion, both in terms of their credit hour requirements and in terms of the structure and course offerings within each program. This re-envisioning brings the credit hour requirements for the various Geodetic Science graduate programs into alignment with existing Graduate School guidelines. In addition, this re-envisioning is necessary because the move of the Geodetic Science program from Engineering to SES has significantly reduced the number of faculty and courses available to support these programs. As a result, the re-envisioned programs have been simplified and focused on the strengths of the existing Geodetic Science faculty within SES.

Conversion of the graduate programs in Geodetic Sciences was led by Prof. Christopher Jekeli, head of the Geodetic Sciences Division within SES. Because the Geodetic Sciences Division is small, conversion plans were developed through discussions and direct consultations within that Division. The conversion plans developed by the Geodetic Sciences Division were then distributed via e-mail to all SES faculty, and were discussed at an SES faculty meeting in February 2011. The proposed conversions were approved by an e-vote, with 20 in favor, 1 opposed, and no abstentions.

For the M.S. thesis option, the minimum credit hour requirements are reduced by more than the standard factor of 2/3rds, from a minimum of 52-57 quarter credit hours (depending on the area of concentration and the specific courses chosen) to a minimum of 30 semester credit hours. In the semester format, “core courses” are selected in 4 categories from lists of options, whereas “core courses” were more completely prescribed in the quarter format. Three pre-approved tracks of “core courses” are available under semesters, in the areas of Geodesy, GIS, and Geodynamics, whereas pre-approved tracks in Geodesy, Photogrammetry, and Mapping & GIS were available under quarters. This change in subject area of the tracks reflects the change in composition of the Geodetic Science faculty as they moved from Engineering to SES, and the reduction in the minimum credit hour requirement reflects the reduced faculty numbers in the Geodetic Science program. The M.S. thesis option maintains the requirement for independent research and the completion and defense of a written research thesis.

For the M.S. non-thesis option, credit hour requirements also are reduced by more than the standard factor of 2/3rds, from a range of 58-67 quarter credit hours (with the range depending on the specific courses chosen) to a minimum of 30 semester credit hours. As with the other Geodetic Science graduate programs, the reduction in the minimum credit hour requirement reflects the reduced number of faculty and course offerings in the Geodetic Science program. The M.S. non-thesis option maintains the requirements for a written technical paper and a written comprehensive examination.

For the Ph.D., credit hour requirements are reduced by more than the standard factor of 2/3rds, in order to align the minimum credit hour requirement (i.e., 80 semester credit hours) with the minimum now set by the Graduate School. A credit hour requirement higher than this value has become increasingly difficult for students to achieve, given the 3 credit-hour limit on enrollment after a student passes the Ph.D. candidacy exam. In addition, specific course requirements within the semester-version of the Ph.D. have been reduced significantly from those in the quarter-version because: 1) the decreased number of faculty supporting the Geodetic Science program cannot regularly offer all of the courses that were required under quarters; 2) the decreased number of faculty supporting the Geodetic Science program do not have the expertise to offer all of the courses included in the quarter-version of the program; and 3) the increase in elective hours will allow students to use appropriate courses offered by other Divisions within SES.

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

Earth Sciences M.S. Program Rationale Statement

The overall goal of the Graduate Degree Program in the School of Earth Sciences is to provide students the opportunity to develop advanced professional training in the Earth Sciences. Specific objectives of the program include providing opportunities for students to participate in advanced classes and seminars and – for the M.S. thesis option -- to conduct independent research on fundamental issues in the Earth Sciences. The products of M.S. research projects are expected to be suitable for publication in the refereed scientific literature.

The M.S. program in the School of Earth Sciences (presently titled the M.S. in Geological Sciences) traditionally has focused on the thesis-based M.S. degree, and we expect that focus to continue in the future. However, our M.S. program does have an approved non-thesis (Plan B) option, which we are also converting to semesters. The Non-Thesis Option is intended for earth scientists in government or industry who do not plan to continue for a Ph.D., and therefore do not require significant training in independent research, but whose career paths will benefit from additional educational and practical experience.

Most of our graduate-level semester-version courses are one-to-one conversions of existing quarter-version courses. Due to the research interests and curricular needs of recent hires in the School of Earth Sciences, however, several new graduate-level courses are being created during the transition, particularly in the areas of oceanography and remote sensing/hydrology. At the same time, course offerings within the areas of geophysics and mineralogy/crystallography have been reorganized and streamlined, due to staffing changes. In converting our courses from quarters to semesters, 5 quarter-credit courses that do not include a lab generally have converted to 3 semester credits; this conversion maintains approximately the same amount of lecture time across the conversion. Our 5 quarter-credit courses that do include a weekly lab (most of which meet for 4 x 48 minute lectures and one 1:48 lab each week) generally have converted to 4 semester credits, with an anticipated meeting schedule of 3 x 55 minute lectures and one lab (~1:40) each week. This conversion maintains approximately the same amount of lecture time across the conversion, and maintains a distribution of lecture vs. lab time that is necessary for the material covered. Our 3 quarter-credit courses generally have converted to 2 semester credits.

Details of the Proposed Conversion

The date of the last significant revision of the Geological Sciences (now requested to be Earth Sciences) M.S. thesis option was in the 1990s. The Geological Sciences M.S. Non-Thesis Option was activated in 2005.

The proposed changes to the M.S. in Earth Sciences can be categorized overall as a minimal change in requirements; perhaps the most significant change is the request to change the name of the degree program from Geological Sciences to Earth Sciences. This name change is proposed so that the name of the M.S. 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”.

Except for the change in credit hour requirements by a factor of 2/3rds, the requirements for the thesis-based M.S. remain the same from quarters to semesters. For the non-thesis M.S., the credit hour requirements also have changed by ~2/3rds; the other changes in this option are more explicit statements of the courses needed to meet specific requirements within the program.

Master's Program in Earth Sciences (now Geological Sciences)

Semester Version

1) Expected Background

All Master's degree aspirants are expected to have a Bachelor's degree, and they normally will have a degree in the Geological Sciences or the Earth Sciences. However, students with other backgrounds (e.g., chemistry, biology, civil engineering) often make significant contributions to the Earth Sciences, and they also are encouraged to apply to the M.S. program.

2) Program Approval Form

In consultation with the student's advisor, and with approval of the Graduate Studies Committee (GSC), a student will design a course of study appropriate to the field of specialization. This will be entered on the *Program Approval Form* and submitted to the GSC. It will provide a record of the proposed course work, and will serve as a guide for the completion of this portion of the graduate program.

If needed, in consultation with the advisor, and with approval of the GSC, students will design a course of study to remedy program deficiencies in geology, mathematics and the basic sciences, to bring the student to the level required to do work in the field of specialization. The *Program Approval Form* will provide a record of the proposed course work, and it will serve as a guide for the completion of this portion of the graduate program. Students should plan on completing all deficient course work with a grade of "B" or better within one year of entry into the program.

3) Advisory Committee Selection

A student should seek an advisor during the first semester of residence. The advisor and the student will choose a second faculty member to serve on the M.S. Advisory Committee, subject to approval by the GSC.

The GSC, in consultation with the advisor, will choose a third member of the faculty to serve on the thesis committee for students completing the M.S. thesis option. The third member shall be from outside the student's area of principal interest. In some instances the student and the advisor may wish to add a fourth faculty member to the committee, but this person shall not replace the member chosen by the GSC.

4) Thesis Option ("Plan A")

a) Credit Hours/Coursework

A minimum of 30 graduate semester credit hours is required for the Master's degree with thesis option. Of these, the School of Earth Sciences requires that at least 20 credits must be in graded graduate-level courses at the 5000-level and above in the earth sciences, or in graded graduate-level courses at the 4000-level and above in related fields (e.g., sciences and mathematics, engineering).

No specific courses are required to complete the M.S. with thesis option in Earth Sciences. Instead, the student and his/her advisor will identify a coherent set of courses appropriate to the student's field of specialization. In general, all students within a particular Division in SES will complete a similar set of foundational courses, followed by the choice of several elective courses. However, required sets of "core courses" have not been established.

As an example, here is the possible coursework taken by a thesis-option M.S. student in the Earth History Division:

Possible Plan of Coursework for M.S. Thesis-Option Student in the Earth History Division			
Autumn Semester, Year 1	Spring Semester, Year 1	Autumn Semester, Year 2	Spring Semester, Year 2
Earth Sci 5621 Intro to Geochemistry 3 credits	Earth Sci 5602.01 Carbonate Systems I 2 credits	Earth Sci 5604 Sequence Stratigraphy 3 credits	Earth Sci 7999 Research for Thesis 10 credits
Earth Sci 5614 Paleobiology 4 credits	Earth Sci 5602.02 Carbonate Systems II 2 credits	Earth Sci 5615 Paleoecology 4 credits	
Earth Sci 6502 Stratigraphy & Sedimentation 4 credits	Earth Sci 7998 or 7999 Research 4 credits	Earth Sci 7999 Research for Thesis 3 credits	
Total = 11 graded semester credit hours	Total = 4 graded semester credit hours + 4 ungraded semester credit hours	Total = 7 graded semester credit hours + 3 ungraded semester credit hours	Total = 10 ungraded semester credit hours
Cumulative = 11 graded credits 0 ungraded credits	Cumulative = 15 graded credits 4 ungraded credits	Cumulative = 22 graded credits 7 ungraded credits	Cumulative = 22 graded credits 17 ungraded credits

b) Thesis and Completion of Degree

The *Application to Graduate* form must be submitted to the Graduate School for the semester in which the student wishes to graduate, according to the rules of the Graduate School. The final Master's Examination cannot be scheduled until the Advisory Committee has given preliminary approval of the thesis document.

Each student must complete a Master's thesis, which describes the results of an original research project. The thesis document must be prepared according to the guidelines described in the Graduate School handbook.

Upon completion of the Master's thesis, candidates for the M.S. degree must complete a final oral examination, which may include questions on both the thesis research and aspects of the M.S. training not necessarily related to the thesis. The Master's Examination Committee consists of the Advisory Committee as originally constituted, although substitutions can be approved by the GSC in situations where a member cannot be present at the time of the examination. The advisor serves as chairperson of the examination. The final oral examination will be scheduled and conducted according to the rules of the Graduate School.

i) Masters Degree Research

a) Choice of Research Area

If necessary, the Chair of the Graduate Studies Committee will provide advice on coursework and help in the selection of a research area and an advisor. By the end of the first semester in the program every student is strongly encouraged to have identified a research area and to have obtained the consent of a faculty member to serve as an advisor. Until the student has an advisor, a member of the GSC will act in that capacity.

b) Research Proposal

During the second semester in the program, the Master's degree aspirant will submit a written proposal to his/her advisor and the members of the Advisory Committee. The proposal will outline an original research problem and the scientific part of the proposal shall be 3 to 5 pages in length. The proposal will include: (1) title page, (2) a statement on the nature and significance of the research, (3) description of the procedures to be employed, (4) projected timetable for completion of the project, and (5) estimated budget (stipend and its duration, anticipated source of funds; fieldwork costs; analytical costs and technician time; computer hardware and software costs; illustration expenses; etc.). NOTE: Anticipated and/or potential sources of funds for the research must be identified for all budget categories.

The student's advisor and the other members of the M.S. Advisory Committee will review the proposal, and the proposal with appropriate revisions will be submitted to the GSC with the advisor and MS Advisory Committee signatures indicating approval for submission. The GSC will review the proposal with respect to science plan, timetable, and budget. If the proposal is acceptable to the GSC, then it will be included in the student's permanent M.S. acceptance and advising file. Proposals should be on file by the end of the student's second semester in the M.S. program.

c) Financial Support for Graduate Students

Qualified M.S. students, who are offered support when first accepted into the M.S. program, are conditionally assured support for four academic-year semesters (not including summer support). Support is conditional on maintaining normal progress, on maintaining good standing in the Graduate School, and on satisfactory performance of GTA or GRA duties. Support is also conditional on availability of funds. Completion of the M.S. is generally expected within two years. Slightly longer time-to-degree may occur, and with justification additional support may be awarded. This additional support will also depend on the availability of funds, a student's satisfactory progress towards the completion of the M.S. degree, and satisfactory performance as a GTA or GRA.

Registration requirements for GTAs, GRAs, fellowships, etc. are those set by the Graduate School.

5) Non-Thesis Option (“Plan B”)

Note: the non-thesis option may not be used as an exit strategy for students in the M.S. thesis option who are having difficulty completing the thesis requirement.

a) Credit Hours/Coursework

A minimum of 37 graduate semester credit hours is required for the Master’s degree non-thesis option, including completion of the following 3 requirements:

1) complete one of the following sets of core courses, selected in consultation with your Earth Sciences advisor (6-8 semester credit hours):

- i) Earth Sci 5621 (Intro to Geochem; 3 semester hours) + Earth Sci 5651 (Hydrogeology; 4 semester hours)
 - ii) Earth Sci 6502 (Sed/Strat; 4 semester hours) + Earth Sci 6530 (Structural Geol; 4 semester hours)
 - iii) Earth Sci 5680 (Deep Earth Geophysics; 3 semester hours) or Earth Sci 5646 (Geodynamics; 3 semester hours)
- AND
- Earth Sci 5617 (Petrology of Earth and Planets; 4 semester hours) or Earth Sci 5629 (Principles of Petrology; 3 semester hours)

2) complete a minimum of 26 additional semester credits of graduate-level coursework in Earth Sciences, chosen in consultation with your advisor. No more than 3 ungraded (S/U) credits can be counted toward this requirement;

3) complete 3 credits of Earth Sci 8570 (Graduate Capstone Project) on a project chosen in consultation with your advisor.

As an example, here is the possible coursework taken by an M.S. non-thesis option student in the Earth History Division:

Possible Plan of Coursework for M.S. Non-Thesis-Option Student Interested in Earth History and Petroleum Geology & Geophysics		
Autumn Semester, Year 1	Spring Semester, Year 1	Maymester or Summer Term, Year 1
Earth Sci 5621 Intro to Geochemistry 3 credits	Earth Sci 6530 Structural Geology 4 credits	Earth Sci 8570 Capstone Project 3 credits
Earth Sci 5614 Paleobiology 4 credits	Earth Sci 5661 Petroleum Geology 4 credits	
Earth Sci 6502 Stratigraphy & Sedimentation 4 credits	Earth Sci 5604 Sequence Stratigraphy 3 credits	
Earth Sci 5687 Energy Geophysics 3 credits	Earth Sci 5780 Reflection Seismology 4 credits Or Earth Sci 5603 Stratigraphy 4 credits	
Earth Sci 5651 Hydrogeology 4 credits	Earth Sci 7998 Research 3 credits	
Total = 18 graded credits	Total = 15 graded credits + 3 ungraded credits	Total = 3 graded credits
Cumulative = 18 graded credits 0 ungraded credits	Cumulative = 33 graded credits 3 ungraded credits	Cumulative = 36 graded credits 3 ungraded credits

b) Final Examinations and Completion of Degree

Pass a final written examination (minimum of 4 hours duration) and a final oral examination (minimum of 1 hour duration). The Examination Committee normally will consist of the student's M.S. Advisory Committee – his/her adviser and one other faculty member approved by the GSC. The examinations will cover all course work and any relevant professional training, including the capstone project and any internship experience.

c) Financial Support for M.S. Non-Thesis Option Students

M.S. non-thesis option students generally will not be considered for GTA or GRA support.

Master's Program in Geological Sciences

Quarter Version

1) Expected Background -- same as for semester version

2) Program Approval Form – same as for semester version

3) Advisory Committee Selection – to be completed by the end of the 2nd quarter of residence.

Otherwise, same as for semester version.

4) Thesis Option (“Plan A”)

a) Credit Hours/Coursework

A minimum of 45 graduate quarter credit hours is required for the Master's degree with thesis option. Of these, the School of Earth Sciences requires that at least 30 credits must be in graded graduate-level courses at the 600-level and above in the earth sciences, or in graded graduate-level courses at the 500-level and above in related fields (e.g., sciences and mathematics, engineering).

Otherwise, same as for semester version.

b) Thesis and Completion of Degree – same as for semester version.

i) Masters Degree Research

a) Choice of Research Area – same as for semester version.

b) Research Proposal – to be completed by end of 3rd quarter in program.

Otherwise, same as for semester version.

c) Financial Support for Graduate Students – same as for semester version. Students offered support at time of admission are assured support for 6 academic-year quarters (not including summer support), conditional on maintaining normal progress, on maintaining good standing in the Graduate School, on satisfactory performance of GTA or GRA duties, and on availability of funds.

5) Non-Thesis Option (“Plan B”)

a) Credit Hours/Coursework

A minimum of 55 graduate quarter credit hours is required for the Master’s degree non-thesis option, including completion of the following 3 requirements:

1) complete a set of 3 core courses (15 quarter credit hours). “Core courses” presently not specified.

2) complete a minimum of 35 additional quarter credits of graduate-level coursework in Earth Sciences, chosen in consultation with your advisor.

3) complete 5 credits of a capstone project, on a topic chosen in consultation with your advisor. Course number used to satisfy this requirement presently not specified.

b) Final Examinations and Completion of Degree -- same as semester version

c) Financial Support for M.S. Non-Thesis Option Students

M.S. non-thesis option students generally will not be considered for GTA or GRA support. Same as semester version.

Transition Plan

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 their advisors and the Graduate Studies Committee within Earth Sciences, but we anticipate few complications because few of our courses are contained in sequences, and because most of our courses are converting on a 1-to-1 basis.

Because our M.S. degree requirements are specified in terms of a required number of credit hours, rather than a required number of courses, credit hours will serve as the “currency” during the transition. Students who have completed graded coursework under quarters will be allowed to count the semester credit hours for the equivalent semester courses toward their degree requirements. For example, if a student has completed a 5 quarter-credit course that is converted to a 4 semester-credit course, the student will count that course for 4 semester credits. If a student has completed a 5 quarter credit-hour course that is converted to a 3 semester-credit course, the student will count that course for 3 semester credits. Credits graded S/U – such as independent study and research -- will be converted using a factor of $\frac{2}{3}$ (i.e., 3 quarter credits will be counted as 2 semester credits).

There presently are no students in the M.S. non-thesis-option -- and none have applied for the 2011-12 academic year – so we do not anticipate having to transition a non-thesis option student into the more clearly defined core course and capstone requirements of the semester format. If any such cases do arise during 2011-12, the student will be advised to complete the quarter-version of the appropriate core courses, which then can be converted as described above.

EARTH SCIENCE SEMESTER COURSES AVAILABLE IN EARTH SCIENCES M.S.

	Course Number	Course Title	Credits	Prerequisites / Co-requisites
Earth Sciences	5189.01	Field Geology I	3	Earth Sci 4423, Earth Sci 6423, Earth Sci 423, or Geol Sci 423; Earth Sci 4530, Earth Sci 6530, Earth Sci 530, or Geol Sci 530; and written permission of instructor.
Earth Sciences	5189.02	Field Geology II	3	Earth Sci 5189.01, Earth Sci 581 or Geol Sci 581
Earth Sciences	5189.03, .04, .05, .06	Field Geology for Educators (various)	2	CANNOT BE USED TO MEET REQUIREMENTS FOR M.S. IN EARTH SCIENCES
Earth Sciences	5191	Internship in the Earth Sciences	1-3	Junior standing or above; permission of instructor.
Earth Sciences	5193.XX	Individual Studies (various topics)	1-5	Permission of instructor.
Earth Sciences	5194	Group Studies	1-5	Permission of instructor.
Earth Sciences	5203	Geo-environment and Human Health	3	GE or GEC data analysis course or equivalent; soph standing and above or permission of instructor.
Earth Sciences	5206	Advanced Oceanography	3	Earth Sci 1100 or Earth Sci 100 or Geol Sci 100 or Earth Sci 1105 or Earth Sci 105 or Geol Sci 105 or Earth Sci 1121 or Earth Sci 121 or Geol Sci 121 or graduate student standing or permission of instructor.

Earth Sciences	5550	Geomorphology	4	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; Earth Sci 1122 or Earth Sci 122 or Geol Sci 122; or permission of instructor.
Earth Sciences	5580	Standards-Based Earth Science for Educators	1-4	CANNOT BE USED TO MEET REQUIREMENTS FOR M.S. IN EARTH SCIENCES
Earth Sciences	5584	Principles of Oceanography for Educators	2	CANNOT BE USED TO MEET REQUIREMENTS FOR M.S. IN EARTH SCIENCES.
Earth Sciences	5600	Siliciclastic Depositional Systems	4	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502 or equivalent.
Earth Sciences	5601.01	Sedimentary Petrology: Sandstones	4	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502 or equivalent, or permission of instructor.
Earth Sciences	5601.02	Sedimentary Petrology: Carbonate Rocks and Shales	4	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502 or equivalent, or permission of instructor.
Earth Sciences	5602.01	Carbonate Depositional Systems I	2	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502, or equiv.
Earth Sciences	5602.02	Carbonate Depositional Systems II	2	Earth Sci 5602.01 or Earth Sci 602.01 or Geol Sci 602.01 and permission of instructor.
Earth Sciences	5603	Stratigraphy	4	Earth Sci 4502, Earth Sci 6502, Earth Sci 502 or Geol Sci 502, or equivalent.
Earth Sciences	5604	Sequence Stratigraphy	3	Earth Sci 4502, Earth Sci 6502, Earth Sci 502 or Geol Sci 502, or equivalent.

Earth Sciences	5605	Paleoceanography	3	Sr or Grad standing in earth sci or related fields.
Earth Sciences	5613	Micropaleontology	4	Earth Sci 4501 or Earth Sci 501 or Geol Sci 501 or equivalent.
Earth Sciences	5614	Paleobiology	4	Earth Sci 4501 or Earth Sci 501 or Geol Sci 501 or equivalent.
Earth Sciences	5615	Paleoecology	4	Earth Sci 5614 or Earth Sci 614 or Geol Sci 614 or permission of instructor.
Earth Sciences	5617	Petrology of Earth and Planets	4	Earth Sci 4423 or Earth Sci 6423 or Earth Sci 423 or Geol Sci 423 or equiv.
Earth Sciences	5618	Advanced Historical Geology	2	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502 or equiv.
Earth Sciences	5621	Introduction to Geochemistry	3	Sr standing in earth sci or related fields; Chem 1220 or Chem 123 or equivalent or above, or permission of instructor.
Earth Sciences	5622	Stable Isotope Biogeochemistry	3	Sr standing in any science program or grad standing in any of the sciences or permission of instructor.
Earth Sciences	5625	Igneous Petrology	4	Earth Sci 4423 or Earth Sci 6423 or Earth Sci 423 or Geol Sci 423 or equivalent.
Earth Sciences	5627	Global Biogeochemical Cycles	3	Earth Sci 5621 or Earth Sci 621 or Geol Sci 621 or permission of instructor.
Earth Sciences	5628	Environmental Isotope Geochemistry	3	Earth Sci 5621 or Earth Sci 621 or Geol Sci 621 or permission of instructor.
Earth Sciences	5629	Principles of Petrology	3	Sr or Grad standing in earth science or related fields, or permission of instructor.

Earth Sciences	5636	Advanced Topics in Mineralogy and Crystallography	3	Earth Sci 4421 or Earth Sci 6421 or Earth Sci 421 or Geol Sci 421 or equivalent, or permission of instructor.
Earth Sciences	5641	Geostatistics	3	Stats 5301 or 528 or equivalent and Math 1251 or Math 153 or above, or permission of instructor.
Earth Sciences	5642	Geomathematical Analysis	3	Earth Sci 5641 or Earth Sci 641 or Geol Sci 641; and Math 1251 or Math 153 or above, or written permission of instructor.
Earth Sciences	5644	Tectonic Evolution of Continents	3	Earth Sci 4423 or Earth Sci 6423 or Earth Sci 423 or Geol Sci 423; and Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502; and Earth Sci 4530 or Earth Sci 6530 or Earth Sci 530 or Geol Sci 530; or written permission of instructor.
Earth Sciences	5645	Advanced Structural Geology	4	Earth Sci 4530 or Earth Sci 6530 or Earth Sci 530 or Geol Sci 530 or equiv.
Earth Sciences	5646	Geodynamics	3	Earth Sci 4530 or Earth Sci 6530 or Earth Sci 530 or Geol Sci 530 or equiv.; Math 1252 or Math 153 or above; and Physics 1250 or Physics 131 or above; or permission of instructor.
Earth Sciences	5650	Glaciology	4	Earth Sci 4450 or permission of the instructor.
Earth Sciences	5651	Hydrogeology	4	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; and Math 1252 or Math 153 or above.
Earth Sciences	5655	Land Surface Hydrology	3	Math 1252 or Math 153 or above; and Chem 1210 or 121 or above; and Physics 1250 or Physics 131 or above.
Earth Sciences	5660	Geology of Metallic Deposits	4	Earth Sci 4423 or Earth Sci 6423 or Earth Sci 423 or Geol Sci 423.

Earth Sciences	5661	Petroleum Geology	4	Earth Sci 4423 or Earth Sci 6423 or Earth Sci 423 or Geol Sci 423; and Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502; or written permission of instructor.
Earth Sciences	5663	Global Change and Sustainability in the Earth System	4	Sr or grad standing in Earth Sci, or permission of instructor.
Earth Sciences	5670	General and Economic Geology of Selected Areas	2-4	Earth Sci 4502 or Earth Sci 6502 or Earth Sci 502 or Geol Sci 502; and Earth Sci 4530 or Earth Sci 6530 or Earth Sci 530 or Geol Sci 530; and Earth Sci 5550 or Earth Sci 550 or Geol Sci 550; or permission of instructor.
Earth Sciences	5675	Scanning Electron Microscopy	2	Chem 1210 or 1220 or equivalent or permission of instructor
Earth Sciences	5676	Elemental Chemical Analysis using Inductively Coupled Plasma Optical Emission and Mass Spectrometry	3	Junior standing or above; and Chem 1220 or Chem 123 or equivalent or above; and permission of instructor.
Earth Sciences	5680	Deep Earth Geophysics	3	Math 1252 or Math 153 or above; and Physics 1251 or Physics 133 or above.
Earth Sciences	5687	Energy Geophysics	3	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; and Math 1251 or Math 151 or above; and Physics 1250 or Physics 131 or above.

Earth Sciences	5703	Principles of Biostratigraphy	2	Earth Sci 4501 or Earth Sci 501 or Geol Sci 501 or Earth Sci 5613 or Earth Sci 613 or Geol Sci 613 or Earth Sci 5614 or Earth Sci 614 or Geol Sci 614; and Earth Sci 5603 or Earth Sci 603 or Geol Sci 603 or equiv; or written permission of instructor.
Earth Sciences	5713	Taxonomy and Phylogeny in the Fossil Record	2	Earth Sci 5614 or Earth Sci 614 or Geol Sci 614 or permission of instructor.
Earth Sciences	5714	Biometry	2	Earth Sci 5614 or Earth Sci 614 or Geol Sci 614; and Earth Sci 5641 or Earth Sci 641 or Geol Sci 641 or equiv; or permission of instructor.
Earth Sciences	5717	Critical Issues in World Freshwater Resources	4	Earth Sci 5651 or Earth Sci 651 or Geol Sci 651; Earth Sci 5752 or Earth Sci 752 or Geol Sci 752 recommended.
Earth Sciences	5718	Aquatic Geochemistry	3	Chem 122 or above; and Math 1251 or Math 152 or above; or equivs.
Earth Sciences	5719	Environmental Organic Geochemistry	3	Earth Sci 5718 or Earth Sci 718 or Geol Sci 718; and Chem 4200 or Chem 4300 or Chem 520; or permission of instructor.
Earth Sciences	5746	Seminar in Rheological Properties of Solids	1	Earth Sci 4530 or Earth Sci 6530 or Earth Sci 530 or Geol Sci 530; and Math 2253 or Math 254 or above; or permission of instructor.
Earth Sciences	5751	Quantitative Ground-Water Flow Modeling	4	Earth Sci 5651 or Earth Sci 651 or Geol Sci 651.
Earth Sciences	5752	Contaminants in Aqueous Systems	4	Earth Sci 5651 or Earth Sci 651 or Geol Sci 651.

Earth Sciences	5754	Risk Assessment and Management in Earth Systems	4	Earth Sci 5651 or Earth Sci 651 or Geol Sci 651 or equivalent course in engineering or environmental sciences, or permission of instructor.
Earth Sciences	5779	Seminar in Physical Properties of Minerals and Rocks	1	Earth Sci 4421 or Earth Sci 6421 or Earth Sci 421 or Geol Sci 421; Earth Sci 5680 or Earth Sci 680 or Geol Sci 680; or equivs; or written permission of instructor.
Earth Sciences	5780	Reflection Seismology	4	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; and Math 1251 or Math 151 or above; and Physics 1250 or Physics 131 or above.
Earth Sciences	5781	Gravity Exploration	3	Earth Sci 5687 or Earth Sci 687 or Geol Sci 687 or written permission of instructor.
Earth Sciences	5782	Magnetic Exploration	3	Earth Sci 5687 or Earth Sci 687 or Geol Sci 687 or written permission of instructor.
Earth Sciences	6421	Earth Materials	3	Chem 1210 or Chem 121 or equivalent.
Earth Sciences	6423	Petrology	3	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; and Earth Sci 6421 or 4421 or 421 or Geol Sci 421.
Earth Sciences	6502	Stratigraphy and Sedimentation	4	Earth Sci 1121 or 121 or Geol Sci 121; Earth Sci 1122 or 122 or Geol Sci 122.
Earth Sciences	6530	Structural Geology	4	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; and Physics 131 or Physics 1250 or above.
Earth Sciences	6560	Applied Geophysics	3	Earth Sci 1121 or Earth Sci 121 or Geol Sci 121; Math 1251 or Math 151 or above; and Physics 1250 or Physics 131 or above.

Earth Sciences	6750	Paleoclimatology	4	Graduate standing or permission of instructor.
Earth Sciences	7998	Research in the Earth Sciences	1-12	Permission of instructor.
Earth Sciences	7999	Research for Thesis in the Earth Sciences	1-12	Permission of instructor.
Earth Sciences	8570	Graduate Capstone Project in Earth Sciences	3	Permission of instructor. ONLY OPEN TO STUDENTS IN THE M.S. NON-THESIS OPTION.
Earth Sciences	8800	Seminar in Stratigraphy and Basin Analysis	1-2	Permission of instructor.
Earth Sciences	8801	Seminar in Sedimentology	1-2	Permission of instructor.
Earth Sciences	8810	Seminar in Paleobiology	1-2	Permission of instructor.
Earth Sciences	8821	Seminar in Geochemistry	1-2	Permission of instructor.
Earth Sciences	8822	Seminar in Mineralogy, Mineral Physics, and Petrology	1-2	Permission of instructor.
Earth Sciences	8840	Seminar in Structural Geology	1-2	Permission of instructor.
Earth Sciences	8850	Seminar in Glaciology and Geomorphology	1-2	Permission of instructor.

Earth Sciences	8851	Seminar in Hydrogeology and Oceanography	1-2	Permission of instructor.
Earth Sciences	8860	Seminar in Energy Resources	1-2	Permission of instructor.
Earth Sciences	8874	Seminar in History of Earth Science Concepts	1-2	Permission of instructor.
Earth Sciences	8878	Seminar in Geophysics	1-2	Permission of instructor.
Earth Sciences	8889	Interdepartmental Seminar in Polar and Alpine Studies	1-2	Permission of instructor.
Earth Sciences	8898	Colloquium in the Earth Sciences	1	Permission of instructor.
Earth Sciences	8998	Research in the Earth Sciences	1-12	Permission of instructor.
Earth Sciences	8999	Dissertation Research in the Earth Sciences	1-12	Permission of instructor.