



TEXAS TECH
UNIVERSITY
College of Education

Multidisciplinary Science Master of Science
Middle School Math and Science (MS)² Concentration
Program Handbook

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Curriculum and Instruction

Multidisciplinary Science Master of Science Middle School Math and Science (MS)² Concentration

Program Overview

The main goal of the (MS)²: Understanding by Design program is to prepare and increase the number of highly qualified in-service middle school mathematics and science teachers to become well developed in content knowledge. Through participation in this program, teachers will thrive in an interdisciplinary environment through their experiences in novel learning communities encompassing a team of mathematics and science teachers as well as university STEM (science, technology, engineering, and mathematics) and education faculty. During this six-year endeavor, 100 (MS)² participants will engage in:

1. Tailored professional development experiences as well as STEM and education courses.
2. Community building between Texas Tech University STEM and education faculty, and in-service mathematics and science teachers.
3. Collaborative design and implementation of integrated STEM modules.
4. Grant proposal writing and manuscript productions suitable for publication in STEM-based education journals (e.g., *National Science Teachers Association* and *National Council of Teachers of Mathematics*).
5. Development of cyber-enabled support network and dissemination platforms for statewide outreach.

The course of study is designed for one middle school math teacher and one middle school science teacher to partner in study including writing curriculum. Partners should be from the same school but a partner from the same district is an acceptable alternative.

Please note: This Middle School Math and Science concentration is different from the similar multidisciplinary science master of science degree coordinated by Dr. Ratna Narayan. The primary difference is that the (MS)² concentration course of study is hybrid: 50 percent online and 50 percent face-to-face.

Contact

Jennifer A. Wilhelm, PhD, is the principal investigator for the Greater Texas Foundation grant that supports this master's degree. She is also an associate professor in the College of Education. Sharon Smith is the project program coordinator. Her email is: Sharon.Smith@ttu.edu; telephone: 806.742.1997, ext. 271. The program's Web site is: <http://www.ttumssquare.org/>

Graduate Faculty

Dr. Jennifer Wilhelm is an associate professor in the program area of Science and Mathematics Education at Texas Tech University. She holds an MS in physics from Michigan State University and a PhD in mathematics/science education from the University of Texas. She joined the faculty of Texas Tech in 2002. She is currently the program coordinator for the Science and Mathematics Education Program. She teaches EDSE 5377: Science Curriculum and Instruction in Education for the Middle School Math/Science (MS)² multidisciplinary science master's degree.

Dr. Zenaida Aguirre-Munoz is an associate professor in the Bilingual Education and Diversity Studies program within the Curriculum and Instruction department of Texas Tech University's College of Education. She received her PhD in psychological studies in education from the University of California, Los Angeles. Aguirre-Munoz joined the Texas Tech faculty in 2004 and is the assistant director for the Center for Leadership in Education. She teaches EDCI 6306: Instructional Modifications for Universal Access to Mathematics and Science for the (MS)² multidisciplinary science master's degree.

Dr. Mary Baker is an associate professor of electrical engineering in the Edward E. Whitacre Jr. College of Engineering at Texas Tech University. Her BS in engineering physics was earned at the Texas Tech University in 1983; MS in applied physics at Texas Tech University in 1985, and PhD in electrical engineering at The University of Texas at Arlington in 1988. She teaches ENGR 5300: Integrating Math, Science, and Technology in the Context of Engineering for the (MS)² multidisciplinary science master's degree.

Dr. Dominick Casadonte is a Minnie Stevens Piper Professor and chair of the Department of Chemistry and Biochemistry at Texas Tech University. After receiving an undergraduate degree in chemistry from Case Institute of Technology of Case Western Reserve University (1973, with honors), Dr. Casadonte earned an MS degree (physical chemistry) and PhD (inorganic chemistry) from Purdue University in 1985. He did postdoctoral work at the University of Illinois in the laboratories of Ken Suslick and Ted Brown. In 1988, Dr. Casadonte was awarded one of the first ten Scholar/Fellow Awards given by the Dreyfus Foundation to work with Noel Kane-Maguire at Furman University for the 1988-89 academic year. He began his academic career at Texas Tech University in fall 1989. He teaches CHEM 5360 and 5361: Conceptual Chemistry for Teachers, I and II for the (MS)² multidisciplinary science master's program.

Dr. Jerry Dwyer has a BA in mathematical sciences, an MSc in computer science and a PhD in applied mathematics, all from University College Cork, Ireland. His dissertation work was in numerical methods for PDEs, with applications in mechanics. Dr. Dwyer worked for many years in computational mechanics related to fracture, composite materials, and glaciology. In recent years he has focused his work on issues of math education and developed a range of K-12 outreach projects at the University of Colorado and the University of Tennessee before arriving at Texas Tech as an assistant professor in fall 2003. He teaches MATH 5360 and 5361: Advanced Math and Statistics for Teachers, I and II.

Dr. David Lamp teaches courses on 'how to teach science' for pre-service teachers mainly at the primary level. Dr. Lamp also presents many workshops on using inquiry in the teaching of science for in-service teachers at all grade levels, as well as teaches courses on physics and astronomy for the Multidisciplinary Master of Science program. He received his PhD in physics from the University of Missouri in 1984, and joined the Texas Tech faculty in 1988. He teaches PHYS 5371: Conceptual Physics for Teachers in Physics for the (MS)² multidisciplinary science master's degree program.

Dr. Mark McGinley is an associate professor with a joint appointment in Texas Tech's Honors College and the Department of Biological Sciences. Originally from Thousand Oaks, California, he earned a BA in zoology from University of California, Santa Barbara, an MS in biology from Kansas State University, and a PhD from the University of Utah. Dr. McGinley began at Texas Tech in 1991 and joined the Honors College in 2005 where he is heavily involved in the Natural History and Humanities (NHH) degree. Dr. McGinley has scholarly interests in plant and animal ecology, science education, environmental issues, and marine conservation. He teaches BIOL 5311: Ecology for Teachers for the (MS)² multidisciplinary science master's degree.

Dr. Lou Densmore received his BS and MS from the department of Biology, University of Houston. He received his PhD from the Louisiana State University Health Sciences Center. He did post-doctoral research in molecular biology at the University of Michigan. He has been at Texas Tech in the department of Biological Sciences since fall 1985. His classes in molecular biology and biology of animals are offered at TTU's Lubbock campus, and field herpetology classes are given at Junction campus. He teaches BIOL 5312: Cell and Molecular Biology for Teachers in Biological Sciences for the (MS)² multidisciplinary science master's degree program.

Dr. Gregory Gellene holds a BS in interdisciplinary studies from Georgetown University, 1979; MS (1983) and PhD (1984) in chemistry from Cornell University. He is a professor and associate chair of physical chemistry in the department of Chemistry and Biochemistry at Texas Tech University. He teaches CHEM 5360 and 5361: Conceptual Chemistry for Teachers, I and II in the (MS)² multidisciplinary science master's degree program.

Dr. Victoria Howle received a BA in English literature from Rutgers University in 1988. After working for a number of years as a technical writer at several software companies, she returned to school to study mathematics. She received her MS in 1998 and Ph.D. in 2001 from the Center for Applied Mathematics at Cornell University. Dr. Howle's research is in applied mathematics with a focus mainly on numerical linear algebra. She teaches MATH 5360 and 5361: Advanced Math and Statistics for Teachers, I and II, in the (MS)² master's program.

Dr. Jeff Lee is an associate professor in the department of Economics and Geography at Texas Tech. His PhD in geography is from Arizona State University. He teaches IS 5301, "The Nature of Science for Teachers" for the (MS)² multidisciplinary science master's degree program.

Dr. Ratna Narayan is an assistant professor in the department of Curriculum and Instruction, and the program coordinator of the Master of Science in Multidisciplinary Science Program at TTU's College of Education. She has a BS in chemistry and a master's degree in inorganic chemistry from Bombay University. She received her PhD in science education from the University of Georgia and has been teaching at Texas Tech since.

Dr. Rebecca Ortiz teaches math education and integrated math and science courses. Dr. Ortiz joined the Texas Tech faculty in fall 2008. Prior to that, she taught at South Houston State University. She is an assistant professor who holds a master's degree in education and PhD in curriculum instructor from Texas Tech University. She is also the recruitment coordinator for the (MS)² multidisciplinary science master's degree program.

Dr. Ron Wilhelm received his BS (1985) and his MS (1989) in physics from Bowling Green State University, and his PhD in physics from Michigan State University (1995). He teaches PHYS 5300: Integrated Research Techniques in Mathematics and Science in the (MS)² master's program.

Admissions

The Greater Texas Foundation has provided funding for tuition and course-fee scholarships for 100 current middle school math and science teachers to earn a master's degree. Two simultaneous applications are required:

One, apply to the Texas Tech University Graduate School as a master of multidisciplinary science student. Create your account to get started. Indicate that your primary location is "distance".

1. Complete the Graduate Admissions application form online at:

<http://www.depts.ttu.edu/gradschool/admissions/how.php>

Choose the "Multidisciplinary Science M.S." from the alphabetical list of degrees offered.

There is a \$50 application fee, which is your responsibility.

2. It is not necessary to contact a College of Education advisor.

3. The College of Education does not require the GRE scores.

4. Have required official transcripts from all of the colleges and universities that you have attended sent to the TTU Graduate School at Box 41030, Lubbock, TX 79409-1030.

If you have any questions about your Graduate School application, call 806.742.2781 or email: gradschool@ttu.edu

The standards for admission to the (MS)² program go beyond those for admission to the Graduate School.

Two, apply to the College of Education (MS)² master of multidisciplinary science program at: <http://www.ttumssquare.org/application.html> for a grant-funded scholarship, being careful to respond to the questions and attach the required documentation.

In addition to the application, please attach the following documents as a part of the form:

1. A copy of your *curriculum vitae*/résumé
2. A letter of intent
 - Why you would like to be a part of this program.
 - Your intention, if chosen, to perform the work required and remain in the program for the entire duration.
3. Two letters of support from:
 - The principal of the school where you are currently teaching.
 - A math/science/engineering co-teacher at your school.

Please click on submit only after you have filled in and attached all the necessary details.

Advisement

Following admission to the College of Education Multidisciplinary Science, Middle School Math/Science concentration, students will be assigned an advisor who will serve as their point of contact throughout the three-year period required to earn this degree.

Because courses must be taken in a prescribed order (see below), College of Education staff will register you in the appropriate class each semester.

Degree Plan

You are responsible for maintaining communication with the TTU Graduate School. At Texas Tech, a student is admitted as a graduate student by the Graduate School as well as admitted to a specific college degree program. A master's degree plan must be filed with the Graduate School during your first semester as a graduate student. The Graduate School will ultimately award your degree and handle all aspects of that process. See:

<http://www.depts.ttu.edu/gradschool/NowWhat.php> for important information as a new Texas Tech graduate student. Note specifically the section, "Required Steps for a Master's Degree."

Program of Studies

The (MS)²: Understanding by Design is a three-year cohort program. Each cohort will complete 36 credit hours of graduate coursework in order to earn a master of science in multidisciplinary science degree. A bachelor's degree is a prerequisite.

During each of the fall and spring semesters, students will take one course through distance education. Courses will be offered online and enhanced by a variety of online multimedia tools. Laptop computers will be provided at no cost.

During each of the summers, coursework will be completed during a three-week intensive session on the Texas Tech campus in Lubbock, Texas. The scholarship will cover the cost of housing in Texas Tech residence halls during the summer sessions. Additional funded summer research opportunities will be available for interested students.

Please note: Portions of this scholarship may be taxable (such as laptop computer, summer housing). Please see IRS Publication 970: <http://www.irs.gov/pub/irs-pdf/p970.pdf> for additional information. (MS)² master of science degree students are responsible for reporting and paying any applicable income tax. Students that are nonresident aliens for tax reporting purposes will be subject to tax withholding on portions of this scholarship and will be responsible for paying the balance to the university.

Semester	Course	Course name	Instructor
6			

*Multidisciplinary Science Master of Science
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offered	number		
Fall	EDSE 5377	Science Curriculum and Instruction in Education	Jennifer Wilhelm
Spring	IS 5301	The Nature of Science for Teachers in Interdisciplinary Studies	Jeff Lee
Summer	MATH 5360	Advanced Math and Statistics for Teachers, I	Jerry Dwyer Victoria Howle
	PHYS 5371	Conceptual Physics for Teachers in Physics	David Lamp
Fall	CHEM 5360	Conceptual Chemistry for Teachers, I	Dominick Casadonte Greg Gellene
Spring	CHEM 5361	Conceptual Chemistry for Teachers, II	Dominick Casadonte Greg Gellene
Summer	MATH 5361	Advanced Math and Stats for Teachers, II	Jerry Dwyer Victoria Howle
	BIOL 5311	Ecology for Teachers	Mark McGinley
Fall	BIOL 5312	Cell and Molecular Biology for Teachers in Biological Sciences	Lou Densmore
Spring	EDCI 6306	Instructional Modifications for Universal Access to Mathematics and Science	Zenaida Aguirre-Munoz
Summer	PHYS 5300	Integrated Research Techniques in Mathematics and Science	Ron Wilhelm
	ENGR 5300	Integrating Math, Science, and Technology in the Context of Engineering	Mary Baker

Criteria for Admissions

Admission will be based on grade point average of the applicant's last 60 hours for the undergraduate degree, a personal statement from the applicant about his/her career goals, and three reference letters. Ideally the cohorts will be diverse in terms of ethnicity and gender. The target is a 50/50 male/female ratio, and a 50 percent minority teacher population and teachers who teach diverse populations of students.

Comprehensive Evaluation

All multidisciplinary science master's degree students must pass a comprehensive evaluation prior to receiving their degree. Students are required to take the evaluation during their last semester of coursework. Arrangements to take the exam at a local site are feasible.

Other Issues

Other important issues are outlined in the Undergraduate and Graduate catalog, available at this link: <http://www.depts.ttu.edu/officialpublications/catalog/viewcat.php>