# Master's Program Assessment Project

# Self-Study Report Template

For August 2003 through August 2007

Due:

## Master of Arts in Teaching in Mathematics Education

## Basic Information

1. Type of program: Select all that apply.

   ☒ Professional

   ☐ Research

   ☒ Interdisciplinary

   ☒ Applied

2. Date program founded or began. 9/1/1972 Began as Master of Arts in Teaching (MAT)

   4/27/1999 Name Changed to Mathematics Education

3. Describe the founding and development of any related centers.

   NA

4. Attach department charter and bylaws.

   At this time these documents do not exist or are not available in the Natural Sciences and Mathematics School archive.

5. Describe resources supporting the program such as libraries, laboratories, etc.

   The McDermott Library supports the research needs of Science/Mathematics Education students. For information on the library, please see http://www.utdallas.edu/library/about/index.htm.

6. Other information the department would like to provide.

## Program Philosophy and Mission

1. What is the mission of the master's program?

The long term mission of Science/Mathematics Education Department is to be and to produce leaders and practitioners in science and mathematics education at institutional, local, state, national and international levels by highlighting best practices and providing opportunities for cutting-edge research in science, technology, engineering and mathematics (STEM) education to current and future STEM education professionals.

2. Is this a published official mission statement? ☒Yes ☐ No

3. How is the program mission related to other key UTD statements, such as:

   a. the university's mission statement

"The University of Texas at Dallas serves the Metroplex and the State of Texas as a global leader in innovative, high quality science, engineering, and business education and research.

The University is committed to (1) producing engaged graduates, prepared for life, work, and leadership in a constantly changing world, (2) advancing excellent educational and research programs in the natural and social sciences, engineering and technology, management, and the liberal, creative, and practical arts, and (3) transforming ideas into actions that directly benefit the personal, economic, social, and cultural lives of the citizens of Texas." (http://www.utdallas.edu/utdgeneral/utdmission.html)

In comparing the University mission with our mission, one can see that this department directly supports the University in all goals enumerated.

   b. the Academic Plan

"Above all else, the purpose of universities is to educate students, and no university's strategic plan would be complete without addressing the education of its students. UTD must also strongly support both excellence and inclusion and, therefore, must play a leadership role in meeting the needs of all of Texas's citizens in a time of unprecedented change in demographics and increasing diversity of the State's

population." In particular our mission, vision and goals support University Action items 2.1, 2.2, 2.3, 2.4. We are particularly committed to 6.1. "An educated public is at the heart of a great city, and UTD is committed to producing first-rate elementary, middle, and high school teachers and to improving education, especially science and math education, in the Metroplex and throughout the State" and to 6.4. (http://www.utdallas.edu/strategicplan/index.php?id=j)

4. Please attach or submit your college or unit academic plan and/or strategic plan when available.

See attached.

5. Is this program regionally or nationally ranked? If so, how and by whom?

No

6. Other information the department would like to provide.

## Benchmarking

1. Identify three peer programs.

Northern Arizona University
http://odin.math.nau.edu/master.html?http://odin.math.nau.edu/graduate.html
University of Texas at Arlington
Texas Christian University

2. Identify three aspirational peer programs.

We have no anspirational programs at this time. If a PhD program and/or additional faculty is approved for the program as suggested by an external review committee for the program, then such programs will need to be located, and possibly, emulated.

We are aware of no other science/mathematics education departments located in the Natural Science College at a school with no School of Education.

3. Identify any other source from which benchmark or ranking data may be obtained. Please attach this data or provide the website where this information can be accessed.

## Program Design

1. What employment opportunities are students in the program being prepared for?

Employment opportunities sought by graduates of the program include team leader, program head, and similar supervisory roles in middle schools and high schools; mathematics supervisor for a school district; teaching positions in community colleges and occasionally in a college or university

2. What are the requirements of the program?

b. Fill in: hours in major field; hours in minor or cognate field; statistics or research design; etc.)

Major field: 9

Minor field: 18

Research or Electives: 6 to 9

c. How many credits must be taken at UTD?

21

d. If there are consortium arrangements with other universities, how is this requirement achieved?

NA

3. How are the requirements of the program designed to ensure fulfillment of the mission?

Specifically, courses allow students to examine local, state, national and global issues in science, mathematics, mathematics education and science education with an eye to how these impact the teaching of science and mathematics and ultimately our future leaders; they focus on evaluating, selecting, and conducting research for use in highlighting best practices to impact decisions affecting science education. Courses also focus on problem-based learning; problems are used as a vehicle for understanding and mastery of concepts, and stress improvement in content knowledge. Courses model appropriate teaching behaviors for multiple grade levels; integrate appropriate pre-college materials for student analysis; emphasize the identification, analysis and use of appropriate pedagogy using educational technology; extend the learning environment beyond the classroom; and accentuate meta-cognitive processes. Courses appropriately integrate educational technology, and emphasize the identification, analysis and use of appropriate use of educational technology.

4. Are key elements of the curriculum made available on a schedule that facilitates timely completion of the program by students? Attach course rotation schedules for the previous three years.

All courses in the program are offered either every year or every other year. See attached

5. a. If UTD offers a similar program at the undergraduate level, how is the post- baccalaureate program progressively more advanced in content?

There is no similar program at the undergraduate level, although a person seeking certification in mathematics occasionally takes a content course at the master's level.

b. If there are courses of similar name or similar substantive content, how are the graduate courses progressively more advanced than those offered at the undergraduate level?

c. Are there any situations in which undergraduates and graduate students are co-enrolled in their respective courses at the same time with the same instructor?

If so, how is the learning experience more advanced for the graduate students?

6. Describe how the program and curriculum are reviewed and updated to maintain currency in the field.

Instructors research recent articles in professional publications in books, journals [e.g. Mathematics Teacher), online reports, etc. and search for 'new' activities at websites such as the Texas Instruments Activities for Teachers and Illuminations of the National Council Teachers of Mathematics in preparation for teaching any course.

7. Do program requirements include courses in which students gain knowledge of literature of the discipline? If so, which courses?

MATH 5320 (all versions), ED 5308 [formerly MATH 5310] all have assessments requiring students to critique articles in professional journals – both print and online.

8. Does program require students to be engaged in research, professional practicums, or similar training experiences? If so, what are they and how is this requirement structured?

Currently students do no classical educational research in the program. Half the courses in the program have an "educational component" in which students study issues involving learning theory, teaching methods, etc.

9. Other information department would like to provide.

## Program Faculty

1. List all faculty who are providing instruction for the program by name, rank, tenure or tenure-track status, gender, years at UTD, year doctoral program was completed, institution granting the degree. Provide an updated CV for each person.

| **Name** | | | **Date Hired** | **Gender** |
|---|---|---|---|---|
| Andreescu, T | ASSOC | Tenure Track | 1/1/2005 | Male |
| Butts, T | FULL | Tenured | 9/1/1981 | Male |

2. Provide the following data regarding the instructional activities of <u>core faculty</u>:

   a. --Number of dissertations (Doctoral) chaired. 0

   b. --Number of Thesis (Master's) chaired. 1

   c. –Number of dissertation committee memberships 0

   d. --**Number of organized classes taught 14**

   e . --Expected average number of organized classes taught by core faculty per academic year 4

   g. -**Other courses (internship supervision, clinical supervision, studio, research, dissertation, Thesis, etc.) 0**

3. Provide the following data comparing your program's faculty to three of the program's benchmark institutions and three of the aspirational peer groups: NA

   Number of core (i.e. full time masters, tenured and tenure-track faculty) by rank, ethnicity, and gender in the program.

   Number of publications (i.e. peer-reviewed publications in excellent or highly respected journals and publishing houses) per full-time faculty equivalent (FTFE) of core faculty per year.

| Faculty Member | Average publications per year for a 3 year period |
|---|---|
| Andreescu, T. | 11 |
| Butts, T. | 2 |

*Total dollar amount of research expenditures and dollar amount of research expenditures per FTFE of core doctoral faculty.$00.00*

Average number of organized classes (both Graduate and Undergraduate) taught by core faculty for academic years 02-03, 03-04, and 04-05.

| | 02-03 | 03-04 | 04-05 |
|---|---|---|---|
| Average number of classes taught | 11 | 8 | 7 |

4. List special honors that have been received by the program faculty during the last 3 years.

On the list of MAA lecturers. The MAA has a program whereby each MAA section may invite at the MAA's expense one speaker from the list to lecture at their annual section meeting.

5. Other information the department would like to provide.

## Students

1. **From which universities do the new admits come?**

UT San Antonio
Florida State University
UT – Arlington
MIT
Central Philippine University
Texas A&M.
Universidad Santa Maria
Grambling State University
Kansas State University
Dallas Baptist University
Harris-Stowe State College.
Jordanian University
Carleton College
UT Dallas
Mississippi College
UT – Austin
Louisiana State University
Miami University
Texas Tech University

2. Describe the admission standards and the process of selecting applicants for admission to the program used during the previous three years. Programs with approved holistic processes should also include this current selection procedure.

The MAT degree in Mathematics Education is designed primarily for teachers possessing secondary certification in mathematics and/or computer science, emphasizing content. Admission requires at least one year of calculus and a junior-level course involving mathematical proof included within the secondary certification in mathematics and/or computer science. Junior high or middle school mathematics teachers may wish to consider a Master of Arts in Interdisciplinary Studies degree. Consult the Graduate Advisor for details. The MAT degree in Mathematics Education requires 36 semester hours. No GRE is required.

Please see
http://www.utdallas.edu/student/catalog/gradcurrent/first40/5.%20Final_%20General%20Admission%20Requirements.htm

3. **Provide data for the last 3 years on:**

**i. The number of applicants to the program for each year.**
**ii. The number and percentage admitted to the program each year compared with the number of applicants.**
**iii. The number and percentage of new admits who enrolled compared with the number who were admitted.**
**iv. The number of students who completed the degree program each year .**

| Years | Number of Applicants* | Number & Percentage Admitted | | Number & Percentage Enrolled | | Number Completed |
|---|---|---|---|---|---|---|
| 8/03-8/04 | 24 | 22 | 92% | 22 | 100% | 11 |
| 8/04-8/05 | 29 | 27 | 93% | 27 | 100% | 7 |
| 8/05-8/06 | 29 | 27 | 93% | 27 | 100% | 8 |

*Estimates only; this information is not available from any office at UTD

**4. Provide the number and percent of full-time and part-time doctoral students by gender and ethnicity (cross-tabs) for the last three years.**

**Diversity: White, African American, Hispanic, Native American, Asian, Alaskan-Pacific Islander**

**U. S. Citizen, Permanent Resident, International**

**Male; Female**

**NA**

5. Provide the number and percent of full-time and part-time master's students with fellowships, scholarships, research assistantships, or teaching assistantships /teaching fellowships.

| Full time (last 3 years) | Percentages | Part time (last 3 years) | Percentages |
|---|---|---|---|
| 1 | 100% | 15 | 20% |

*6. Describe the types of financial support and dollar amounts provided to master's students in the program.*

*Fellowships*

*Scholarships from sale of books $6,800*

*TA funding from the University* $5,396

*RA*

7. How many students receive tuition support? Where does this support come from?

The program has an occasional teaching assistantship, but no scholarships other than those available to all UTD students and a few cash stipends from the department for needy teachers.

8. Provide the number of master's student scholarly activities (peer-reviewed publications; presentations, exhibitions, or performances at national or international platforms or highly recognized state or regional venues).

Some students have given talks at regional and state conferences such as the Conference for Mathematics Teaching after graduating from the program, but no records of the number of such talks have been maintained.

9. Describe major accomplishments, honors, etc. among the program's master's graduates.

William Tate is currently Professor and Chair of the Education Dept. at Washington University in St. Louis, MO.

10. Provide the following data comparing your program's master's students to three of the program's benchmark institutions and three of the program's aspirational peers.

*i. Average dollar amount of financial support (fellowships, TA's and RA 's) for master's students.*

*ii. Percentage of master's students receiving tuition waivers or tuition scholarships.*

**iii. Graduation/attrition rates**

**iv. Number of master's degrees conferred**

Such data for other schools cannot be obtained. The UTD program has no students with other than token financial support. There have been 26 graduates in the past 3 years. Attrition rates are unknown, but are not high.

11. Other information or data that the department would like to provide.

## Outcomes

1. What are the key learning outcomes that have been identified for the program?

**Research and Critical Thinking:** Teachers will demonstrate an ability to critically think and independently conduct research in mathematics teaching and learning and education reform efforts.

**Content/Pedagogical Content Knowledge:**
a. Teachers will demonstrate an ability to analyze and select the best practices and methods associated with problem based mathematics learning.

b. Teachers will obtain the depth of content knowledge of skilled educators in science and mathematics education reflective of cutting-edge research and national mathematics education reform initiatives

**Universality of Knowledge:**
Teachers will demonstrate an ability to connect the content of their high school level mathematics with the content of college level mathematics courses

**Technology Application:**
Teachers will demonstrate proficiency with educational technology for use in teaching and learning.

2. What methods are used to determine whether students have achieved the key learning outcomes of the program?

Journal responses and class presentations, papers and projects are scored via rubrics assessing targeted content of courses. Embedded essay questions, multiple-choice benchmark item-sets, and problem sets assess targeted content of courses.

3. How many graduates are employed in a position in their field within one year of completing their master's degree programs? Where have the graduates been employed?

The vast majority of our graduates are employed as educators when they enter the program. These students go on to assume leadership roles school districts (6 as Supervisors; 46 as Science Department Chairs; 21 as Administrators/ Researchers), universities (16 hold PhDs), medical fields (2 dentists, 1 doctor), and government (2 Dallas City Council members).

4. Summarize improvements to the program that were based on assessment results for the 3 years.

Coursework in continuously updated based on latest research and community need. One new faculty member has been hired to relieve some of the teaching burden and to increase effective outreach programs.

5. What is the placement record for students who have graduated in the last three years?

NA

6. In what ways is this program distinctive from similar programs at other universities in Texas, and elsewhere?

In very few places in the US is an MAT in mathematics education offered through a department based in an NSM school. This allows easier access to scientists who will allow our students to conduct research.

7. Other outcome information the department would like to provide.

## Budget

1. What is the approximate proportion of the total departmental budget that is dedicated to master's program support? Describe the areas of support.

100%

2. Describe budgetary challenges that the department has dealt with to support the master's program.

   We never have enough money for travel for each faculty member to present research at one national conference per year; to support more than two or three TAs; to repair/replace equipment; and to allow faculty to upgrade our technological skills through advanced training.

## Departmental Conclusions and Recommendations

1. Describe the area(s) of the master's program that you (the department) consider excellent.

   Students' performance improved with experience and class discussion. All students met the success criteria for these outcomes through their application of content knowledge and use of problem solving strategies. Experienced teachers are able to analyze lessons and Internet sites and make appropriate evaluations. All students appropriately use educational technology. Mathematics content supports students goals of improvement on their teaching.

2. Describe the area(s) of the master's program that you (the department) consider areas of limitation or challenge.

   Students have difficulty translating from undergraduate level to graduate level products. Explicit examples are needed as models for quality of work expected. Peer review is needed to spur students to greater efforts to produce professional products. Students were highly frustrated with UTD equipment (or lack of equipment) that was common in their middle and high schools, thereby making it difficult to obtain a high quality product. Some students did not attend class regularly enough to maintain quality learning. Some students have difficulty communicating how they apply knowledge gained through their university coursework.

3. If you (the department) were provided with additional funding each year for master's education that consisted of an amount equal to 5% of your total departmental budget, what would your (i.e. the department's) priorities be for spending the increase?
   a. Infrastructure: Departmental sets of laptops with podcasting capabilities. Video camera with sound to produce higher quality teaching tools. Web mediated educational community space with a person (within the department such as a research/teaching assistant) to moderate the discussions and post student/faculty work. Our own server on which to house this educational community and products produced by faculty/students. Funding to replace consumable laboratory materials and repair/replace laboratory equipment.

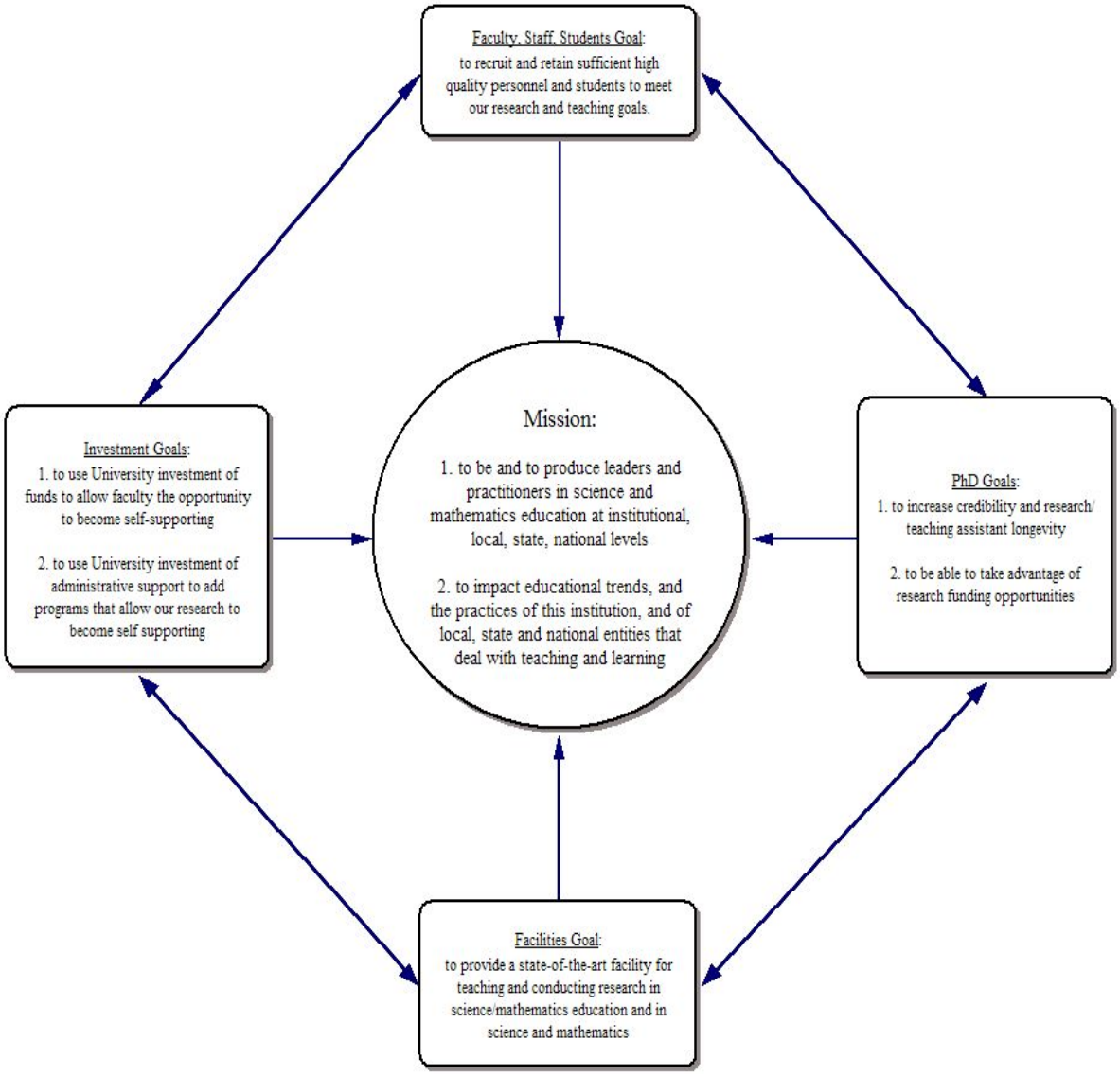
   b. Additional Education: Instructor training on new, yet common, technology that is available to our students through their school districts. Equipment that is at least equal to what teachers us in public schools. Help from the NSM webmaster to create resources for use by teachers. Our own server on which to house this educational community and products produced by faculty/students.

4. List and explain the department's recommendations for improvement of its master's program.

   We cannot continue to teach the number of classes we offer, produce research, publish, write grants, conduct a myriad of outreach activities, and increase the number of students we serve without University support through faculty and resources.

5. Other conclusions and/or recommendations that the department would like to provide.

# Science/Mathematics Education Department
# Strategic Plan



Abstract

Science/Mathematics Education is a growing, dynamic department. Our faculty and students are drawn from the discipline fields within NS&M as well as the fields of science and mathematics education teaching and research. We are making excellent progress toward our goals of being and producing leaders in science/mathematics education and impacting trends and practices in education at our institution and beyond. We are proud of our progress in growing our externally-supported research and our student population. However, we face many challenges that can only be overcome with support and investment from UTD.

Our current faculty is small, and we are missing key personnel needed to maintain and grow a vigorous program. Our facilities are inadequate for our needs and will not support our growth. By the nature of our work in education, we face special restrictions on grant funds that are unique within NS&M and impair our research efforts. With no Ph.D. program we lose students almost as soon as they begin fruitful research with us in science/mathematics education and are at a significant disadvantage in obtaining federal funds without the restrictions we face in our current grants.

In our strategic plan we have outlined both the present state of the department and what we need to reach our potential. We recognize the fiscal challenges and facilities issues facing the entire university. However, we fully expect that if the university chooses to make Science/Mathematics Education a priority, we will become not only a self-sustaining program but an asset that will help propel the university to the nationally recognized status we at UTD know we can achieve.

The long term mission of the Department of Science/Mathematics Education (SME) is to be and to produce leaders in science and mathematics education at institutional, local, state, national and international levels. In support of the mission of the department (SME), and by extension the University, we seek to impact educational trends, and the practices of this institution, and of local, state and national entities dealing with teaching and learning of science and mathematics education.

To fulfill our mission, the *strategic plan* of the SME faculty is to focus our research on the Pre-Kindergarten through 14 (sophomore year in college) Learning Continuum in STEM (Science, Technology, Engineering, and Mathematics) fields. As one of a handful of universities in the nation with a faculty mixing expertise in science and mathematics research with expertise in science and mathematics education research and practice, we already have an advantage in creating partnerships that bridge the diverse education and STEM disciplines. In keeping with major efforts of the National Science Foundation, we are well on our way to recognition as leaders in educational research as we continue to shape leaders in PK-14 Science and Mathematics Education. As we grow our program we intend to continue to forge partnerships with public and private pre-college schools, other institutes of higher education, informal education entities, and most importantly, other departments and schools within the University of Texas at Dallas.

To continue to nurture our research/teaching focus we must have quality facilities—our Research/Teaching Facility goal. As part of our goal of establishing a nationally recognized research/teaching program we envision a state-of-the-art facility for teaching and conducting research in science/mathematics education and in science and mathematics under the umbrella of the Center for Science/Mathematics Education Research (C-SER). This facility will be available to our faculty, our graduate students, local administrators, local teachers, and researchers interested in science and mathematics teaching and learning.

Also essential in growing our research/teaching programs to reach national and internationally recognized status is the addition of Ph.D. programs in science and mathematics education. Each year we turn away many talented students interested in continuing their research and learning with us as they earn a Ph.D. Unfortunately, without such a program we are not only losing quality students each year to other institutions, but we are also losing talented potential researchers who could provide invaluable assistance to our faculty and growing program. Without a Ph.D. program and the investment in research such a program represents, we are at a significant disadvantage in competition for national research funding and must rely on first or second year graduate students to assist in research.

The Science/Mathematics Education department has changed radically in the last five years. We have developed a research focus, hired new faculty and procured a substantial amount of funding. However, we are now at capacity in our ability to use our time wisely and continue to grow toward attaining our goals. With the addition of funding for research and teaching facilities, support for junior faculty and a doctoral program we will be able to attain the next level in our plan to reach our research and programmatic goals.

Objectives that must be met in order to reach our program goals are:

1. increase our recognition within the University
2. provide adequate teaching and research space for faculty and graduate students
3. continue to increase the number of students and programmatic offerings
4. increase recognition throughout the national and international research community
5. increase direct federal funding
6. increase partnerships within and beyond UTD
7. increase participation in the Center for Science/Mathematics Education Research

**State of the Department**

At this time SME can be characterized in terms of faculty/staff, grants/contracts, facilities, and collegial relationships. The department is composed of:

- 3 science faculty (2 discipline specialists, 1 science education researcher)
- 2 mathematics faculty (2 discipline specialists)
- 1 visiting faculty (discipline specialist)
- 1 half-time senior lecturer (science pedagogy specialist)
- 1 reduced-service faculty member (science education researcher)

- Weak connections with discipline departments through affiliate faculty
- 2 support staff
- 2 graduate teaching assistants

We have attracted more than $300,000 in outside funding in a single. The preponderance of money is for student tuition and therefore permits program growth. Through our extensive efforts in obtaining support for our students, we have brought the number of graduate students from 12 to 51. Our growth, while actively sought by the faculty, has also resulted in the necessity for carrying a heavy teaching load, particularly for our three (3) junior faculty. Faculty typically support a teaching load 50% higher than required during the academic year and substantial summer teaching along with our regular duties of establishing fundable research, publishing/presenting research, competing for more grants/contracts, and being of service to the department and University. The grants/contracts we have received are, for the most part, federal flow-through funds administered by the state. These contracts are considered service by funding agencies and are highly restrictive:

- Low (10% to 0%) faculty salary
- No or highly restricted travel
- Low (0% to 20%, 8% typical) allowed indirect cost thus little to no research support
- No TA/RA support

Our facilities, while much improved over previous years, have become strained. At this time we have:

- Offices for current faculty and staff (8 rooms)
- 1 shared classroom
- 1 tiny geoscience laboratory
- 1 storage room/office for the Center for Science/Mathematics Education Research
- 1 storage room (past capacity and also being used to house TAs and a lecturer from geosciences)

If we are to continue to be as productive as we have been over the years, we must have more faculty and support staff, which means that we must also have more facilities.

The students we have traditionally served are the primarily kindergarten through twelfth grade practicing science and mathematics teachers from our local area (approximately 800 to date). These students go on to assume leadership roles school districts (6 as Supervisors; 46 as Science Department Chairs; 21 as Administrators/ Researchers), universities (16 hold PhDs), medical fields (2 dentists, 1 doctor), and government (2 Dallas City Council members). Although most graduate with a Master of Arts in Teaching, we also provide professional development for a substantial number of non-degree seeking students. Our discipline specialists teach several large classes in the Mathematical Sciences and the Geosciences departments, and in the recent past the Physics and Biology departments. Many of these classes are taken by students seeking teacher certification.

With all of our accomplishments over the last few years, there is a specific issue impacting the program: state funding. Because of the marked decrease in state support, there is little money available for tuition support for teachers seeking to obtain master's degrees and there is only a small increase in salary for teachers who receive these degrees. Our students are pursuing higher degrees because they want to better themselves and/or they must obtain additional graduate hours to maintain their teaching certificates. Our growing student population, recently driven by teacher quality grants, requires that the faculty teach above capacity even as demand for additional non-grant associated coursework grows steadily.

**Requirements for Success in the Short Term**

For faculty to continue to perform at an optimum level, *all* of the following **critical** needs must be met within the next *year*. These needs are divided into the categories of financial support from the University, facilities, new hires, new programs and degrees, and recognition. Each of these is listed below:

Recognition by the school and University (in order of priority)

- Research in STEM teaching and learning is a discipline (just like mathematics and science)
- Respect for our unique skills and what we bring to the University
    - Research in science and mathematics learning

    - Service to the educational community through our ability to assess educational learning environments
    - Research in science and mathematics content
    - Impact on the quality of the local pool of potential students for UTD through our substantial work training precollege educators
- Support of our mission by administration
    - Our role within the school and University clearly defined

Faculty (in order of priority)

- Science education researcher
- Biology and chemistry content specialists
- Senior lecturer/grant writer/assistant director associated with the Center for Science/Mathematics Education Research (C-SER)

Staff (in order of priority)

- Program coordinator (recruiting)
- 3 Teaching Assistants (geosciences, physics, mathematics)
- 1 Undergraduate Assistant

Facilities (equal priority)

- 2 office for teaching/research assistants
- 3 offices for new faculty and lecturer
- Research/Teaching Facilities
    - 2 Multipurpose science/mathematics research/teaching facilities
- Research computer lab with work stations, lab tables, work space and audio-visual equipment (within 3 years)
- Research mathematics teaching lab with work stations, lab tables, work space and audio-visual equipment (within 3 years)

Financial Support (in order of priority)

- Grow research programs (equipment, materials, personnel)
- Support junior faculty
    - Travel to national and international research meetings to increase visibility through research presentation
    - Travel to funding agencies such as NSF to meet program directors
    - Funds to allow acceptance to perform invited talks (generally partially funded by host)
    - Reduce teaching loads by hiring lecturers and TAs
- Add laboratory fees to SCI courses to pay for extensive consumable materials utilized in inquiry-based science instruction (requires Provost permission)

Support programs which allow credibility and research/teaching assistant longevity at the UT-system and at the state levels (in order of priority)

- PhD in Science Education (within 3 years)
- MAT-SE Online
- Certificate Program (18 hour certificate of completion)

**Programmatic Production**

If these critical needs are met we will be able to maintain our level of productivity and increase our activities in the following areas **immediately**:

Immediate service to

- Pre-service teachers through content with appropriate pedagogy embedded
- Inservice teachers certificate programs
- Undergraduate students interested in integrated coursework
    - NATS classes
    - McDermott Scholars and Collegium V offerings
- Discipline area teaching assistants through pedagogy instruction
- Master's candidates
    - MAT in Mathematics and Science
- Dual master's candidates

    - NS&M
    - Brain and Behavioral Sciences
    - General Studies
- PhD Candidates (within three years)
- Formal and Informal PK-14 educators from community colleges and museum educators

Immediate Collegial Partners

- Within the University
    - All departments within NS&M
    - Brain Sciences
    - Arts and Humanities
- Institutes of Higher Education
    - Curtin University of Technology, Perth, Australia
- Pubic and private PK-12 Schools/Districts
- Informal Institutions
    - Dallas Museum of Natural History
    - Dallas Zoo
    - Heard Museum and Wildlife Sanctuary
    - Science Place
    - SciTech Discovery Center
- Business and Industry
    - PASCO Scientific

**Requirements for Success in the Long Term**

For faculty and the Science/Mathematics Education Department to excel and function within a Tier 1 University, *all* of the following long term needs must be met. These needs are divided into the categories of new hires, facilities, support from the University for junior faculty and new programs and degrees. Each of these is listed below:

Faculty within 5 years (in order of priority)

- Science education researcher
- Mathematics education researcher
- Elementary science educator/researcher (within 7 years)
- Elementary mathematics educator (within 7 years)

Staff within 5 years (in order of priority)

- 3 Teaching Assistants (geosciences, physics, mathematics)
- 2 Research Assistants (science ed research, math ed research)
- 2 Undergraduate Assistants (science, mathematics)
- 1 Full time secretary for C-SER
- Lecturers for service courses (Master Teachers who have been through our programs)

Facilities within 5 years (in order of priority)

- 2 offices for teaching/research assistants
- 3 offices for new faculty
- Research/Teaching Facilities
    - Research computer laboratory
    - Research mathematics teaching laboratory
    - 2 Research science teaching laboratories with work stations, lab tables, work space and audio-visual equipment
    - 3 Science research wet labs (biology, physics, geosciences) for small groups of research students
    - 2 Multipurpose science/mathematics teaching facilities with workstations, lab tables and audio-visual equipment (within 7 years)
- 2 offices for C-SER staff

Administrative and Financial Support (in order of priority)

- Travel for junior faculty to allow them to establish/maintain their research agenda with their peers

- Programs that continue to allow credibility and research/teaching assistant longevity (in order of priority)
    - PhD in Mathematics Education
    - Certificate programs
        - Master Science Teacher
        - Master Mathematics Teacher
        - Master Technology Teacher

**Programmatic Production**

If these long term needs are met we will be able to increase our level of productivity through these additional activities continued service, fully developed relationships within and outside of the University:

Continued Service to

- Pre-service teachers
- Undergraduate students interested in integrated coursework
- Inservice teachers through certificate programs for Master Teachers
- Discipline area teaching assistants
- Formal and Informal PK-14 educators
- Master's candidates
- Dual master's candidates
- PhD candidates in Mathematics Education (within three years of proposal)
- PhD candidates in Science Education

Development of Relationships (within 5 years)

- Opportunities for equal collaboration, particularly under the C-SER umbrella with departments within our school, centers within the University, schools throughout the University, the research community, and the geographic community
- Grants co-authored with other departments to federal agencies and national foundations
- Strengthening of affiliate faculty relationships through co-authorship of classes, grants and publications
- Financial and administrative support from the University to host collegial meetings with public and private PK-12 schools, other colleges and universities, informal institutions, businesses and industry, representatives of foundations and other possible funders, and governmental agencies.

# Course Rotation Schedules for Science Education 2004-2006

| Semester | Prefix | Number | Course Name |
|---|---|---|---|
| Spring 2004 | MATH | 5V06 | Advanced Mathematical Problem Solving for Teachers |
| Spring 2004 | MATH | 5320 | Usual/Unusual Problems Using Precalculus |
| Summer 2004 | MATH | 5306 | Non-Euclidean Geometry for Teachers |
| Summer 2004 | MATH | 5310 | Seminar in the Teaching of Mathematics |
| Fall 2004 | MATH | 5V06 | Connecting College and School Mathematics |
| Fall 2004 | MATH | 5320 | Usual/Unusual Problems Using Mathematical Modeling |
| Spring 2005 | MATH | 5320 | Usual/Unusual Problems Using Probability/Statistics |
| Spring 2005 | MATH | 5V06 | Advanced Mathematical Problem Solving for Teachers |
| Spring 2005 | MATH | 5V06 | Connecting College and School Mathematics |
| Spring 2005 | MATH | 5320 | Usual/Unusual Problems Using Probability/Statistics |
| Summer 2005 | MATH | 5320 | Usual/Unusual Problems Using Algebra |
| Summer 2005 | MATH | 5310 | Seminar in the Teaching of Mathematics |
| Fall 2005 | MATH | 5320 | Usual/Unusual Problems Using Discrete Mathematics |
| Fall 2005 | MATH | 5V06 | Using Calculators in Secondary Mathematics |
| Spring 2006 | MATH | 5320 | Calculus |
| Spring 2006 | MATH | 3310 | Theoretical concepts of Calculus |
| Spring 2006 | MATH | 5320 | Usual/Unusual Problems Using Precalculus |
| Spring 2006 | MATH | 5V06 | Advanced Mathematical Problem Solving for Teachers |
| Summer 2006 | MATH | 5310 | Seminar in the Teaching of Mathematics |
| Summer 2006 | MATH | 5330 | Real Analysis |
| Summer 2006 | MATH | 5320 | Usual/Unusual Problems Using Geometry |
| Summer 2006 | MATH | 5306 | Non-Euclidean Geometry for Teachers |
| Summer 2006 | MATH | 5V06 | Connecting College and School Mathematics |
| Fall 2006 | MATH | 5330 | Math for teachers of gifted students |
| Fall 2006 | MATH | 5320 | Usual/Unusual Problems Using Mathematical Modeling |
| Fall 2006 | MATH | 3305 | Foundations of Measurement and Informal Geometry |