The University of Arizona

SUBMISSION CHECKLIST
FOR
PLANNING AUTHORIZATION FOR A NEW
ACADEMIC DEGREE PROGRAM (Unique or Duplicative)

Directions:

1. Provide information regarding the proposed program in the format requested on the attached pages.
2. Obtain signatures of the proposed unit administrator and department or committee head and college dean or Director of GIDPs. In some situations, signatures of more than one dean or department head may be required. If the planned program requires commitment of resources from other than the initiating unit, the signature of the collaborating department/committee head and collaborating college dean is also required. Please add additional signature pages if needed. If you have any questions, please contact Sandra Gonzales, CCIT 337, 621-1847.
3. Forward the original and one copy to the college office for the dean’s signature and retain a copy for departmental files.
4. The dean should forward the original to Academic Programs, Attn: Sandra Gonzales, CCIT 337, and retain the remaining copy for college files. An electronic version of the documents with appropriate signatures is preferred but not required. For electronic submission, only the signature page should be submitted as a PDF.
5. Documents must be submitted in a timely manner to move through the campus/tri-university/Arizona Board of Regents approval process. UA campus protocols include subcommittee review of the appropriate Undergraduate/Graduate Council; full Undergraduate/Graduate Council review; Provost Management Group review; and Academic Council (deans) review. Once through the UA campus protocols, proposals are sent by the Provost’s Office for review to the Chief Academic Officers at Arizona State University and Northern Arizona University as well as to the Board staff at the Arizona Board of Regents, for final review prior to submission to the Arizona Board of Regents for formal approval.
6. Program uniqueness or duplication is determined by means of Classification of Instruction (CIP) codes. Please contact Sandra Gonzales at 621-1847 for details or email beelers@u.arizona.edu for assistance in determining the proper CIP code for the proposed new program before completing this request. She can provide a list of programs (if any) which share the same code within the Arizona University System and assist you with determining unique or duplicative status of the proposed program.

Complete proposal packet consists of:

1. Signature cover page with all appropriate signatures - Please include additional signature pages if needed. The proposal will not be forwarded for review without all appropriate signatures being present.
2. Proposal Document - Respond to each item individually in using “not applicable” where appropriate.
3. Executive Summary - Respond to each item individually using “not applicable where appropriate. Be as concise as possible while providing key points of the proposal. The Executive Summary is submitted to ABOR for inclusion in meeting documents.

NOTE: The establishment of any Academic Degree Program requires approval by the Arizona Board of Regents prior to announcement and implementation. See ABOR Policy 2-203.
The University of Arizona

ARIZONA UNIVERSITY SYSTEM
CHIEF ACADEMIC OFFICERS GUIDELINES
FOR
REQUESTS FOR PLANNING AUTHORIZATION
FOR NEW ACADEMIC DEGREE PROGRAM
Unique or Duplicative

SIGNATURE COVER PAGE

Initiating college, department, or committee:  Department of Mathematics

Title of this proposal:  Certificate in Mathematics Teaching Mentoring

Unit Administrator: (name and title)  Douglas L. Ulmer, Associate Head for the Graduate Program

Signature: __________________________  Date: __________________________

College Dean: _______________________  Date: __________________________
(Signature)
Request for Authorization to Plan a New Degree Program  
(Unique or Duplicative)

Type of Request:  
Authorization to Plan New Degree Program

Degree Title and Program Name:  
Master of Arts in Middle School Mathematics Leadership

Requested by:  
The Department of Mathematics

Level:  
GRADUATE PROGRAM X UNDERGRADUATE PROGRAM □

CIP Code*:  
13.1311

Type of Program:  
Unique □ Duplicate X

What is the purpose of this program?  
The Mathematics Department proposes a new Master’s Degree concentrating on the mathematics taught in middle school and its pedagogy: The real number system, Algebra, Geometry, and Probability and Statistics.

What is the State’s need for this program?  
By offering this degree, the University would be addressing a serious problem in education in the State and the Nation. The degree would give dedicated middle school mathematics teachers the opportunity to master the subjects they are asked to teach. It should improve mathematics education across the board. Better prepared middle school teachers will produce better prepared high school students. Better prepared high school students will experience more success in their mathematics courses in high school and beyond. Success in high school mathematics is critical in our increasingly technical modern economy.

The demand for qualified mathematics instructors at every level is well documented. The federal No Child Left Behind legislation and Arizona Instructional Measurement test have further increased the need for quality mathematics instruction in all our schools. The three state Universities have all made efforts to increase the number of highly qualified mathematics teachers in Arizona high schools. To some extent, middle school mathematics has been underserved in this process. Changes in state and federal laws have meant that school districts have placed a premium on recruiting and retaining high school teachers with undergraduate mathematics degrees. This has made it that much more difficult for them to find and keep equally qualified teachers for middle school and junior high classes.

The Department of Mathematics and the Tucson Unified School District (TUSD) joined together to address this problem. They proposed forming a partnership that would create a solution to this problem, and sought funding from the National Science Foundation (NSF). They hoped their joint effort would eventually have a major national impact.

TUSD middle school teachers have responded with enthusiasm to initial descriptions of a master’s degree program designed specifically for them. Other local school districts have also expressed interest in the
proposed program. The NSF agreed with the basic goals of the proposal and has agreed to fund a 5 year program that would allow as many as 45 TUSD Middle School teachers to pursue a graduate degree in mathematics part time, at night and over the summer.

We now propose a new Master’s Degree in Middle School Mathematics Leadership that would enhance this NSF grant and would help continue the program into the future. In a short time, the new degree should attract students from throughout the city and state. NSF has encouraged the Department to include a distance learning component as part of the project, and if that promise is fulfilled, the new degree could well become a truly national program. This new degree would concentrate on the mathematics that middle school and junior high teachers must understand and appreciate to do their job well. It would create a new level of professional mathematician whose specialization would involve the basic notions of modern mathematics that appear in middle school curricula. Their training would include all the educational tools necessary to teach these basic ideas effectively.

**What is the projected student demand for this program?**
The Master’s program, at least at first, will be targeted toward an audience of middle school teachers who have elementary certification. Most, if not all, of the candidates will be full time in-service teachers already teaching middle school mathematics who will pursue the degree part time. NSF has funded a pilot program that represents a partnership with TUSD. As part of their contribution, TUSD has pledged to recruit their teachers into the degree and provide incentives to the teachers who participate. This commitment was sufficient for NSF to provide funding for as many as 45 master’s candidates. The state’s largest school district employs more than enough middle school mathematics teachers to support the degree program indefinitely. Additionally, rumors about the NSF project have spread to other Tucson area school districts, and the Department has already received inquiries about other openings in the pilot program.

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<th>5-YEAR PROJECTED ANNUAL ENROLLMENT</th>
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<td>No. Student Majors</td>
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**How does this program meet the University’s strategic goals?**
This program will have direct impact on the quality of education in the state. It will have almost immediate impact on the quality of mathematics education in the Tucson Unified School District. By offering a Master’s degree in the teaching of middle school Mathematics to precisely those active in the state classrooms, the University will enhance the mathematics education of the State’s student at a most critical point of their schooling.

The UA Department of Mathematics houses a Mathematics Education research group, including faculty with Ph.D.’s in both Mathematics and Mathematics Education, and has a long history of designing pre-service and in-service professional development programs for teachers, starting in the late 80s and continuing until the present day:

- Promoting Reasoning in School Mathematics (PRISM), a three-year NSF-funded teacher enhancement project for middle and high school teachers in the Tucson area
- Making Math Count, an NSF-funded project for middle school teachers throughout the state
• Promoting Reform in Mathematics Education (PRIME), an NSF-funded five-year program to increase the mathematical knowledge and leadership skills of teachers in grades 3-8
• Making Everybody Count, an NSF-funded sequel to Making Math Count
• The NSF-funded Math and Parents Partnerships (MAPPS)

Furthermore, there are three current programs that demonstrate the department’s ability to design vertically integrated, multi-institutional partnerships that include faculty, post-doctoral fellows, graduate students, and undergraduates in collaborative enterprises, including outreach to local schools:

• The Center for Mathematics Education of Latinos/as (CEMELA), an NSF CLT, is a partnership with three other universities which includes professional development for local elementary and middle school teachers;

• The NSF Vertical Integration of Research and Education (VIGRE) grant, which, although primarily focused on the graduate program, provides graduate students with outreach opportunities in local schools, and hosts a regional network of universities interested in providing students with undergraduate research experiences both in mathematics and in education;

• The Center for Recruitment and Retention (CRR), funded by local school districts and philanthropists, which has a teacher induction program to support new teachers in the field and a tutor program that recruits and places mathematics undergraduates as assistants in local classrooms.

The UA College of Science includes science and mathematics education in its research program through hiring and promotion. It has a similar master’s degree for biology teachers. Furthermore, the College of Science has developed innovative promotion and tenure procedures designed to reward faculty whose principal scholarly activity is in education, for which it received an NSF Recognition Award for Integration of Research and Education in 1997. The university has recognized and rewarded the efforts of mathematics faculty in college education with three University Distinguished Professorships.

The UA College of Education, under the leadership of recently appointed Dean Ron Marx, has started rebuilding a small but active group in mathematics education. The College will offer courses in education research as part of the project.

With NSF funding, the Arizona Mathematics Department is perfectly poised to create the state’s only graduate degree in Mathematics designed specifically to address the needs of middle school teachers while the other state universities concentrate on high school teachers. Further, generous NSF support provides just the financial assistance necessary to specifically design a program for full time school teachers working part time on the degree. The NSF and the UA Mathematics Department are hopeful that the materials developed will spread the Master’s Degree in Middle School Mathematics to various universities around the country.

**What new resources are anticipated for this program?**

For the first five years, all additional recourses will be covered by a grant from The National Science Foundation. NSF has contributed $4.8 million toward a master’s degree program for middle school and junior high school teachers over the next 5 years. For now, teachers in this program will pursue the Department’s existing Master’s Degree with a teaching option that was designed primarily for high school teachers. However, the NSF proposal was designed to draw on existing departmental resources as much as possible, so that the degree program can continue after the grant runs out.

On the one hand, in five years the loss of financial incentives offered to TUSD teachers under the NSF grant will reduce the number of candidates. At the same time, a new degree will encourage additional
middle school teachers to look to the UofA for a graduate degree in mathematics. Also, recent state and federal laws encourage teachers to become certified highly qualified teachers which may also increase interest in such a degree.

It is hard to judge the long term demand for this degree, but at the rough size planned in the NSF project, it should not place a burden on the graduate program of the Department or the University that would be greater than it would expect without this separate teaching master’s degree. It appears, however, that the University will be playing an increasing role in the advanced training of all of the State’s teachers in any case. Approval of this degree now will allow the UofA to influence the quality of the State’s mathematics education by seeing that middle school and junior high teachers are properly served at the graduate level.

**DUPLICATIVE PROGRAMS**

**A. Other Programs Offered in Arizona**
Currently Arizona State University Mathematics Department offers a Master of Natural Science Degree with a High School Certification option through their College of Education. Students in this program have the option to receive a middle school endorsement as well. Northern Arizona University is reorganizing their Master’s of Arts Degree in Teaching so that it is accessible through distance learning. Their program is aimed primarily towards in-service high school teachers working part-time.

**B. Rationale for planning/implementing a duplicative program.**
While all three of the State’s Universities have graduate degree’ available to in-service teachers, the program leading to the proposed degree would be offered in the evenings and during the summer to make the program available to full time teachers working part time. Further it would be the only degree program in the state aimed specifically toward middle school teachers of mathematics. The part time aspect of the program means the proximity to the campus for local school teachers is an important issue. In time, alternate instructional delivery methods are planned for the course work that would allow a serious distance learning opportunity to students. The NSF funding anticipates the need to design this type of program.

The Arizona Mathematics Department and the NAU Mathematics Department have had preliminary discussions on cooperating as we offer Master’s programs to in-service teachers. NAU is already adjusting program, aimed toward high school teachers, as a distance learning form. The proposed Arizona degree would act as a natural complement to this. We both hope eventually to form a partnership that would allow Arizona faculty to make it easier for NAU to reach high school teachers in the southern part of the state. The partnership would allow Arizona to share NAU’s existing distance learning capabilities to make the proposed middle school degree accessible throughout the state. The partnership with the State’s largest school district and the federal funding make Arizona the ideal place to establish such a dedicated degree.