Master of Science
in Applied Science Education

Student Handbook

Division of Teacher Education
Department of Cognitive and Learning Sciences
Michigan Technological University
1400 Townsend Drive
Houghton, MI 49931
Telephone: (906) 487-2460
Fax: (906) 487-2468
Email: brad@mtu.edu
www.ed.mtu.edu

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Welcome to Michigan Tech University's

Master of Science Program
in
Applied Science Education!

Department of Cognitive and Learning Sciences Mission Statement

The mission of the Department of Cognitive and Learning Sciences (formerly Department of Education) is to provide exemplary programs supporting the preparation, professional development and continuing practice of secondary school teachers, and to promote a solid foundation for understanding human cognition and behavior. This mission will be met through continued assessment of departmental, programmatic, and curricular goals.

MS-ASE Tracks

There are three routes to the MS-ASE:

The Applied Science and Mathematics Track is the original MS-ASE degree for professional educators. It is designed for teachers with at least one year of experience, who wish to improve their knowledge and application of science and mathematics in the classroom.

The Earth System Science Track (ESS) is being initiated in 2007 with support from the National Science Foundation; it is designed for in-service teachers who want to improve their understanding of Earth Science and who may wish to become certified to teach Earth Science.

The Peace Corps-Master's International Track (PC-MI) was introduced in 2006 for individuals with degrees in science, mathematics, or engineering, who want to combine Peace Corps service with a graduate program leading to teaching certification.

Admission

Admission to the MS-ASE program is selective. Applications (www.admin.mtu.edu/rgs/graduate/apply.html) are reviewed by the Graduate Committee of Michigan Tech's Department of Education. Applicants must: be the recipient of a bachelor's degree or its equivalent from an accredited institution be prepared for advanced study as demonstrated by their undergraduate program of study and scholastic record

Applicants for the Applied Science and Mathematics track and the Earth System Science track must also: possess secondary teacher certification in mathematics or science have at least one year of secondary teaching experience

Advising

Initially an advisor will be assigned by the Department of Education. However, you are encouraged to choose your own advisor at any time. Remember that you must choose an MTU graduate faculty member who will advise you on course selection and choice of research topic and who will supervise the research experience. The advisor is an important factor in the graduate student's timely and successful completion of the program of study.

The heart of graduate study lies in the student-advisor mentoring relationship. Your advisor will be your primary contact as you complete your prospectus and research report. He/she will assist you in communicating with your committee, distributing drafts of your report and scheduling meetings and your final presentation. We recognize the need for flexibility in choosing an advisor and committee. Any suggestions you may have, or

questions concerning choosing a committee may be directed to your assigned or chosen advisor.

Possible advisors from the Department of Cognitive and Learning Sciences graduate faculty for the Applied Science and Mathematics Track and for the Earth System Science Track are:

Dr. Brad Baltensperger	brad@mtu.edu
Dr. Kedmon Hungwe	khungwe@mtu.edu
Dr. Shari Stockero	stockero@mtu.edu
Dr. William Yarroch	wlyarroc@mtu.edu

ESS students will also select a co-advisor from the Department of Geological and Mining Engineering and Sciences.

Advisors for the Peace Corps-Master's International Track will be selected from the graduate faculty of the departments of Biological Sciences, Chemistry, Cognitive & Learning Sciences, Geological and Mining Engineering & Sciences, Mathematical Sciences, and Physics, as appropriate to the individual student's needs. Discuss your advisor selection with the Directors of the PC-MI program in Science Education (Dr. Sarah Green and Dr. Brad Baltensperger).

During your first year, complete Form M2, http://www.gradschool.mtu.edu/trackforms/M2GSO-Advisor.pdf, on which you designate your advisor. In January of your first year in the MS-ASE program, you will receive the Departmental Graduate Student Curriculum Plan and Contract, which documents all previous coursework, required program courses, and/or electives. You should return your M2 by May 1st following enrollment in your first MS-ASE course.

Your Graduate Committee

Each student's work is supervised and evaluated by a graduate committee. The committee consists of your advisor, who serves as chair, plus 2-3 other faculty. At least one member of the committee must not be a faculty member or adjunct faculty member in the Department of Cognitive and Learning Sciences. Consult with your advisor in establishing your committee. Your committee serves as the evaluation committee for your oral examination and provides input and critique for your graduate research report.

Summary of Program Requirements

All work required for the MS-ASE degree (30 credits) must be completed within five calendar years of the first enrollment in the degree program. It is expected, however, that

most students can complete the requirements in three years. You must be enrolled in a course each fall and spring semester until completion of your degree (see "Continuous enrollment" section Pg 10).

The MS-ASE is a 30-credit master's degree program. Once admitted to the program, each student will establish an individual degree program in consultation with his/her advisor. All grades must be B (3.0 on 4.0 scale) or better in the required science education core courses and applied science core courses. The student must maintain a cumulative grade point average of 3.0 or better.

Applied Science and Mathematics Track

This track of the Master of Science in Applied Science Education (MS-ASE) degree is designed to meet the needs of teachers who want to: improve their knowledge and application of science and mathematics in the classroom continue their professional development seek an advanced degree in an application-based master's program accomplish the goals of national and state curriculum standards

This program offers a graduate degree for in-service secondary mathematics and science teachers that promotes professional development within their discipline and addresses classroom and students' needs. Through the coursework, participants will be able to demonstrate advanced ability to integrate technological literacy and real world applications into mathematics and science curricula serving students in grades 6-12. This emphasis is a priority in both state and national standards for secondary mathematics and science education.

Science Education Core Courses, 6 credits

Offered as online distance learning courses during the academic year

ED 5700	Research in Education	2 credits
ED 5730	Learning Materials, Inquiry and Assessment	2 credits
ED 5740	Connecting Benchmarks and Research	2 credits

Applied Science Core Courses, 12 credits

Offered as intensive institutes during the summer

ENG 5100	The Engineering Process	4 credits
ENG 5200	Engineering Applications in Physical Science	4 credits
ENG 5300	Engineering Applications in Earth Science	4 credits

Industry or Research Internship, 3-6 credits

ENG 5900 The internship is a full time one- or two-month summer position doing applied science or mathematics. See details on pp. 8-9. ENG5900 can be taken at a

rate of 1 credit per semester if needed in order to maintain continuous enrollment.

Graduate Research Report, 2 credits
ED5900 Enrollment in this course is mandatory at the time of completion and presentation of the report to your committee. See details on page 4. ED5900 can be taken at a rate of 1 credit per semester if needed in order to maintain continuous enrollment.

Elective Science/Math Education, Mathematics and/or Science Courses, 4-7 credits
Only credits approved by the department will be accepted. Most Michigan Tech summer professional development courses can be applied as electives.

Earth System Science Track

The program is designed to serve practicing teachers who are:

- currently teaching Earth/space science but are teaching out of field; or
- teaching another science and are interested in teaching Earth/space science in the future, or
- interested in working toward an advanced degree in science education.

The requirements were designed around national and state science education standards to ensure that participating teachers will develop the skills necessary to engage students in learning about Earth/space science and will meet the requirements for highly qualified status.

Science Education Core Courses, 6 credits
Offered as online distance learning courses during the academic year

ED 5700	Research in Education	2 credits
ED 5730	Learning Materials, Inquiry and Assessment	2 credits
ED 5740	Connecting Benchmarks and Research	2 credits

Applied Science Core Courses, 12 credits

GE 5020	Earth System Science I	4 credits
GE 5030	Earth System Science II	4 credits
ENG 5300	Engineering Applications in Earth Science	4 credits

Field Courses, 7 credits

SS 5150	Natural Hazards and Human Impacts	3 credits
GE 5130	Geology of Utah's National Parks	4 credits

Graduate Research Report, 2 credits
GE 5999 Graduate Research in Geology

Elective Science Education and/or Science Courses, 6-7 credits
Only credits approved by the department will be accepted.

Peace Corps-Master's International Track

There is a nationwide need for experienced and qualified science teachers. Education experts and government leaders have expressed great concern over the shortage of science teachers and the shortage of high school students who go on to major in science and engineering fields in college. Returning Peace Corps volunteers will be especially qualified for secondary school teaching positions because of their practical experience, their ability to demonstrate the relevance of science to the lives of students in international settings, and their ability to integrate science with other disciplines.

This track is designed for graduates with degrees in science, mathematics, or engineering who would like to become certified teachers and who wish to serve abroad in the Peace Corps. Courses in the program provide the basics of education theory, practice and application. Most program completers will be able to earn teaching certification shortly after completing their Peace Corps service.

Education Core Courses, 11 credits

ED 4150	Literacy in Content Areas	4 credits
ED 4700	Fundamentals of Instruction	3 credits
ED 5110	Educational Psychology	2 credits
ED 5210	Principles of Education	2 credits

Science Education Core Courses, 7 credits

ED 4710	Methods of Teaching Science & Mathematics	3 credits
ED 5700	Research in Education	2 credits
ED 5730	Learning Materials, Inquiry and Assessment	2 credits

Applied Science Core Courses, 6 credits

FW 5770	Rural Community Development	2 credits
plus ONE of the following:		
ENG 5100	The Engineering Process	4 credits
ENG 5200	Engineering Applications in Physical Science	4 credits
ENG 5300	Engineering Applications in Earth Science	4 credits

During Peace Corps service - 5 credits

ED 5998 International Science Education Practicum 1 credit per semester

Graduate Research Report, 1 credit

ED 5900 Enrollment in this course is mandatory at the time of completion and presentation of the report to your committee. See details on page 4.

Course Descriptions

Education Courses

ED 4150 - Literacy in Content Areas, 4 credits

Introduction to literacy processes and methods for improving content understanding that focus on language. Designed for preservice secondary teachers. Emphasizes strategies for comprehending and interpreting texts and a close examination of cultural and learning differences. Field experience involves tutoring in secondary schools. On campus, spring semester.

ED 4700 - Fundamentals of Instruction, 3 credits

Study of key areas of instruction in preparation for student teaching. Emphasis is placed on lesson planning, classroom management, and student assessment and evaluation. On campus, fall semester.

ED 4710 - Methods of Teaching Science and Mathematics, 3 credits

Application of learning and instructional theories to the teaching of science and mathematics. On campus, spring semester.

ED 5110 - Educational Psychology, 2 credits

Review of psychological principles as they relate to human learning. Covers factors in school that contribute to the emotional, psychological stability of the developing child: assessing students' capabilities, setting educational objectives for the child, classroom practices, procedures, teachers' behavior and their relationship to different types of students. On campus, fall semester.

ED 5210 - Principles of Education, 2 credits

Contemporary issues in education from historical, philosophical, sociological, and legal perspectives. Emphasizes the structure/function of U.S. education as well as exceptional children, especially the handicapped and culturally different. On campus, fall semester.

ED5700 Education Research, 2 credits

In-depth study of education research methods pertaining to classroom practice, curriculum standards, and program evaluation. The course includes an opportunity to design

research to answer questions relevant to classroom teaching and learning. Offered online during fall semester. This course is equivalent to ED5701 + ED5702. Required in all tracks.

ED5730 Learning Materials, Inquiry and Assessment, 2 credits
The course examines the implications of using technological applications in the physical, earth, and biological sciences as a "medium" for connecting science education research, the Michigan Mathematics and Science Frameworks, and the teaching of the sciences in secondary education, especially for evaluating and designing curricular materials and resources for science education. Offered online during spring semester. This course is equivalent to ED5731 + ED5732. Required in all tracks.

ED5740 Connecting Benchmarks and Research, 2 credits
Current research and classroom practice are examined using the Michigan Mathematics and Science Benchmarks. The objective is to further understanding of how goals can promote higher levels of learning. Offered online during fall semester. This course is equivalent to ED5741 + ED5742. Required in all tracks.

Applied Science Core Courses

ENG5100 The Engineering Process 4 credits
This institute introduces engineering to pre-college teachers by providing them with meaningful experiences that they can bring back to their classrooms. The engineering process and some of the "non-technical" aspects important in engineering are outlined. Students are required to complete a design project that meets certain criteria. During the fall semester after participation in the summer course, students are required to design a teaching unit based on this course and implement it in their pre-college classrooms. Equivalent to ENG5101 + ENG5102. Offered as an intensive institute during the summer.

ENG5200 Engineering Applications in the Physical Sciences, 4 credits
Students complete hands-on explorations in engineering disciplines related to the physical sciences (Electrical, Mechanical, Metallurgical, Civil, Biomedical, Computer, and Chemical Engineering disciplines). Students will explore how math and science are applied in these disciplines and will work on projects suitable for inclusion in their pre-college classes. Review of math and science principles will be included as necessary to complete the course material. Sessions will also be conducted on the state and national science and math education standards as they apply to the physical sciences. During the fall

semester after participation in the summer course, students write a paper demonstrating how they have implemented course content and concepts in their pre-college classrooms. This course is equivalent to ENG5201 + ENG5202. Offered as an intensive institute during the summer.

ENG5300 Engineering Applications in the Earth Sciences, 4 credits
Students complete hands-on explorations in engineering disciplines related to the earth sciences (Geological, Mining, Mineral Processing, Environmental, Aerospace, and Civil Engineering disciplines). Students explore how math and science are applied in these disciplines and will work on projects suitable for inclusion in their pre-college classes. Review of math and science principles will be included as necessary to complete the course material. Sessions will also be conducted on the state and national science and math education standards as they apply to the earth sciences. During the fall semester after participation in the summer course, students will be required to write a paper demonstrating how they have implemented what they have learned in their pre-college classrooms. Prerequisite: ENG5100. Equivalent to ENG5301 + ENG5302. Offered as an intensive institute during the summer.

GE 5020 Earth System Science I,
4 credits
This course includes basic geologic content traditionally covered in university-level physical geology and historical geology. ESS I approaches the necessary content by stepping through geologic time from the present into the past. The course takes a place-based approach, using the geologic record of Michigan. Layers of rock in Michigan and surrounding areas contain physical evidence of Earth system processes that operated in the past. The course works backward in time by moving down through the layers of rock in the Michigan basin and nearby regions. Much of the rock record in Michigan is sedimentary in origin and contains a record of changes in paleo-geography and life through time. The course covers the origin of the sedimentary rocks in the basin, how scientists know the origin of the rocks, and why certain nearby areas (e.g., the Appalachians) were elevated and acted as source areas for sediments at particular times. Gaps in the geologic record (unconformities and hiatuses) are addressed in terms of their Earth system significance (including climate and sea level changes). Offered as a distance learning course during fall semester.

GE 5030 Earth System Science II,
4 credits
ESS II focuses on material traditionally covered in courses on astronomy, meteorology, and

oceanography. ESS II addresses content from these fields by focusing on the Earth's climate system. Earth's climate depends on astronomical, meteorological, and oceanographic processes. The course investigates long- and short-term climate change, as well as the data that are used by scientists to document past climate change. A variety of data sources will be used by teachers during the course, including ice core data from the Greenland and Antarctic ice sheets, deep sea drilling data, meteorological measurements from sites such as Mauna Loa, and astronomical parameters available from the U.S. Naval Observatory and other sources. The Department of Geological and Mining Engineering and Sciences at MTU is part of MTU's Remote Sensing Institute, and a great deal of expertise is available in the department related to the use of GIS and satellite data in synoptic evaluation of the Earth's climate system. Through the use of large real-time, near real-time, and long-term datasets, teachers taking the course will become familiar with the techniques and tools that practicing geoscientists use to study Earth's climate. Offered as a distance learning course during spring semester.

Field Courses

(Earth System Science Track only)

SS5150 Natural Hazards and Human Impacts, 3 credits

Content typically found in courses on Natural Hazards and Social Science (both required in the undergraduate pre-service program at MTU). The course emphasizes the impact of Earth system processes on societies, and human impacts on local, regional, and global Earth processes. A combination of field, laboratory, and classroom-based activities is used to compare contemporary human impacts with the geologic record. MTU is located in and adjacent to the mid-continent rift system and Paleozoic to Recent rocks surround the rift. Rock exposures are widely present in the MTU area because much of the post-Paleozoic cover was removed during the last glaciation. Glacial deposits are common in the region and provide excellent evidence of the effects of long-term global climate change. The course also emphasizes the use of field-based activities as a means of insuring deep learning. Integrating pedagogical approaches with scientific and social scientific content knowledge will enhance the utility of the course for in-service teachers. A summer intensive field course.

GE5130 Geology of Utah's National Parks, 4 credits

A two-week, field-based course taught in Utah's National Parks. Course requires a project and special assignments. Participants conduct research to identify the Earth system processes (tectonics, sea level change, climate change, etc.) responsible for development of

landforms in and around Utah's National Parks. A summer intensive field course.

International Development and Science Education
(Peace Corps-Master's International Track only)

ED 5770 - Rural Community Development Planning and Analysis, 2 credits
Context, analysis, and monitoring of development processes of rural communities in tropical countries. On-campus, spring semester course.

ED 5998 - International Science Education Practicum, 1 credit each semester
Field work and reporting from students in the Peace Corps Master's International Program in Science Education.

Internship 3-6 credits
(Applied Science and Mathematics Track only)

The industry or research internship (ENG5900) is a full time one- or two-month summer position doing applied science, most often in a work setting close to home. You should work with your education advisor to identify the internship. The internship is designed to emphasize the application of engineering and science principles in a "real-world" setting.

Prospectus. During the semester prior to enrollment, you will need to complete a prospectus outlining your intended internship. The prospectus should describe the purpose of the internship, proposed activities, and a timeline for completion. It should also identify how the internship is expected to relate to the final Graduate Research Report. The prospectus should be approximately 1000 words in length and should be submitted to your advisor for approval at least two months before the internship is to begin.

Internships can be arranged with government agencies, industries, or with university scientists or engineers engaged in research. The purpose is to observe and participate in the activities of practicing scientists and engineers and to use that understanding to inform classroom teaching. It should be seen as a source of inspiration and ideas for the classroom. A 3-credit internship requires 120-150 hours of activity at the internship site. Interns should document their internship activities with a log or journal of activities. Submission of those documents to their advisor at the conclusion of the internship is necessary before credit can be granted. Internships can be completed during one summer or semester or can be spread over a longer period of time.

Elective Education, Science, and Mathematics Courses 4-7 credits (Applied Science and Mathematics and Earth System Science tracks only)

Michigan Tech summer professional development activities can be applied as electives, such as the ESMIS and EPDIS courses, Geology of Utah Institute, and the Earth Science Institutes. Other graduate level coursework in applied science must be approved through your advisor.

Approved Applied Science and Mathematics Courses:

ED5560 Ecology of Isle Royale
ED5565 Developing Algebraic Thinking
ED5570 Lesson Study
ED5601 Special Studies (ESMIS/EPDIS)
    Ecology of the Great Lakes
    Watershed Investigations
    Space and Planetary Sciences
ED5602 Special Applications in Education
    Watershed Investigations
    Space and Planetary Sciences Lab
ED5603 Special Topics in Education
    Earth Science Principles and Application
ED5620 Prof Dev: Teaching Earth Science
ED5630 Prof Dev: Teaching Life Sciences
ED5640 Prof Dev: Teaching Env'l Science
ED5641 Global Change Institute
ED5650 Prof Dev: Teaching Physical Science
ED5660 Prof Dev: Teaching Mathematics
ED5661 Prof Dev: Mathematics-Navigation
ED5665 Prof Dev: Teaching Computer Science
ED5670 Prof Dev: Teaching Technology
GE5130 Geology of Utah's National Parks
MA5920 Statistics for Educators

Graduate Research Report

The graduate research report is the culminating product of your work in the Masters Program. It represents your ability to understand key ideas from your coursework and internship, to apply these ideas to your classroom, to measure the effectiveness of your efforts, and to document all of this in both written and oral formats. It is designed to highlight your understanding of applied science education through coursework; development, implementation, and assessment of classroom units; internship activities; and research.

Some feel that the research report can seem like a bottomless pit. It is true that much time needs to be devoted to the preparation and documentation of the work you choose to do, but remember that the product represents university scholarship in its best form. Your MS-ASE research report paper will become a permanent part of the MTU library collection and will reflect on this master's program as long as that library exists. Future students will draw on your scholarship for their inspirations.

You will generally enroll in ED 5900 (Graduate Research in Education) or GE 5999 (Graduate Research) [for the Earth System Science Track] at the time of completion and presentation of the report to your graduate committee. You can enroll in either course for one credit at a time, but 2 credits are needed for degree completion (1 credit for the Peace Corps-Master's International Track).

Prospectus. By this time you should have submitted the M4 Form http://www.gradschool.mtu.edu/trackforms/M4DegreeSchedule.pdf. To begin the process, you must write a 2-3 page prospectus that clearly communicates your plan for the report to your advisor for approval. The purpose of the prospectus is to describe what you propose to accomplish in the report and how you intend to do so. Your advisor may circulate the document to other members of your committee for their recommendations or comments (your committee must be identified at this time).

Human Subjects Approval. Consult with your advisor concerning the need for human subjects approval. This will generally be done before or at the same time your prospectus is being written.

Identifying a Problem. The first step in writing the report is the selection of a problem in an area that typically involves both the application of MS-ASE coursework already taken and the MS-ASE internship. Some possibilities are:

- Creation or major modification of an instructional unit based on MS-ASE coursework or the internship, classroom implementation of that unit, and subsequent evaluation to determine the success of the unit.

- Detailed analysis of student learning/misconceptions subsequent to instruction on relevant MS-ASE content or processes.
- Creation and testing of new classroom materials derived from experiences in the internship and/or MS-ASE coursework.
- Mentoring work with other teachers to help them better understand how science and engineering function. This would include evaluation of the success of such mentoring and any products of this mentoring process.

Useful resources:

Stephen Isaac and William B. Michael. (1999). *Handbook in Research and Evaluation* (3rd Ed). San Diego, CA : EdITS.

Geoffrey E. Mills. (2002). *Action Research: A guide for the teacher researcher*. (2nd Ed). Upper Saddle River, New Jersey: Prentice-Hall, Inc.

Online resources are also available through department faculty.

Content. Once you have identified your topic and have established clear questions that you are seeking answers to, you should proceed with the project. Generally your work will include:

- background research that places your activities in the context of what educators already know about the topic
- presentation of your data (quantitative or qualitative)
- summary and interpretation of your findings
- conclusions and implications of the research, including suggestions for further study

Format. The report is generally 40-60 pages long (plus front matter, references and appendices). For most reports, the following format is typical (although any given report may utilize a somewhat different format, where appropriate for its approach).

- Title page (see example page 11)
- Table of contents
- Statement of the topic or problem, and its importance. (This could be considered to be the first chapter of a multi-chapter document. The chapter format is one way of organizing and simplifying the structure of what you have to say).
- Review and appraisal of previous literature, and a statement about the background of the problem (this could be considered to be the second chapter).
- Statement about the procedures, subjects, and facilities used in conducting the study.
- Presentation, summary, and interpretation of data (quantitative or qualitative) or findings.
- Conclusions and their limitations.
- Educational implications of the

study, and the suggestions they offer for further research.
- References. Because your report is a scholarly document, this is very important.

Style. The preferred form is that of the American Psychological Association (APA) Publication Manual. Other forms may be appropriate, with approval of your advisor. The following books contain many helpful ideas and suggestions about such issues as arrangement and notation of tables, footnotes, appendices, table of contents, bibliography, and literary style. Whatever form is selected, it should be used consistently throughout the report.

Useful resources:

American Psychological Association. (2001). *Publication Manual of the American Psychological Association* (5th Ed.). Washington, DC: Author.

A Manual of Style. (1996). (14th Ed.). Chicago: University of Chicago Press.

Turabian, Kate L. (1996). *A Manual for Writers of Term Papers, Theses, and Dissertations*. (6th Ed.). Revised by John Grossman and Alice Bennett. 1996 Series: Chicago guides to writing, editing, and publishing. Chicago: University of Chicago Press.

Research Presentation

Each student must present his/her research to the graduate committee in an oral examination, either in person or through videoconferencing. Faculty and students will be invited to attend.

At least two weeks prior to the examination, complete **M5, Schedule of Oral Examination**, http://www.gradschool.mtu.edu/trackforms/M5SchedulingOralExamination.pdf in consultation with your whole committee. This names your examining committee and schedules your oral examination. At least two weeks prior to your oral examination, distribute readable copies of the thesis/report to your committee.

Take your **M6, Report on Oral Examination**, http://www.gradschool.mtu.edu/trackforms/M6OralExamination.pdf to the exam for signatures.

The presentation of your research results will normally take 30-45 minutes. It should include an introduction to the problems, a discussion of your methodology and how your study relates to the relevant literature, presentation of conclusions and implications of the study. Discussion and questions will follow. Non-committee members will then be excused and the committee may have additional questions or discussion to raise with the student. Following this, the committee will deliberate and determine if the examination and report satisfy the requirements of the program.

Your advisor/department may retain your M6 for up to two weeks following the

defense while you make changes as directed by the committee; research grades are not changed until the M6 is in the Graduate School Office. Note: At the time of your oral examination you must be enrolled in ED5900 or UN5953.

Submission of Final Document

Make corrections as indicated by your committee and to the satisfaction of your advisor. Submit a CD of the final report (or two CDs if completing the M7 form for electronic theses), along with the binding fee, to the Graduate School Office. One bound copy will be filed in the library. The second bound copy will be kept in the Department of Education. Please make additional, unbound copies available to the committee if they wish to have them. For an additional charge, you may have a copy bound for your own use. These forms are on the graduate school website: http://www.admin.mtu.edu/rgs/graduate/forms/BindingForm.pdf.

Continuous Enrollment; Registration Requirements

Continuous enrollment

Continuous enrollment throughout the academic year (fall and spring semesters) is required until the end of the semester in which you complete all your degree requirements. If you wish to remain active in the graduate program you must be enrolled each semester in either a regular course, the internship (ENG5900), a research course (ED5900), or one of three courses approved to facilitate continuous enrollment (UN5951, UN5952, and UN5953) (http://www.admin.mtu.edu/rgs/graduate/forms/ContinuousEnrollmentAdmit.pdf). If you do not maintain active status, your enrollment will be considered inactive and you will have to apply for re-admission to regain active status.

Because the core applied science courses and many of the appropriate elective courses are offered only during the summer, the graduate school has agreed to waive the continuous enrollment course fee for 3 semesters for MS-ASE students. **However, you still must register for one of the three continuing enrollment courses** for each fall and spring semester. For assistance or questions, contact the Department of Education. To facilitate continuous enrollment, you may enroll in ENG5900, ED 5900, or GE5999 for 1 credit per semester Speak with your advisor about this circumstance.

Under some circumstances, if you are making NO progress toward your degree during a given academic year semester, you may request a waiver of continuous enrollment. However this is limited to only one term, and must be approved by the Dean of the Graduate School. The "no progress" designation required for a waiver means you will have no use of campus facilities and no use of faculty time.

Registering and Avoiding Late Fees

Michigan Tech requires that you be

registered for classes and that your tuition and fees be paid in full *five days before the beginning of each semester*. Keep informed about the deadline for registration and payment in order to avoid a bill for late payment. Students with unpaid bills will be automatically dropped from their classes and will only be able register by contacting the Office of Student Records and Registration.

Graduate School Requirements

Keeping on Track

Students are required to complete the Graduate Student Curriculum Plan & Contract by June 1st following completion of their first MS-ASE course. Students who do not enroll in courses as stated in the Curriculum Plan and Contract, or who do not complete courses with a grade of "B" or better, or who must take an incomplete in a course will be considered "Off Track". Students who are deemed "Off Track" are not eligible for financial assistance. Those who remain "Off Track" for a period greater than 2 semesters will be ineligible for continuation in the program without first requesting re-enrollment through the Department of Education Graduate Committee. Re-enrollment requests must be submitted in writing, and address your ability to re-enter the program and remain on track in the future.

Transfer Credits

A limited number of graduate course credits from other colleges or universities, taken within 5 years prior to admission to the MSASE program, may be accepted for graduate credit at Michigan Tech. A request for transfer credit must be made during the student's first semester in the program. Transfer of credits taken after enrollment at MTU must be approved in advance of course registration. Courses intended primarily for undergraduates are not transferable. The number of credits accepted depends on an evaluation by the department and the dean of the Graduate School. Transfer credits for courses taken after admission to the program and approved in advance may not exceed one-half of the non-research course credits. The total of transfer credits may not exceed one-half of the non-research course credits.

Credit Definition

Academic advancement by students is measured in terms of semester-hour credits or simply credits. One credit should average three to four hours of a student's time per week for one semester. Depending on course requirements, these hours may all be spent in the classroom or laboratory or may be divided between home study and class or laboratory.

Time Limit

All work required for the Master of Science degree must be completed within five calendar years of the first enrollment in the degree program.

Graduation

You must complete your degree requirements no more than five calendar

years after you started Graduate School. When you have completed your degree requirements, you can usually receive a certification letter immediately. Your transcript will indicate degree granted by the 4th week of the next semester. Your diploma will be mailed to you about 90 days after the term ends. Leave a valid address with the Graduate School.

Be sure the Graduate School and your advisor are aware of your commencement plans at the beginning of the commencement semester. If you wish to participate in the commencement ceremony, the final copy of your report must be filed with the Graduate School several weeks in advance. Please check with Graduate School Office regarding this deadline.

Typical Time Frame for Program Completion
Applied Science and Mathematics Track:

When	What
Application Process, Prior to Acceptance in the Program	Complete Program Application. Write Your Statement of Purpose Obtain 3 letters of Recommendation and Undergraduate Transcripts
Upon Acceptance into the program	Enroll in ENG 5100. Complete **Patent, Research, and Proprietary Rights Form** (Appendix) Meet pre-assigned advisor. You may choose a permanent advisor at anytime.
Summer Year 1	Complete ENG5100. Enroll in ED5700 for fall.
Fall Semester, Year 1	Complete ED5700 (online). Register for Spring Semester course, ED5730.
January- February Year 1	Receive **Graduate Student Curriculum Plan & Contract** from your advisor**.** Complete form and return to Education Department by June 1. Complete **MTU Graduate School Transfer Credits Form** *http://www.gradschool.mtu.edu/trackforms/TransferCredits.pdf* if necessary. Return to the Department by June 1.
Spring Semester, Year 1	Complete ED5730 (online). Enroll in ENG5200 & ENG5300 for summer. Complete M2 Form, designating your advisor and committee. Complete Elective Course if needed.
June 1, End of Year 1	Have your **Graduate Student Curriculum Plan & Contract** on file with the Department of Education
Summer, Year 2	Complete ENG 5200 & ENG 5300. Register for Fall Semester course, ED5740.
Fall Semester, Year 2	Complete ED5740 (online). Complete Elective course if needed. Make contacts, investigate opportunities for Internship.
Spring Semester, Year 2	Complete Elective courses or enroll in UN5951 to maintain continuous enrollment. Complete **Internship Prospectus.** (See Internship, p 6) Complete **M4 Form (**Graduate School's version of Departmental Graduate Student Curriculum Plan and Contract) due in the Graduate School Office the semester prior to your scheduled Research Report Presentation.
June 1, End of Year 2	Obtain approval of **Internship Prospectus** from your Education Advisor.
Summer, Year 3	Complete Internship.
Year 3 As soon as possible 1. At Least 2 weeks prior to research presentation 2. 2 weeks prior to research presentation Oral Examination	Complete electives, if necessary. Meet with Advisor Submit **Prospectus** for Research Report to your Education Advisor. Provide advisor with draft of report. Revise and resubmit drafts as needed Complete Graduate Research Report: 1. Make revisions, submit final version to advisor and committee members; schedule defense with committee members. 2. Submit Form **M5** to Graduate School. Bring Form **M6, Report on Oral Examination** to your defense for approval.
After Oral Examination	Complete graduate school survey forms, binding forms and pdf version of research report to CD. Provide one bound copy for the Department of Education Archives, and one copy for the Graduate School. Also provide your advisor and committee members with unbound copies of your report. Follow the Graduate School Degree Completion Checklist; pay specific attention to items 1a, 2, 3, 4b, 5 (M7), and 6-13.

Typical Time Frame for Program Completion
Earth System Science Track:

When	What
Application Process, Prior to Acceptance in the Program	Complete Program Application. Write Your Statement of Purpose Obtain 3 letters of Recommendation and Undergraduate Transcripts
Upon Acceptance into the Program	Complete **Patent, Research, and Proprietary Rights Form** (Appendix) Meet pre-assigned advisor. You may choose a permanent advisor at anytime.
Summer, Year 1	Complete GE 5130 or SS 5150 or ENG 5100/5200/5300 Register for Fall Semester course, GE 5020.
Fall Semester, Year 1	Complete GE 5020 (online). Register for Spring Semester course, GE 5030.
January- February Year 1	Receive **Graduate Student Curriculum Plan & Contract** from your advisor**.** Complete form and return to Education Department by June 1. Complete **MTU Graduate School Transfer Credits Form** *http://www.gradschool.mtu.edu/trackforms/TransferCredits.pdf* if necessary. Return to the Department by June 1.
Spring Semester, Year 1	Complete GE 5030 (online). Enroll in GE 5130 or SS 5150 or ENG 5100/5200/5300 for summer. Complete M2 Form, designating your advisor and committee
June 1, End of Year 1	Have your **Graduate Student Curriculum Plan & Contract** on file with the Department of Education
Summer, Year 2	Complete GE 5130 or SS 5150 or ENG 5100/5200/5300 Register for Fall Semester course, ED 5700.
Fall Semester, Year 2	Complete ED 5700 (online).
Spring Semester, Year 2	Complete ED 5730 (online). Complete **M4 Form (**Graduate School's version of Departmental Graduate Student Curriculum Plan and Contract) – due in the Graduate School Office the semester prior to your scheduled Research Report Presentation.
Summer, Year 3	Complete GE 5130 or SS 5150 or ENG 5100/5200/5300
Fall Semester, Year 3	Complete ED 5740 (online).
Spring Semester, Year 3	Complete Elective courses or enroll in UN5951 to maintain continuous enrollment. Complete **M4 Form (**Graduate School's version of Departmental Graduate Student Curriculum Plan and Contract) – due in the Graduate School Office the semester prior to your scheduled Research Report Presentation.
Year 3 As soon as possible 1. At Least 2 weeks prior to research presentation 2. 2 weeks prior to research presentation Oral Examination	Complete electives, if necessary. Meet with Advisor Submit **Prospectus** for Research Report to your Education Advisor. Provide advisor with draft of report. Revise and resubmit drafts as needed Complete Graduate Research Report: 1. Make revisions, submit final version to advisor and committee members; schedule defense with committee members. 2. Submit Form **M5** to Graduate School. Bring Form **M6, Report on Oral Examination** to your defense for approval.
After Oral Examination	Complete graduate school survey forms, binding forms and pdf version of research report to CD. Provide one bound copy for the Department of Education Archives, and one copy for the Graduate School. Also provide your advisor and committee members with unbound copies of your report. Follow the Graduate School Degree Completion Checklist; pay specific attention to items 1a, 2, 3, 4b, 5 (M7), and 6-13.

Typical Time Frame for Program Completion
Peace Corps-Master's International Track:

When	What
Application Process, Prior to Acceptance in the Program	Complete Program Application. Write Your Statement of Purpose Obtain 3 letters of Recommendation and Undergraduate Transcripts Apply to Peace Corps
Prior to fall semester	Complete **Patent, Research, and Proprietary Rights Form** (Appendix) Meet pre-assigned advisor. You may choose a permanent advisor at anytime. Enroll for fall courses.
Fall Semester, Year 1	Complete ED 4700, ED 5110, ED 5210, ED 5700 (online).
January- February Year 1	Receive **Graduate Student Curriculum Plan & Contract** from your advisor**.** Complete form and return to Education Department by March 1. Complete **MTU Graduate School Transfer Credits Form** *http://www.gradschool.mtu.edu/trackforms/TransferCredits.pdf* if necessary. Return to the Department by March 1. Complete M2 Form, designating your advisor.
Spring Semester, Year 1	Complete ED 4150, ED 4710, ED 5730 (online), FW 5770. Enroll in ENG 5100, ENG 5200, OR ENG 5300 for summer. Complete M2 Form, designating your advisor.
June 1, End of Year 1	Identify your committee members Have your **Graduate Student Curriculum Plan & Contract** on file with the Department of Education
Summer, Year 2	Complete ENG 5100, ENG 5200, OR ENG 5300.
Fall Semester, Year 2	Peace Corps Service begins Enroll in ED 5998 each semester while abroad with the Pece Corps
Years 2 & 3	File quarterly reports with your advisor Develop and submit **Prospectus** for Research Report to your Education Advisor.
Summer, Year 3	Complete Peace Corps Service.
Year 3 As soon as possible 1. At Least 2 weeks prior to research presentation 2. 2 weeks prior to research presentation Oral Examination	Complete electives, if necessary. Meet with Advisor Submit **Prospectus** for Research Report to your Education Advisor. Provide advisor with draft of report. Revise and resubmit drafts as needed Complete Graduate Research Report: 1. Make revisions, submit final version to advisor and committee members; schedule defense with committee members. 2. Submit Form **M5** to Graduate School. Bring Form **M6, Report on Oral Examination** to your defense for approval.
After Oral Examination	Complete graduate school survey forms, binding forms and pdf version of research report to CD. Provide one bound copy for the Department of Education Archives, and one copy for the Graduate School. Also provide your advisor and committee members with unbound copies of your report. Follow the Graduate School Degree Completion Checklist; pay specific attention to items 1a, 2, 3, 4b, 5 (M7), and 6-13.

SAMPLE TITLE PAGE FOR YOUR GRADUATE RESEARCH REPORT

Title of your Master's Report

By

Jane/Jon M. Doe

A Master's Report submitted in Partial Fulfillment of the
Requirements for the MS-ASE Degree through
the Department of Education

Michigan Technological University

Approved by_____ _____
(Advisor) Date

_____ _____
(Dept Chair) Date