

**Masters of Science Teaching Science – General Science
Portland State University - Center for Science Education**

1.0 Program Background

About the Master’s of Science Teaching in General Science Degree (MST)

The goal of the Master’s of Science Teaching Degree is to advance the use and understanding of science inquiry through an active research program. Graduate students work with faculty advisors to develop and carry out an assessment based research agenda. Several scholarship pathways are open to MST graduate students, including citizen science, service learning and research based science learning. MST graduate students have the opportunity to work with students at various grade levels, from kindergarten to undergraduate college students. In addition to research, MST students take both graduate level science and education courses. The MST is administered within flexible guidelines to match the needs of students with varying backgrounds and professional plans. For more information contact: Jennifer Wells at 725-8345 or e-mail wellj@pdx.edu.

About the Center for Science Education

The Center for Science Education (CSE) exists to enhance science teaching and understanding through innovative education, research and community outreach programs. These programs have been successful in gaining national support from such prestigious organizations as the National Science Foundation, the Environmental Protection Agency and the U.S. Department of Education. Graduate students in the MST program participate in and contribute to these programs through their scholarship. Past graduate students have had the opportunity attend and present their research at the “International Conference on Service Learning.” The CSE’s pedagogy follows an inquiry process that challenges students to develop new ways of viewing science education. Students are expected to carry these techniques back to the community, thereby creating more knowledgeable students with a greater capacity for inquiry and a better informed citizenry.

Who should enroll?

This program is suited to persons who are: current and future teachers desiring to enhance science teaching skills or individuals interested in science interpretation for the general public. Prospective applicants do not need an undergraduate science degree. Each applicant’s transcripts and life experiences are evaluated individually. Please note that an MST does not lead to an Oregon State teaching certificate.

2.0 Admission to the Program

University Requirements

Prospective students must be admitted into the Portland State University graduate program. Requirements for admission are found in the most current PSU Bulletin and include, but may not be limited to the following submissions:

- The University application form
- The application fee
- One official transcript from every college or university attended (except PSU), including junior colleges and community colleges

Program Entrance Requirements

All applicants to the MST program must have a Bachelors of Science or Arts degree from an accredited college. Students do not need an undergraduate degree in science, but it is beneficial. Those students lacking a suitable background in science will be expected to take supplemental science courses. A minimum of 12 credits of 100/200 level science laboratory classes is required. Additionally, students meeting only the minimum science requirement may be asked to take additional upper division science courses the first year of their MST program. The MST Committee makes this decision. Students must maintain a B average in courses taken to fulfill the prerequisite requirements and receive a B or better in courses taken towards their MST degree. Students must provide the information in Table One 90 days prior to their starting term. Due to a limited number of advisors, it is best to apply as soon as possible. It is the student's responsibility to periodically check with the Center for Science Education to insure their file is complete. A card will be sent to students when all the appropriate materials have arrived. All correspondences and application materials should be sent to: **Portland State University, Center for Science Education, P.O. Box 751, Portland, Oregon 97221.**

The CSE adheres to the Office of Admissions' graduate student policies regarding admission, enrollment policies, credit regulations, academic standing, and academic honesty. Students should also familiarize themselves with the General Requirements for Graduate Degrees, as laid out in the Portland State University Bulletin.

Table One: General Requirements for Admission to the MST Program

- One official transcript from every college or university attended, including PSU, junior colleges and community colleges
- Resume
- Letter of Intent: Entering the MST Program requires forethought, including an understanding of student goals and how they can be met through the MST program. These thoughts should be laid out in a one to two page letter of intent.
- Departmental Application Form
- Two letters of recommendation from a faculty member, community partner and/or workplace associate. The person writing the letter of recommendation should include how long they have known the applicant and in what context. Skills they may wish to address are: Leadership Skills, Initiative/Motivation, Written Communication Skills, Oral Communication Skills, Scholastic Achievement in Field, Group Process Skills, Creativity, Responsibility and Teaching Skills (if pertinent).
- GRE Scores (Beginning the 2003/2004 academic year)

3.0 Acceptance to the Program

The MST is open to all students who meet the academic prerequisites addressed here. Due to the limited number of advisors available, not all students that apply and meet the acceptance criteria may be accepted for a particular start date. Once the student has completed the application procedure, their materials will be reviewed. They will be notified of their status within 60 days. Students will be accepted as regular, conditional or deferred.

REGULAR STATUS: Those students meeting all prerequisites for the program with appropriate science background, GPA, recommendations, and program goals.

CONDITIONAL STATUS: A “conditional status” may be given to those students with academic deficiencies, including a low GPA or a weak science background. The committee will provide students with recommendations for upgrading their status to regular. Students accepted as “conditional” are still eligible for departmental assistantships. Students must notify the department and provide transcripts when they have met the requirements to upgrade their status to “regular.”

DEFERRED STATUS: A “deferred status” may be given to those students with academic deficiencies, including a low GPA or an inadequate science background. The committee will provide students with recommendations for upgrading their status to regular. Students meeting all program admissions requirement may also receive a “DEFERRED STATUS” if the program has

reached maximum enrollment and an advisor is not available. Students accepted as “deferred” are not eligible for departmental assistantships.

After acceptance by the CSE, a copy of the student’s acceptance letter is forwarded to the Office of Admissions and Records. Following confirmation of eligibility by the Office of Admissions and Records, students are free to start the program. The Office of Admissions and Records determines residency status, calculates applicable grade point averages, and verifies that an accredited institution awarded the student’s baccalaureate degree. The Office of Admissions and Records will notify the student as to whether or not their eligibility was confirmed.

Selecting An Advisor

Upon acceptance into the MST Program, students will receive in their acceptance letter the name of a faculty member interested in working with them. It is the responsibility of the student to contact the professor and set up an interview date. Students are free to change advisors, once they have decided on a research focus.

4.0 Financial Aid

Graduate Assistantships and other forms of financial aid may be available depending on departmental funding. Please fill out the Free Application for Federal Student Aid, available in the Financial Aid Office. The CSE attempts to provide funding for as many of its graduate students as possible. CSE graduate assistants work at the university level as teaching assistants or assessment specialist, while others work in the schools, supporting CSE community based education projects. Those students, who are funded, usually receive tuition remissions and campus office space, as well. At present, the CSE has funding available for the 2002-2003 school year.

5.0 MST Program Guidelines for Faculty and Students

Thesis: The MST degree requires a thesis. This is to be a piece of original work in the field of science education on a topic of mutual interest to the student and the student’s advisor. The purpose of the thesis is to synthesize different elements of the student’s coursework, to develop communication and presentation skills required for professional work and to demonstrate an understanding of research design and methodology. Students may take more than six thesis credits but only six apply towards the MST degree. Recent student research projects include “Wetlands Education as a Service Learning Opportunity” and “Science Education for At-risk Youth Performing Non-native Invasive Plant Recognition and Removal at a Regional Park.”

Course Work: A minimum of 45 credits are required to graduate with an MST degree. The university requires students to take 24 science and nine education credits. The list of courses taken by the CSE-MST students to meet both the university and department requirements are listed below. The two part Research Based Learning (I and II) classes are four credits each, taken in a student's first two terms at PSU and make up eight of the student's 24 science credits. RBL I and II are required for all CSE-MST students. The other 16 science credits are selected at the discretion of student and advisor.

CSE-MST Requirements	Credits
<ul style="list-style-type: none"> • <u>Science</u> <ul style="list-style-type: none"> ○ Prefix: BI, CHEM, ESR, PHYS, GEOL, approved GEOG and by arrangement SCI ○ SCI 510: Researched Based Learning I and II (Fall and Winter terms of first year) 	16
<ul style="list-style-type: none"> ○ SCI 510: Researched Based Learning I and II (Fall and Winter terms of first year) 	8
<ul style="list-style-type: none"> • <u>Thesis</u> <ul style="list-style-type: none"> ○ SCI 503 	6
<ul style="list-style-type: none"> • <u>Education</u> <ul style="list-style-type: none"> ○ SCI 507: Seminar ○ Education (select from CSE Grad Education Courses Listed Below) 	3
	6
<ul style="list-style-type: none"> • <u>Electives</u> 	6
Total	45

CSE Grad Ed Courses	Credits	CSE Faculty Instructor
Diversity (W)	3	Linda George
ESR 570: Environmental Education (Sp)	3	Marion Dresner
ASC 510: Assessment (F/W/SP/Su)	2-3 each	Bill Becker
SCI 510: Forging Community Partnerships: Program Development/Grant Writing (Sp)	3	Julie Smith/ Tom Ralley

Center For Science Education Course Offerings

SCI 507 MST Seminar: The CSE graduate/faculty seminar serves as an important setting in which to read and discuss the professional literature, host speakers, report on CSE projects, explore thesis ideas, & present ongoing as well as finished graduate and faculty work. It is expected that graduate students attend and participate in the graduate/faculty seminar as a key part of their professional education even though credit is earned only during the first year of graduate study.

SCI 510 Forging Community Partnerships: A key element both the University and the Center For Science Education is service learning. This course presents the CSE model for program and curriculum development through service and community partnerships.

SCI 510 Research Based Learning:

Fall Term: Research Based Learning I. Students are exposed to science inquiry as they learn science by doing science. Working with faculty, students experience the methods and processes of scientific inquiry, including experimental design, the recording, quantification, and interpretation of observations and the effective communication of results.

Winter Term: Research Based Learning II. Students learn to design, implement and assess Research Based Learning in a classroom setting.

ESR 570 Environmental Education: An overview of the purpose and scope of environmental education. Provides an educational framework and examples of a variety of sites where environmental education is practiced. Specific examples of teaching strategies, materials and methods will be presented. Students will be expected to carry out a site-based project utilizing some of the materials developed in class.

SCI 503 Thesis: Offered in all terms.

ASC 510 Assessment: This course is designed for graduate students who become involved in PSU’s campus wide “Assessment Initiative”, but is open and beneficial to all students interested in assessing student learning. Students may take any one or all of the Assessment courses offered. Assessment I is not a prerequisite for Assessment II, etc.

Fall Term: ASC 510 Academic Assessment I. Topics covered: background literature, concepts and terminology of assessment, measurable student learning outcomes, strategies for assessing students learning, designing departmental assessment plans, qualitative and quantitative methods of assessment

Winter Term: ASC 510 Academic Assessment II. Topics covered: development of assessment measures, use of technology in assessment, grading vs. assessment, survey development, interview techniques, portfolios, assessing writing and critical thinking, assessing learning environments

Spring Term: ASC 510 Academic Assessment III. Topics covered: qualitative and quantitative data analysis, scoring student work samples, validity and reliability of assessment measures, using assessment results for program improvement, assessment as scholarship

SCI 410/510 Diversity and Equity Issues in Science/Science Education: This course will explore the persistent under-representation of women and minorities in the sciences and engineering. A growing body of scholarship indicates that the demographic characteristics of the practitioners of science have implications for the way science is done and how it is used. Thus it is critical for science educators to become aware of the roles they play in shaping the population of future generations of scientists. We will examine the factors that effect diversity in the sciences by 1.) understanding the demographic characteristics of scientists and engineers in the US and globally, and how the science and engineering "pipeline" has changed over time, 2.) analyzing research that attempts to investigate the underlying causes for the disproportionate representation of women and minorities in science and engineering and 3.) examining intervention programs and pedagogical approaches that attempt to address diversity and equity issues in science.

Sample Plan of Study for CSE - MST Students*

Year	Fall	Cr	Winter	Cr	Spring	Cr
1	Researched Based Learning (SCI 510)	4	Researched Based Learning (SCI 510)	4	Seminar (SCI 507)	1
	Seminar (SCI 507)	1	Seminar (SCI 507)	1	Wetlands Ecology (ESR 524)	4

	GIS I (GEOG 588)	4	GIS II (GEOG 592)	4	Grant Writing (Urban St 538)	3
					Directed Readings (SCI 505)	1
2	Thesis (SCI 503)	1	Diversity (SCI 510)	3	Environmental Ed (ESR 570)	3
	Geology of Oregon Country (GEOL 552)	4	Thesis (SCI 503)	2	Thesis (SCI 503)	3
	Project (SCI 506)	4	Environmental Geology (GEOL 561)	4	Watershed Hydrology (ESR 525)	4

*Note: this is not a recommended plan of study, only a sample plan that meets both the university and department requirements.