Cover Page

Institution Submitting Request: University of Utah
Proposed Title: Masters of Science for Secondary School Teachers in Earth Sciences
School or Division or Location: College of Mines and Earth Sciences
Department(s) or Area(s) Location: Department of Geology and Geophysics
Recommended Classification of Instructional Programs (CIP) Code[1] : 13.1337
Proposed Beginning Date: 09/20/2012
Institutional Board of Trustees' Approval Date:

Proposal Type (check all that apply):

R401-4

Items submitted will be reviewed by the Office of the Commissioner of Higher Education (OCHE), then forwarded to the Chief Academic Officers (CAO) and Program Review Committee (PRC) before being presented to the Regents. K-12 Personnel Programs are also reviewed by appropriate officials and faculty of the schools and colleges of education. See R401-4.2.2 for all programs requiring specialized reviews.

Section #		Item
4.1.1	☐	Non-Credit Certificate of Proficiency Eligible for Financial Aid
	☐	Credit Certificate of Proficiency Eligible for Financial Aid
4.1.1	☐	Non-Credit Certificate of Completion
	☐	Credit Certificate of Completion
4.1.9	☐	Fast-Tracked Certificate
4.1.2	☐	Associate of Applied Science Degree
4.1.3	☐	Associate of Science Degree
	☐	Associate of Arts Degree
4.1.5	☐	Bachelor's Degree
4.1.6	☐	K-12 School Personnel Programs
4.1.7	x	Master's Degree
4.1.8	☐	Doctoral Degree

Chief Academic Officer (or Designee) Signature:
I certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

_____
Signature Date:

Printed Name: *Name of CAO or Designee*

[1] CIP codes must be recommended by the submitting institution. For CIP code classifications, please see http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55.

Institution Submitting Request: University of Utah
Proposed Title: Masters of Entertainment Arts and Engineering (MEAE) (with three graduate emphases incorporated therein: Game Arts, Game Engineering, and Game production) and a Joint MEAE/Master of Fine Arts in Film and Media Arts
School or Division or Location: College of Engineering and the College of Fine Arts
Department(s) or Area(s) Location: Entertainment Arts & Engineering Program
Recommended Classification of Instructional Programs (CIP) Code[1] : 36.0113, 50.0102, and 50.0411
Proposed Beginning Date: 08/26/2013
Institutional Board of Trustees' Approval Date: *MM/DD/YEAR*

Proposal Type (check all that apply):

R401-4 *Items submitted will be reviewed by the Office of the Commissioner of Higher Education (OCHE), then forwarded to the Chief Academic Officers (CAO) and Program Review Committee (PRC) before being presented to the Regents. K-12 Personnel Programs are also reviewed by appropriate officials and faculty of the schools and colleges of education. See R401-4.2.2 for all programs requiring specialized reviews.*		
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Chief Academic Officer (or Designee) Signature:
I certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Signature **Date:** 11-7-12

Printed Name: Michael L. Hardman

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Executive Summary

University of Utah
Masters of Science for Secondary School Teachers in Earth Sciences
03/28/2012 Revised 05/17/2012, 02/12/2013, 02/19/2013

Program Description

The Masters of Science for Secondary School Teachers (MSSST) program was established by the College of Science in 1972 and offers degrees for secondary school teachers in Chemistry, Physics, Biology and Math (Teaching). The MSSST degree program is available to certified middle and high school teachers who have been teaching for a minimum of three years as a way to provide advanced training and fulfill Utah State Office of Education (USOE) endorsement requirements for science and mathematics. The proposed Masters of Science for Secondary School Teacher in Earth Sciences degree will be offered in the Department of Geology and Geophysics, which is part of the College of Mines and Earth Sciences. The program consists of 34 hours of study: 23 hours are in core Geology, Physics and Chemistry courses, 5 hours are in science-based pedagogical courses, and 6 hours are for completion of a master's project. The program meets the USOE requirements for endorsements in Earth Science and Physical Science for teachers who have the prerequisites of 1 year each of Chemistry and Physics. The program will be offered to cohorts of up to 25 teachers and will be designed to take into account USOE Science Core Curriculum concepts and content-based pedagogical methods. Courses will be given in the evenings during the academic year, and during the mid-summer months (mid-June to mid-August) to accommodate K-12 teaching schedules.

Role and Mission Fit

The Masters of Science for Secondary School Teacher in Earth Sciences degree will help the University of Utah fulfill its mission to serve the people of Utah through the dissemination of knowledge by teaching and community engagement. The Masters of Science for Secondary School Teacher in Earth Sciences degree facilitates this goal both by providing instruction to secondary teachers and through the instruction that these teachers will, in turn, provide their students. In its role as teaching institution, the University commits itself to providing challenging instruction for all its students and encourages interdisciplinary work and the integration of instruction and research opportunities. It expects and rewards superior teaching and academic excellence among its faculty. The Masters of Science for Secondary School Teacher in Earth Sciences degree will facilitate this goal through the very nature of the program content. Also, it is likely that the teaching skills of the science faculty will be improved by working with professional teachers in addition to improving the science content knowledge of the teachers. In its role as contributor to public life, the University's faculty, staff, and students are encouraged to contribute time and expertise to community and professional service. The Masters of Science for Secondary School Teacher in Earth Sciences degree allows for faculty to engage in K-12 education in a very meaningful and lasting way. Finally, the President of the University has explicitly stated that that the University should make it a priority to reclaim its place in the state of producing the highest quality teachers of science in numbers that are significant. Prior to the MSSST cohort program, approximately two teachers a year were graduating with a higher-level degree in the sciences. With this program, we can significantly and positively impact those numbers.

Faculty

Because this is an interdisciplinary program, faculty will be drawn from multiple departments including Geology & Geophysics, Chemistry, Physics, Atmospheric Sciences, Mining Engineering, Metallurgical Engineering and the Urban Institute of Teacher Education within the College of Education. The main focus of the program, however, is Earth Science so faculty headcounts are included for the Department of Geology & Geophysics below. When feasible (and desirable), teachers will be taking regularly scheduled courses that are offered to the general population at the University. However, several of the necessary courses are not offered at a time teachers can take them (either after 4:00 pm during the school year or from mid-June to early August during the summer). Therefore, faculty will be recruited to teach special sections of the courses and will be compensated accordingly. As these courses will be offered through Academic Outreach and Continuing Education (AOCE), compensation will come directly from tuition.

Since this amounts to an additional course per academic year semester, and two during the summer sessions, there is little impact on the participating department. Instructors have already been arranged for the majority of the courses.

Market Demand

Earth Science, Geology, Middle Level Science, and Physics range from 3.2 to 3.6 (the highest current ranking is 4.0 (Special Education)) on the Teaching Field Index of Criticality. This implies that demand for teachers that are qualified to teach these subjects is high and job placement should not be a problem. Additionally, with the changes in the USOE Core Curriculum to develop a new Earth Science course and move it to a more experience-based science, the demand for such courses will grow and therefore so will the need for more teachers.

Student Demand

When the program was announced by the USOE for feedback from teachers, over 40 responded that they would be interested in participating.

Statement of Financial Support.

Appropriated Fund ..... ☐
Special Legislative Appropriation ..... ☐
Grants and Contracts ..... ☐
Special Fees/Differential Tuition x
Other (please describe)..... ☐

Similar Programs Already Offered in the USHE

To our knowledge, no other USHE institution offers a MS degree in Earth Sciences for practicing teachers. There are programs for pre-service (undergraduate) teachers and MEd or MAT degrees offered by colleges of education but none require the rigor of a science-based master's project and advanced scientific coursework. Our hypothesis is that by engaging teaching in authentic research activities with their master's project, they will be better prepared to teach scientific process to their students. We will also provide courses that tie the content and the pedagogy together and will require an aspect of classroom translation in the master's project.

Program Description

University of Utah
Masters of Science for Secondary School Teachers in Earth Sciences
03/28/2012, Revised 05/17/2012, 02/12/2013, 02/19/2013

Section I: The Request

The University of Utah requests approval to extend the disciplinary tracks of the existing Masters of Science for Secondary School Teachers (MSSST) degree to include a MSSST degree in Earth Sciences effective for students beginning in Fall 2012.

Section II: Program Description

Complete Program Description

The Masters of Science for Secondary School Teachers (MSSST) program was established by the College of Science in 1972 and offers degrees for secondary school teachers in Chemistry, Physics, Biology and Math (Teaching). The MSSST degree program is available to certified middle and high school teachers who have been teaching for a minimum of three years as a way to provide advanced training and fulfill Utah State Office of Education (USOE) endorsement requirements for science and mathematics.

The proposed Masters of Science for Secondary School Teachers in Earth Sciences degree will be offered in the Department of Geology and Geophysics, which is part of the College of Mines and Earth Sciences. The program consists of 34 hours of study: 23 hours are in core Geology, Physics and Chemistry courses, 5 hours are in science-based pedagogical courses, and 6 hours are for completion of a Master's project. The program meets the USOE requirements for endorsements in Earth Science and Physical Science for teachers who have the prerequisites of 1 year each of Chemistry and Physics. The program will be offered to cohorts of up to 25 teachers and will be designed to take into account USOE Science Core Curriculum concepts and content-based pedagogical methods. Courses will be given in the evenings during the academic year, and during the mid-summer months (mid-June to mid-August) to accommodate K-12 teaching schedules.

Purpose of Degree

The purpose of the Masters of Science for Secondary School Teacher in Earth Sciences degree is to: (1) provide teachers with advanced training in Earth and physical science concepts and methods, and (2) increase the number of highly qualified teachers teaching Earth Science, Physics and Chemistry. Currently, there is no other MS degree program that meets the USOE requirements for endorsements in Earth and physical science. Therefore, many teachers only take a minimum number of courses in these content areas in order to be endorsed. This program will provide teachers with a thorough grounding in the Earth and physical sciences through coursework and content-based pedagogical seminars, while affording them the benefits of completing a MS degree. Teachers will also engage in a scientific research experience that will serve as the foundation of their Master's project.

Institutional Readiness

Currently, the MSSST degree is being administered by the College of Science MSSST Steering Committee and managed through a partnership with the Center for Science and Mathematics Education (CSME). The traditional MSSST program allows teachers to design their own plan of study and independent research project. Difficulties with conflicting University and K-12 teaching schedules and the lack of a readily available support network resulted in only 97 applicants and 52 graduates during a 37-year period. In 2009, the Center for Science and Mathematics Education (CSME) developed cohort programs for MSSST degrees in Mathematics, Biology, and Chemistry. It graduated 17 teachers in Math (Teaching) in 2011, and is on track to graduate 26 teachers in Biology and Chemistry (Teaching) this fall. Another group of 25 teachers enrolled in the CSME MSSST Math cohort program this year and will graduate in 2013.

Due to the success of the cohort model and the management resources provided by the Center for Science and Mathematics Education, the College of Mines and Earth Science and Department of Geology and Geophysics have agreed to support the creation of the new MSSST degree in Earth Sciences by providing coursework, instructors, supervisory committee members and a presence on the MSSST Steering Committee. The MSSST Steering Committee has agreed to administer the program through its partnership with the Center for Science and Mathematics Education. The CSME will recruit participants, arrange the program of study, facilitate the creation of supervisory committees, track progress toward graduation, and provide general graduate advising. It is a practical arrangement considering that the CSME is already managing the other MSSST cohort programs.

The only potential impact on any undergraduate programs is a positive one in that courses offered to the Masters of Science for Secondary School Teacher in Earth Sciences cohort in the Department of Geology and Geophysics will also be made available to pre-service teachers in the Earth Science Teaching Composite undergraduate program.

Faculty

Because this is an interdisciplinary program, faculty will be drawn from multiple departments including Geology & Geophysics, Chemistry, Physics, Atmospheric Sciences, and the Urban Institute of Teacher Education within the College of Education. The main focus of the program, however, is Earth Science so faculty headcounts are included for the Department of Geology & Geophysics below. When feasible (and desirable), teachers will be taking regularly scheduled courses that are offered to the general population at the University. However, several of the necessary courses are not offered at a time teachers can take them (either after 4:00 pm during the school year or from mid-June to early August during the summer). Therefore, faculty will be recruited to teach special sections of the courses and will be compensated accordingly. As these courses will be offered through Academic Outreach and Continuing Education (AOCE), compensation will come directly from tuition. Since this amounts to an additional course per academic year semester, and two during the summer sessions, there is little impact on the participating department. Instructors have already been arranged for the majority of the courses.

Faculty Category	Faculty Headcount – Prior to Program Implementation	Faculty Additions to Support Program	Faculty Headcount at Full Program Implementation
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	23	0	23
Full-time Non-Tenured	7	0	7
Part-time Tenured			
Part-time Non-Tenured			
With Master's Degrees			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured			
With Bachelor's Degrees			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			
Part-time Non-Tenured			
Other			
Full-time Tenured			
Full-time Non-Tenured			
Part-time Tenured			

Part-time Non-Tenured			
Total Headcount Faculty			
Full-time Tenured	23	0	23
Full-time Non-Tenured	7	0	7
Part-time Tenured			
Part-time Non-Tenured			
Total Department Faculty FTE (As reported in the most recent A-1/S-11 Institutional Cost Study for "prior to program implementation" and using the A-1/S-11 Cost Study Definition for the projected "at full program implementation.")	30	0	30

Staff

The Center for Science and Mathematics Education will provide the necessary staff for the Masters of Science for Secondary School Teacher in Earth Sciences degree as part of its role in supporting the MSSST program:

- Dr. Holly Godsey, CSME Formal Science Education Manager and Assistant Professor (Lecturer) in the Dept. of Geology and Geophysics will serve as the program manager including developing the plan of study, coordinating with faculty advisors, communicating with the program evaluator, and teaching select courses.
- Dr. Louisa Stark, Faculty Associate of the CSME, Clinical Professor in the College of Education, and Director of the Genetic Science Learning Center, will provide pedagogical training, conduct seminars, coordinate with faculty from the College of Education and consult on program design and progress.
- Marcia Cook, CSME Accountant, will manage all of the financial aspects of the program including collecting tuition, coordinating with the USOE on state funding, and paying instructors.
- Alison Jarrett, MSSST Program Coordinator, will oversee the admissions process, track graduate student progress, communicate with participants regarding forms, policies and procedures, assist in setting up courses, and serve as the liaison to the Graduate School.
- Oversight will be provided by the Dept. of Geology & Geophysics and the MSSST Steering Committee.

Library and Information Resources

No special resources are needed.

Admission Requirements

The admission requirements for the MSSST Earth Science program are:

- A BS degree from a regionally accredited college or university.
- A minimum 3.00 undergraduate weighted mean GPA.
- Must have been teaching in a scientific discipline for at least three years in a secondary school.
- Recommendation from their school principal.
- Additional suggested prerequistes: 1 year of Chemistry and 1 year of Physics.

Student Advisement

As this is a cohort program, all of the students will follow the same plan of study designed by the program personnel (see section VI below). Academic progress will be tracked by the MSSST Program Coordinator and the Program Manager will advise in the case of inadequate performance. Students will be assigned advisors from the Department of Geology and Geophysics to guide them through their Master's projects. Supervisory committees will consist of at least one tenure-track faculty member from the Department of Geology and Geophysics, and two additional members from the College of Mines and Earth Sciences, the College of Science, or the College of

Education. Information on classes, University requirements, master's project expectations and other issues will be given at monthly cohort meetings that will serve as an informal means of advising and supporting the teachers. Cohort meetings have been an integral part of the success of the current MSSST Biology and Chemistry program and also serve as a professional learning community for the teachers where scientific topics, pedagogy and other classroom issues are discussed.

Justification for Graduation Standards and Number of Credits

The program consists of 34 hours of study: 23 hours are core Geology, Physics and Chemistry courses, 5 hours are science-based pedagogical courses, and 6 hours are required for completion of a Master's project. The program also meets the USOE requirements for endorsements in Earth Science and Physical Science for teachers who have the prerequisites of 1 year each of Chemistry and Physics. The program also meets the requirements for an endorsement in Physics for those students who have already taken calculus. In order to graduate, teachers must have satisfactory performance as defined by the Graduate School in 30-36 credits of courses approved by the supervisory committee. Six credits must be for original work in the form of a project.

External Review and Accreditation

Dr. Mary Burbank, Director of the Urban Institute for Teacher Education, and Dr. Margarita Cummings from the Jordan School District (currently with the CMSE) were involved in the conception of the MSSST cohort program. Dr. Melissa Goldsmith from the College of Education, served as an evaluator for both the MSSST Math and MSSST Biology/Chemistry cohort programs and her data were used in designing the Masters of Science for Secondary School Teacher in Earth Sciences degree. Shannon Buchanan, Science Education Specialist for the Utah State Office of Education was also highly involved in establishing the area of need (Earth and physical science teachers). The CSME will work with the USOE to ensure that endorsement criteria are met using the processes that are in place for the MSSST Math and MSSSST Biology/Chemistry programs.

Projected Program Enrollment and Graduates; Projected Departmental Faculty/Students:

Data Category	Current – Prior to New Program Implementation	Projected Year 1	Projected Year 2	Projected Year 3	Projected Year 4	Projected Year 5
Data for Proposed Program						
Number of Graduates in Proposed Program	X	16	16	16	16	16
Total # of Declared Majors in Proposed Program	X	16	16	16	16	16
Departmental Data – For All Programs Within the Department						
Total Department Faculty FTE (as reported in Faculty table above)	30	30	30	30	30	30
Total Department Student FTE (Based on Fall Third Week)	185	201	201	201	201	201
Student FTE per Faculty FTE (ratio of Total Department Faculty FTE and Total Department Student FTE above)	6.2	6.7	6.7	6.7	6.7	6.7
Program accreditation-						

required ratio of Student FTE/Faculty FTE, if applicable: (Provide ratio here:_____ __)						

Expansion of Existing Program

The Masters of Science for Secondary School Teacher in Earth Sciences program is an additional disciplinary track of the existing MSSST degree program. Enrollment statistics are as follows:

Program	Years	Discipline	Enrolled (projected)	Graduated (projected)
MSSST Program (Independent)	1972-2009	All available (Physics, Chemistry, Biology, Math)	97	52
MSSST Program (Independent)	2009-present	All available (Physics, Chemistry, Biology, Math)	6	(6)
MSSST Cohort Program	2009-2011	Math	19	17
MSSST Cohort Program	2010-2012	Biology and Chemistry	27	(26)
MSSST Cohort Program	2011-2013	Math	24	(24)
MSSST Cohort Program	2012-2014	Earth and Physical Science	(16)	(16)

Section III: Need

Program Need

In 2011, the Utah State Office of Education (USOE) identified a pressing need to increase the number of teachers qualified to teach Earth and Physical Sciences[1]. In addition, the USOE is in the process of revising the Earth Systems Core Curriculum into an Earth Science curriculum. The goal is to move from a descriptive format to one based on scientific inquiry and integration of the various scientific disciplines that contribute to the field of Earth Science. These higher-level concepts will require a deeper understanding in order to be taught effectively. Currently, the majority of teachers teaching Earth Systems have endorsements in Environmental Science, which only requires a single course in geology. Further, most Earth Systems teachers have an undergraduate degree in Biology, General Science or Science Education. These teachers will need much deeper content development to be successful with an enhanced Earth Science curriculum. A true understanding of the Earth and its systems requires a much more rigorous background in geologic and physical processes. For these reasons, we are proposing to add an Earth Sciences track to the existing Masters of Science program for Secondary School Teachers that will provide a solid grounding in geology while also integrating physics, chemistry and biology.

Labor Market Demand

Earth Science, Geology, Middle Level Science, and Physics range from 3.2 to 3.6 (the highest current ranking is 4.0 (Special Education)) on the Teaching Field Index of Criticality. This implies that demand for teachers that are qualified to teach these subjects is high and job placement should not be a problem. Additionally, with the changes in the USOE Core Curriculum to develop a new Earth Science course and move it to a more experience-based science, the demand for such courses will grow and therefore so will the need for more teachers.

Student Demand

When the program was announced by the USOE for feedback from teachers, over 40 responded that they would be interested in participating.

Similar Programs

To our knowledge, no other USHE institution offers a MS degree in Earth Sciences for practicing teachers. There are programs for pre-service (undergraduate) teachers and MEd or MAT degrees offered by colleges of education but none require the rigor of a science-based master's project and advanced scientific coursework. Our hypothesis is that by engaging teaching in authentic research activities with their master's project, they will be better prepared to teach scientific process to their students. We will also provide courses that tie the content and the pedagogy together and will require an aspect of classroom translation in the master's project.

Collaboration with and Impact on Other USHE Institutions

While we have no plans to collaborate as this time with other institutions, there may be opportunities to do so based on experiences with the current MSSST program. For example, the MSSST Biology/Chemistry cohort needed to take a Cell Biology course with a laboratory component that was not available at the University of Utah. Therefore, we contracted with an instructor at Salt Lake Community College for the course. Also, one of the MSSST Chemistry teachers will be working with a professor at BYU for her master's project, an arrangement that will benefit all involved parties. We also foresee opportunities for combined professional development workshops with other local institutions.

Benefits

The University of Utah will benefit from this program by having the opportunity to train the teachers who will directly influence the pipeline of students that the University hopes to attract. Better science teaching in the schools by teachers who have had positive experiences at the University of Utah will lead to more students pursuing STEM disciplines at the U and elsewhere. The University is deeply committed to STEM education and has demonstrated this commitment by supporting the creation of the Center for Science and Mathematics Education (CSME), a joint effort by the College of Science and the College of Education. The mission of the CSME is to build programs, provide resources, and foster partnerships between academia and the community at large that promote understanding and enthusiasm for science and mathematics. The CSME provides exemplary teacher education programs based on research on best practices and develops programs in science and mathematics that aim to increase the recruitment and retention of students in STEM areas. The University will also benefit by engaging its science faculty with professional teachers who have experience with pedagogical methods and who are constantly thinking of ways to communicate effectively with students.

Consistency with Institutional Mission

The Masters of Science for Secondary School Teacher in Earth Sciences degree will help the University of Utah fulfill its mission to serve the people of Utah through the dissemination of knowledge by teaching and community engagement. The MSSST program facilitates this goal both by providing instruction to secondary teachers and through the instruction that these teachers will, in turn, provide their students. In its role as teaching institution, the University commits itself to providing challenging instruction for all its students and encourages interdisciplinary work and the integration of instruction and research opportunities. It expects and rewards superior teaching and academic excellence among its faculty. The Masters of Science for Secondary School Teacher in Earth Sciences degree will facilitate this goal through the very nature of the program content. Also, it is likely that the teaching skills of the science faculty will be improved by working with professional teachers in addition to improving the science content knowledge of the teachers. In its role as contributor to public life, the University's faculty, staff, and students are encouraged to contribute time and expertise to community and professional service. The Masters of Science for Secondary School Teacher in Earth Sciences degree allows for faculty to engage in K-12 education in a very meaningful and lasting way.

Finally, the President of the University has explicitly stated that that the University should make it a priority to reclaim its place in the state of producing the highest quality teachers of science in numbers that are significant. Prior to the MSSST cohort program, approximately two teachers a year were graduating with a higher-level degree in the sciences. With this program, we can significantly and positively impact those numbers.

Section IV: Program and Student Assessment

Program Assessment

The goals of the Masters of Science for Secondary School Teacher in Earth Sciences degree are:

- To enhance and deepen the content knowledge of practicing Earth and physical science teachers in a manner that recognizes the professional goals of the teachers and is relevant to the USOE Core Curriculum Standards.
- To increase the number of teachers qualified to teach Earth and physical science courses.
- To provide meaningful instruction to teachers while simultaneously providing the benefits of a graduate degree and USOE-accredited endorsements.
- To support a professional learning community of Earth and physical science teachers who work and learn together while sharing ideas and best practices.
- To provide opportunities for professional development through seminars, workshops, interactions with faculty, and lab and field experiences.

Expected Standards of Performance

By the time teachers complete this program they should:

- Understand scientific concepts in a way that enables effective teaching of those concepts.
- Understand the interdisciplinary nature of science.
- Develop an appreciation for how we know what we know in science.
- Be able to engage in independent inquiry and project development that will be translated into their classroom environments.

Standards and compentencies where chosen in part from the National Science Education Standards for Earth, Physical and Space Science[2].

Means of Assessment:

- Teachers will take the Praxis II Test 0571 - Earth and Space Science: Content Knowledge at the beginning and end of the program as a measure of change in content knowledge.

- Course evaluations will be gathered and summarized for each of the program courses with particular attention paid to the special topics courses.
- Student grades will be evaluated to determine if students are making adequate process and if the courses are at the appropriate level for the participants.
- Surveys of participants' teaching confidence levels, approaches, and attitudes will be given throughout the program.
- Mid-course reflection sessions will be held once per semester during the monthly cohort meetings to evaluate program effectiveness, progress toward goals, attitudes of participants, etc.
- An annual report will be produced in August 2013 and distributed to all stakeholders including the College of Science, College of Mines and Earth Science, College of Education, Department of Physics, Department of Geology & Geophysics, the USOE, and the USHE.
- A final report will be produced at the completion of the program (Fall 2014) and similarly distributed.

Both formative and summative assesment criteria will be designed in collaboration with our program evaluator from the College of Education.

Section V: Finance

Budget

5-Year Budget Projection						
Departmental Data	Current Budget—Prior to New Program Implementation[a]	Year 1	Year 2	Year 3[e]	Year 4	Year 5
Personnel Expense						
Salaries & Wages-Instructors[b]		26,000	30,000	0	26,000	30,000
Salaries & Wages-Evaluator[c]		7,000	7,000	15,000	7,000	7,000
Salaries & Wages-CSME Staff Coordinator (0.1 FTE)[d]		5,000	5,000	5,000	5,000	5,000
Benefits (36%)		13,680	15,120	7,200	13,680	15,120
Total Personnel Expense		51,680	57,120	27,200	51,680	57,120
[a]No budget is included here because the Geology & Geophysics department budget will not be impacted. [b]Instructors are paid $2000 per credit hour for a course. [c]The Evaluator's duties will be the greatest in year three when coursework is completed. [d]A CSME staff person will be paid to coordinate the MSSST cohort. [e]Note that there are no instructor salaries incurred in year 3 because participants will be doing their research internships and registering for project hours only.						
Non-personnel Expense						
Travel						
Capital						
Library						
Current Expense						
Other – AOCE course charge		2,560	1,920	640	2,560	1,920
Other expenses- Workshops, speaker honorariums, refreshments, poster session, supplies		6,000	10,000	500	6,000	10,000
Total Non-personnel Expense		8,560	11,920	1,140	8,560	11,920
Total Expense (Personnel + Current)	$	$60,240	$69,040	$28,340	$60,240	$69,040
Departmental Funding		Year 1	Year 2	Year 3	Year 4	Year 5
Appropriated Fund						
Other:						
Special Legislative Appropriation						
Grants and Contracts						
Special Fees/Differential Tuition	0					
Tuition ($300 per credit hour)		62400	72000	28800	62400	72000
Total Revenue	$	$62,400	$72,000	$28,800	$62,400	$72,000
Difference						
Revenue - Expense	$	$2,160	$2,960	$460	$2,160	$2,960

Departmental Instructional Cost/Student Credit Hour* (as reported in institutional Cost Study for "current" and using the same Cost Study Definition for "projected")	$170.00	$170.00	$170.00	$170.00	$170.00	$170.00

*Projected Instructional Cost/Student Credit Hour data contained in this chart are to be used in the Third-Year Follow-Up Report and Cyclical Reviews required by R411.

Funding Sources

The primary source of funding for the Masters of Science for Secondary School Teacher in Earth Sciences degree is the money generated through tuition.

Reallocation

No funds will be reallocated for this program.

Impact on Existing Budgets

Since the program is entirely funded through tuition, there will be no impact on existing budgets.

Section VI: Program Curriculum

This is a sample curriculum for the cohort beginning in 2012. Some courses may vary depending on participants' background and needs:

Course Prefix & Number	Title	Credit Hours
Required Courses		
GEO 6920-1*	Global Geophysics for Teachers	3
GEO 6920-2* or MET E 5015	Earth Materials for Teachers *or* Global Influence of Metals for Teachers	3
GEO 6920-3*	Field Geology for Teachers	3
GEO 6920-4*	Paleobiology for Teachers	2
GEO 6470	Stable Isotope Ecology	3
GEO 6970	Thesis hours	6
ASTRO/PHYS 69XX*	Modern Physics for Teachers	3
ATMOS 5400	The Climate System	3
CHEM 5380*	Applied Chemistry for Teachers	3
EDU 6950-2*	Earth and Physical Science Teaching Seminar	2
EDU 6950	Multi-cultural Science Education	3
Total Number of Credits		34
**Course will be set up as "Special Topics"*		

New Courses to Be Added in the Next Five Years

Although seven courses will need to be added for this program, all of the new courses will be designed as "special topics" courses for the Masters of Science for Secondary School Teacher in Earth Sciences degree. All of these courses are based on currently existing courses but their primary purpose will be to enhance the depth of content knowledge of teachers within the context of what they are expected to teach. Additional material will be

added to each content-based course that involves subject-specific teaching methods. Courses will be open to non-cohort members as well and may be of appeal to the pre-service teachers in the Earth Science Teaching Composite (undergraduate) program or any science teacher. Faculty instructors have already been arranged for all but two of the below courses and instructors for those courses will be confirmed by May. The Earth Materials course will be taught in conjunction with faculty from Metallurgical or Mining Engineering and will contain a component of resource sustainability.

Semester	Course Prefix and Number	Course Title	Credit Hours
Summer 2012	CHEM 5380	Applied Chemistry for Teachers	3
Spring 2013 and Spring 2014	EDU 6950	Earth and Physical Science Teaching Seminar	2
Summer 2012	GEO 6920-1	Global Geophysics for Teachers	3
Fall 2013	ASTRO/PHYS 69xx	Modern Physics for Teachers	3
Spring 2013	GEO 6920-2	Earth Materials for Teachers	3
Summer 2013	GEO 6920-3	Field Geology for Teachers	3
Spring 2014	GEO 6920-4	Paleobiology for Teachers	3

Program Schedule

Below is a suggested program schedule for the cohort starting in 2012. Alterations and substitutions may be made based on participants' backgrounds and needs:

Semester	Course	Credit
Su 2012	CHEM 5380 Applied Chemistry for Teachers	3
	GEO 6920-1 Geophysics for Teachers	3
Fall 2012	ATMOS 5400 The Climate System	3
Sp 2013	GEO 6920-2 Earth Materials for Teachers MET E 3015 Global Influence of Metals	3
	EDU 6950 Earth and Physical Science Teaching Seminar 1	1
Su 2013	GEO 6470 Stable Isotope Ecology	3
	GEO 6920-3 Field and School Yard Geology for Teachers	2
	EDU 6950 Multicultural Science Methods	3
Fall 2013	ASTRO/PHYS 69xx Modern Physics for Teachers	3
Sp 2014	GEO 6920-4 Paleobiology for Teachers	3
	EDU 6950 Earth and Physical Science Teaching Seminar 2	1
Su 2014	GEO 6970 Master's Project hours	6
	Total Credits	34

Section VII: Faculty

- Charles H. (Butch) Atwood, Ragsdale Professor of Chemical Education, Dept of Chemistry
- Mary Burbank, Director, Urban Institute for Teacher Education
- David S. Chapman, Dean Emeritus of the Graduate School; Distinguished Professor, Dept. of Geology and Geophysics.
- David B. Kieda, Chair and Professor, Dept. of Physics
- Holly S. Godsey, Asst. Professor (Lecturer), Dept. of Geology and Geophysics; Formal Science Education Manager, Center for Science and Mathematics Education
- Michael S. Moats, Assoc. Professor, Dept. of Metallurgical Engineering
- Barbara P. Nash, MSSST Committee Member; Professor of Geology and Geophysics
- Mike Nelsen, Chair and Professor, Dept. of Mining Engineering
- Clayton S. Pierce, Research Asst. Professor, Urban Institute for Teacher Education
- Tom Richmond, MSSST Committee Member; Assoc. Professor of Chemistry
- Jon Seger, MSSST Committee Member; Professor of Biology

- Louisa A. Stark, Clinical Professor, Urban Institute for Teacher Education; Director, Genetic Science Learning Center
- Courtenay Strong, Assistant Professor, Dept. of Atmospheric Sciences
- Peter Trombi, Chair of the MSSST Committee; Professor of Mathematics

References

[1]Teaching Field Index of Criticality for Utah, T.H. Bell Teaching Incentive Loan Program, 2011.

[2]National Research Council. National Science Education Standards for Earth, Physical and Space Science. Washington, D.C.: The National Academies Press, 1996.