



NEW GRADUATE CONCENTRATION PROPOSALS
ARIZONA STATE UNIVERSITY
GRADUATE COLLEGE

This form should be used for academic units wishing to propose a new concentration for existing graduate degrees.

A concentration is a subspecialty within a degree and major which reflects that the student has fulfilled a designated, specialized course of study which qualifies the student as having distinctive skills and training in one highly concentrated area of the major. Concentrations are formally-recognized educational designations (including the assignment of a university plan code for reporting/record-keeping purposes and appearance on the ASU transcript). Concentrations are to be distinguished from not formally recognized academic distinctions frequently referred to as “emphases,” “tracks,” “foci,” “options,” etc.

Submit the completed and signed (chairs, unit deans) proposal to the **Office of Graduate Academic Programs**. Mail code 1003 and electronic copies to ozel@asu.edu or Denise.Campbell@asu.edu

Please type.

Contact Name(s): Andrew Webber; Colleen Megowan-Romanowicz	Contact Phone(s): 480-965-5906; 480-727-5217
College/School/Division Name: Graduate College	
Academic Unit Name: (or proposing faculty group for interdisciplinary proposals)	
Existing Graduate Degree and Major under which this concentration will be established: Master of Natural Science (MNS)	
Proposed Concentration Name: Middle School Science, Technology, Engineering and Mathematics (STEM)	
Requested Effective Term and Year: Summer 2010	
Do Not Fill in this information: Office Use Only Plan Code:	CIP Code:

1. Overview

- A. Provide a brief description (*not to exceed 250 words*) of the new concentration (including the specific focus of the new concentration, relationship to other concentrations in this degree program, etc).

The proposed Middle School Science, Technology, Engineering, and Mathematics concentration under the Master of Natural Science degree program is a focused course of study for K-8 certified teachers, providing them with integrated content in STEM subject matter that enables them to be considered highly qualified by the No Child Left Behind Act. The concentration adapts coursework in the Physics MNS concentration to reflect the content required of middle school teachers. In addition, the proposed concentration utilizes sustainability research and integrates STEM content around sustainability. Its target audience is middle school teachers as opposed to secondary certified teachers (the primary audience of the Physics concentration), or secondary mathematics teachers and applied mathematicians (the primary audience of the Mathematics concentration in the MNS program).

2. Impact Assessment

- A. Explain the unit’s need for the new concentration (e.g., market demand, research base, direction of the discipline, and interdisciplinary considerations). How will the new concentration complement the existing degree program, including enrollment, national ranking, etc?

Market demand is a heavy driver of this proposed concentration. School districts approached faculty in Mary Lou Fulton Institute and Graduate School of Education (MLFIGSE) and College of Teacher Education and Leadership (CTEL) requesting a content-focused masters’ program for K-8 certified middle school teachers similar to the MNS degree program for high school science teachers offered by the Physics Department in the College of Liberal Arts and Sciences (CLAS). In the Chandler Unified School District, we already have interest from 50 prospective students. We are also partnering with Fountain Hills and Mesa, and project that there will be similar interest. The Tempe Elementary School District has also requested partnership.

This concentration will increase overall program numbers by a factor of 2 each year at current projections. These new students are recruited from an entirely different population of teachers than those recruited by existing programs.

B. Please identify other **related** ASU programs and outline how the new concentration will complement these existing ASU programs? **(If applicable, statements of support from potentially-affected academic unit administrators need to be included with this proposal submission.)**

1. The Physics concentration in the MNS: This proposed concentration complements the Physics concentration by potentially co-listing requirements. The STEM concentration will extend the physics content and methods into a new population of students.
2. The Mathematics concentration in MNS: This proposed concentration complements the Mathematics concentration by targeting a new population of students.
3. Teacher Education for Arizona Mathematics & Science (TEAMS): This proposed concentration complements TEAMS in that TEAMS is designed for pre-service teachers, providing them secondary certification. TEAMS students already have content backgrounds in STEM subject matter. The proposed concentration targets in-service teachers and provides them the content knowledge needed to be effective and innovative teachers.

C. Is this an interdisciplinary concentration? If yes, please address the relationship of the proposed concentration to other existing degree programs and any parallel or similar concentrations in these degree programs. **(Please include relevant Memoranda of Understanding regarding this interdisciplinary concentration from all applicable academic units.)**

This is an interdisciplinary concentration. This concentration is designed and conducted by faculty in CTEL, MLFIGSE and the College of Liberal Arts and Sciences (CLAS). It does not compete with any existing program. Courses in the proposed concentration may be utilized as electives or as concentration courses, as deemed appropriate by any program in these schools. **(Letters from Deans are attached)**

3. Academic Requirements and Curriculum

A. What are the total minimum hours required for the major and degree under which the proposed concentration will be established?

30

B. Please provide the admissions criteria for the proposed concentration. If they are identical to the admission criteria for the existing major and degree program under which this concentration will be established, you may attach a copy of these criteria as they appear on the departmental website, or other source (please indicate source). Please also list all undergraduate and graduate degrees and/or related disciplines that are required for admission to this concentration program.

Bachelor's degree from a regionally accredited university with a Junior-Senior GPA of 3.00 (no particular major is required but the applicant must be a K-8 teacher.

Satisfactory score on ASU Mathematics Department's online mathematics placement examination or completion of STM 601, *Foundations in Mathematics for Middle School Teaching*

Students must meet all admissions criteria of the Graduate College and must submit an online application for admission.

C. If the proposed concentration is part of a larger, interdisciplinary agenda, please provide additional admission information related to students who may enter with various academic backgrounds, including expected entry-level competencies. As applicable, please also address the courses that must be taken to remedy any relevant deficiencies for incoming students.

Courses necessary for making up deficiencies:

STM 601, *Foundations in Mathematics for Middle School Teaching* or equivalent as determined by program faculty.

D. What knowledge, competencies, and skills (learning outcomes) should students have when they graduate from this proposed concentration program? Examples of program learning outcomes can be found at <http://www.asu.edu/oue/assessment.html>.

Learning Outcomes:

Students will have the knowledge and skills requisite for teaching middle school mathematics or science, that is, a level of understanding that is at least 6 years beyond 8th grade.

Students will be competent in modeling sustainability science, including data analysis, reporting, and communication.

Students will be able to apply technology for learning and teaching STEM content via modeling.

Students will be able to design and evaluate middle school mathematics or science courses, curriculum, standards, and pedagogy.

Students will be able to translate and apply research findings in science, engineering, and mathematics to the teaching of middle school students.

- E. How will students be assessed and evaluated in achieving the knowledge, competencies, and skills outlined in 3.D. above? Examples of assessment methods can be found at (<http://www.asu.edu/oue/assessment.html>).

Students will successfully complete coursework specific to STEM subject matter in sustainability contexts.

Students will successfully complete and defend an action research project.

F. Please provide the curricular structure for the proposed concentration.

- Additionally, please ensure that all **new** required course proposals have been submitted to the Provost's office through the ACRES online course proposal submission system for approval before this concentration is put on the University Graduate Council and CAPC agendas.

Required Core Courses for the Degree			Credit Hours
(Prefix & Number)	(Course Title)	(New Course?) Yes or No?	(Insert Section Sub-total) 3
STM 501	<i>Introduction to Modeling in STEM</i>	Yes	3
Required Concentration Courses			Credit Hours
(Prefix & Number)	(Course Title)	(New Course?) Yes or No?	(Insert Section Sub-total) 21
STM 502	<i>Cognition and Instruction in STEM</i>	Yes	3
STM 503	<i>Mathematical Modeling</i>	Yes	3
STM 504	<i>Modeling Integrated Science</i>	Yes	3
STM 505	<i>Engineering Design</i>	Yes	3
STM 511	<i>Classroom Applications in STEM</i>	Yes	3
STM 512	<i>Quantitative Modeling</i>	Yes	3
STM 513	<i>Sustainability Science</i>	Yes	3
Elective or Research Courses (as deemed necessary by supervisory committee)			Credit Hours
(Prefix & Number)	(Course Title)	(New Course?) Yes or No?	(Insert Section Sub-total) 3
STM 518	<i>Action Research in the Mathematics and Science Classroom</i>	Yes	3
Culminating Experience <i>E.g. - Capstone project, applied project, thesis (masters only) – 6 credit hours) or dissertation (doctoral only) – 12 credit hours) as applicable</i>			Credit Hours (Insert Section Sub-total) 3

STM 593/PHS 593 <i>Applied Project: Action Research</i>	3
Other Requirements <i>E.g. - Internships, clinical requirements, field studies as applicable</i>	Credit Hours (Insert Section Sub-total)
Total required credit hours	30

*** Pre-Requisite Deficiency Course**

STM 601	<i>Foundations in Mathematics for Middle School Teaching (pre-requisite)</i>	Yes	*3
---------	--	-----	----

***STM 601 is not part of the plan of study**, but is a pre-requisite deficiency course we are creating for the program that some teachers will be required to take. The course does not presently exist but we feel that some teachers may need it before beginning the program. We will require completion of STM 601 prior to enrollment in MNS courses for teachers whose mathematical knowledge needs reinforcement to participate successfully in program offerings. These participants will be identified by looking at the results of their online mathematics placement examination currently used by the mathematics department in CLAS for screening new undergraduates.

- G.** Please describe the primary course delivery mode, (e.g., online, face-to-face, off-site etc.). **Please note:** If this proposed initiative will be offered **completely** online, clearly state that in this section.

The proposed concentration will utilize primarily face-to-face instruction. All courses will have some online component, including moderated discussion groups/blogs, podcasts and other media. Courses will be held off-campus **, primarily, utilizing facilities hosted by our school district partners. **some courses will be held off campus at the Chandler Unified School District Instructional Resource Center.

- H.** Please **describe** the culminating experience(s) required for completion of the existing degree and major, and the proposed concentration (e.g., thesis, dissertation, comprehensive exams, capstone course(s), practicum, applied projects, etc.).

The culminating experience is a group classroom research Applied Project. Action Research Projects (aimed at practical improvements in teaching practice) will be undertaken by teams of two or three teachers. Projects begin with a written proposal subject to approval by the instructor followed by application for Human Subjects Approval. Classroom implementation and subsequent evaluation are required. The group will be required to submit an extensive final written report and make a public presentation to peers, or as an alternative to the written report they may publish a paper in a peer reviewed journal.

- I.** Please **describe** any other requirements for completion of the existing degree and major, and the proposed concentration (e.g., internships, foreign language skills, etc.).

NA

- J.** **For interdisciplinary programs**, additional sample curricular structures must be included as appendix items to this proposal relating to students with various academic backgrounds who may pursue the proposed concentration, including expected mastery of core competencies (e.g., course work, skills, and/or knowledge).

See attached syllabi

4. Administration and Resources

- A.** How will the proposed concentration be administered (including recommendations for admissions, student advisement, retention etc.)? Describe the administering body in detail, especially if the proposed concentration is part of a larger interdisciplinary agenda. How will the graduate support staff for this proposed concentration program be met?

The concentration will be administered by the Center for Research on Education in Science, Mathematics, Engineering and Technology (CRESMET) and the MLFIGSE in consultation with the Graduate College. Admissions screening will be done by a

committee of CRESMET faculty and student advisement, retention and graduate support will be handled by MLFIGSE and CRESMET personnel.

Admission:

Student applications will be reviewed by a committee of concentration faculty. Final admission recommendations regarding applicants will be forwarded to the Graduate College.

Advisement and Retention:

Each student in the program will be assigned a faculty advisor. They will be required to meet with their advisor at least once per semester to plan course progressions, and to review their progress. Faculty will recommend remediation if necessary.

- B.** How many students will be admitted immediately following final approval of the concentration? What are enrollment projections for the next three years?

Year 1 - 25 students; year 2 - 25 students; year 3 – 50 students; year 4 – 50 students; year 5 – 50 students

- C.** What are the resource implications for the proposed concentration, including any projected budget needs? For Doctoral students, how will the students be supported financially? Will new books, library holdings, equipment, laboratory space and/or personnel be required now or in the future? If multiple units/programs will collaborate in offering this concentration please discuss the resource contribution of each participating program. Letters of support must be included from all academic units that will commit resources to this concentration.

The budget for this program is covered by the NSF Math-Science Partnership Innovation through Institutional Integration Grant: The Modeling Institute, NSF award # 930109. Students will receive tuition assistance from grant funding. No new books, library holdings, laboratory space, equipment, or personnel will be required now or in the future.

- D.** Please list the primary faculty participants regarding this proposed concentration.


<i>Name</i>	<i>Title</i>	<i>Area(s) of Specialization as they relate to proposed concentration</i>
Colleen Megowan-Romanowicz	Asst professor	Science Education, cognition
James Middleton	Professor	Mathematics Education, cognition
Tirupalavanam Ganesh	Asst Dean of IT	Engineering Education
Carole Greenes	Assoc Vice Provost of STEM	Mathematics Education
Charles Kazilek	Senior Research Professional	Biology Education
Monica Elser	Academic Assoc/Education Mgr	Sustainability Science
David Birchfield	Asst Professor	Media Arts and Sciences
Wendy L. Taylor	Asst Director/Mars Space Flt Fac	Earth and Space Sciences

- E.** Is there a graduate faculty structure for this concentration program that will differ from the original degree program graduate faculty structure (**for PhD programs only**)? If yes, please include the name of the graduate faculty group and whether they will participate in offering this concentration.

NA

Approval Signature Page:

Middle School Science, Technology, Engineering and Mathematics (STEM) Concentration

Approvals (if the proposal submission involves multiple units, please include letters of support from those units)	
DEPARTMENT CHAIR (Please print or type) (Not applicable)	
_____ SIGNATURE	_____ DATE
Associate Vice Provost - Graduate College Dr. Andrew Webber	
 _____ SIGNATURE	10/9/09 _____ DATE

The following section will be completed by the GC following the recommendations of faculty governance bodies.

UNIVERSITY VICE PROVOST AND DEAN OF THE GRADUATE COLLEGE	
_____ SIGNATURE	_____ DATE

Please note: Proposals for new concentrations also require the review and recommendation of approval from the University Graduate Council, Curriculum and Academic Programs Committee (CAPC), the Academic Senate (Information item only), and the Office of the Provost before they can be put into operation.

The final approval notification will come from the Office of the Provost.

GF0809E-92

Associate Vice Provost Filiz Ozel
Office of Graduate Academic Programs
The Graduate College
Arizona State University
MC 1003
Tempe AZ 85287-1003

RE: the creation of a Middle School STEM concentration in the MNS program

Dear Dr. Ozel,

I have reviewed the Modeling Institute's proposal for a new Middle School STEM concentration in the Master of Natural Science Program. I support this proposed new program and am prepared to work with other faculty and administrators to enable science and mathematics education faculty from the College of Liberal Arts and Sciences to teach courses for this program.

Sincerely,



Sid P. Bacon
Dean of Natural Sciences
College of Liberal Arts and Sciences

cc: The Modeling Institute
Denise Campbell

October 2, 2009

Associate Vice Provost Filiz Ozel
Office of Graduate Academic Programs
The Graduate College
Arizona State University
MC 1003
Tempe AZ 85287-1003

Dear Dr. Ozel:

I have reviewed the Modeling Institute's proposal for a new Middle School STEM concentration in the Master of Natural Science Program.

I support this proposed new program and am prepared to commit science and mathematics education faculty from the College of Teacher Education and Leadership to teach courses for this program.

Sincerely,



Mari E. Koerner, PhD
Dean, College of Teacher Education and Leadership

cc: The Modeling Institute
Denise Campbell

October 2, 2009

Associate Vice Provost Filiz Ozel
Office of Graduate Academic Programs
The Graduate College
Arizona State University
MC 1003
Tempe AZ 85287-1003

RE: the creation of a Middle School STEM concentration in the MNS program

Dear Dr. Ozel,

I have reviewed the Modeling Institute's proposal for a new Middle School STEM concentration in the Master of Natural Science Program. I support this proposed new program and am prepared to commit science and mathematics education faculty from the Mary Lou Fulton Institute and Graduate School of Education to teach courses for this program. I understand that credit for teaching courses will go to the school to which the faculty member is assigned.

Sincerely,



George Hynd
Senior Vice Provost, Dean & Director
Mary Lou Fulton Institute and Graduate School of Education

cc: The Modeling Institute
Denise Campbell