REQUEST TO CLASSIFY PROPOSED PROGRAM

Section I (REQUIRED)

1.	The proposed new degree program will be (please check one): ☒ Undergraduate* ☐ Masters* ☐ Doctoral* ☐ Professional*			
2.	Have you contacted the Associate Provost for Academic Administration (APAA)?			
	YES ☒ Date of contact: Fall 2009; March 2011			
	NO ☐ (Contact the APAA prior to filling out the remainder of this form.)			
3.	Degree Title:	Bachelor of Science in Education		
4.	Major Title:	STEM Education and <content area> (Mathematics, Physics)		
5.	Option:			
6.	Primary College:	College of Education		
7.	Primary Department:	Science, Technology, Engineering, and Mathematics (STEM) Education		
8.	CIP Code (supplied by APAA)	13.1399		
9.	Accrediting Agency (if applicable):	National Council of Accreditation of Teacher Education (NCATE)		
10.	Who should be contacted for further information about the proposed new degree program:			
	Name: Margaret Mohr-Schroeder	Email: m.mohr@uky.edu	Phone: 257-3073	
11.	Has the APAA determined that the proposed new degree program is outside UK's band?			
	☐ YES (Continue with the Section II* on a separate sheet.)			
	☒ NO (This form is complete. Print PAGE ONE & submit with appropriate form for new program.)			

Section II (Attach separate pages.)

I. Submit a one- to two- page abstract narrative of the program proposal summarizing: how this program will prepare Kentuckians for life and work; any plans for collaboration with other institutions; and any plans for participation in the Kentucky Virtual University.

II. Provide a comprehensive program description and complete curriculum. For undergraduate programs include: courses/hours; college-required courses; University Studies Program; pre-major courses; major courses; option courses; electives; any other requirement. Include how program will be evaluated and how student success will be measured. Evaluative items may include, but are not limited to retention in the major from semester to semester; success rate of completion for core courses; and academic performance in suggested program electives.

III. Explain resources (finances, facilities, faculty, etc.) that are needed and available for program implementation and support.

* After filling out this form, you must also submit a form for New Undergraduate Program, New Master's Program, or New Doctoral Program. There is no form for new professional programs.

NEW UNDERGRADUATE PROGRAM FORM

(Attach completed "Application to Classify Proposed Program"[1])

1. General Information:

College:	Education	Department:	Science, Technology, Engineering, and Mathematics (STEM) Education
Major Name:	STEM Education and <content area> (Mathematics, Physics)	Degree Title:	Bachelor of Science in Education
Formal Option(s), if any:	____	Specialty Field w/in Formal Options, if any:	____
Date of Contact with Assoc. Provost for Academic Administration[1]:	Fall 2009; March 2011	Today's Date:	April 13, 2011
Accrediting Agency (if applicable):	National Council of Accreditation of Teacher Education		
Requested Effective Date:	☒ Semester following approval. OR ☐ Specific Date[2]: ____		
Contact Person in the Dept:	Margaret Mohr-Schroeder	Phone: 257-3073	Email: m.mohr@uky.edu

2. General Education Curriculum for this Program:

The new General Education curriculum is comprised of the equivalent of 30 credit hours of course work. There are, however, some courses that exceed 3 credits & this would result in more than 30 credits in some majors.

- There is no foreign language requirement for the new Gen Ed curriculum.
- There is no General Education Electives requirement.

General Education Area		Course	Credit Hrs
I. Intellectual Inquiry (one course in each area)			
Arts and Creativity		any approved course	3
Humanities		any approved course	3
Social Sciences		any approved course	3
Natural/Physical/Mathematical		any approved course	3
II. Composition and Communication			
Composition and Communication I		CIS or WRD 110	3
Composition and Communication II		CIS or WRD 111	3
III. Quantitative Reasoning (one course in each area)			
Quantitative Foundations[3]		MA 113 or MA xx 137	4
Statistical Inferential Reasoning		STA 210	3
IV. Citizenship (one course in each area)			

[1] Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration.

[2] Programs are typically made effective for the semester following approval. No program will be made effective unless all approvals, up through and including Board of Trustees approval, are received.

[3] Note that MA 109 is NOT approved as a Gen Ed Quantitative Foundations course. Students in a major requiring calculus will use a calculus course (MA 113, 123, 137 or 138) while students not requiring calculus should take MA 111, PHI 120 or another approved course.

	Community, Culture and Citizenship in the USA		any approved course	3
	Global Dynamics		any approved	3
			Total General Education Hours	31

3. Explain whether the proposed new program (as described in sections 4 through 12) involve courses offered by another department/program. Routing Signature Log must include approval by faculty of additional department(s).

Letters of support are attached for Physics and Mathematics.

4. How will University Graduation Writing Requirement be satisfied?

☒ Standard University course offering	Please list: _____
☐ Specific course	Please list: _____

5. How will college-level requirements be satisfied?

☐ Standard college requirement	Please list: _____
☐ Specific required course	Please list: _____

6. List pre-major or pre-professional course requirements, including credit hours (if applicable):

SEM 110, 2 hours
EDP 202, 3 hours
MA 113 or 137, 4 hours
STA 210, 3 hours
MA 114, 4 hours
MA 261, 3 hours (for Mathematics)
PHY 231, 4 hours (for Physics)
CHE 105, 3 hours (for Physics)

7. List the major's course requirements, including credit hours:

Please see attached curriculum contract for course requirements

STEM Education Primary Major:
EDS 516, 3 hours
SEM 421, 3 hours
SEM 422, 3 hours
SEM 435, 10 hours
EPE 301W, 3 hours

AND One or more of the following areas:

Mathematics Secondary Major:
MA 213, 4 hours
MA 322, 3 hours
MA 361 & 362 OR MA 416 & 417 - 6 hours
MA 310, 3 hours
MA/STA 320, 3 hours
MA 341, 3 hours

NEW UNDERGRADUATE PROGRAM FORM

Physics Secondary Major:
CHE 107, 3 hours
PHY 232, 4 hours
PHY 228, 3 hours
PHY 306, 3 hours
PHY 335, 3 hours
PHY 361, 3 hours
PHY 401G, 3 hours
~~XXXXXXXXXXXXXXXXXXXXXXXXXXXX~~
~~PHY 460W** to be submitted, 4 hours~~
AST 310, 3 hours
MA 213, 4 hours
PHY ELECTIVE, 300 OR ABOVE, 4 HOURS

8. Does program require a minor? ☐ Yes ☒ No

If so, describe, including credit hours. _____

9. Does program allow for an option(s)? ☐ Yes ☒ No

If so, describe option(s) below, including credit hours, and also specialties and subspecialties, if any:
_____

10. Does the program require a certain number of credit hours outside the major subject in a related field? ☒ Yes ☐ No

If so, describe, including credit hours: STEM Content support courses outside of major subject up to 120 hours; approved by advisor

11. Does program require technical or professional support electives? ☐ Yes ☒ No

If so, describe, including credit hours: _____

12. Is there a minimum number of free credit hours or support electives? ☒ Yes ☐ No

If so, describe, including credit hours: STEM Support courses up to 120 hours (see attached curriculum contract for example courses)

13. Summary of Required Credit Hours.

a. Credit Hours of Premajor or Preprofessional Courses:	19-23	Not Applicable ☐
b. Credit Hours for Major Requirements:	63-75	
c. Credit Hours for Required Minor:	_____	Not Applicable ☒
d. Credit Hours Needed for Specific Option:	_____	Not Applicable ☒
e. Credit Hours Outside of Major Subject in Related Field:	variable up to 120 hours total	Not Applicable ☐
f. Credit Hours in Technical or Prof. Support Electives:	_____	Not Applicable ☒
g. Minimum Credit Hours of Free/Supportive Electives:	variable up to 120 hours total	Not Applicable ☐
h. Total Credit Hours Required by Level:		

100:	10	200:	10-13	300:	18-24	400-500:	21-27
i. Total Credit Hours Required for Graduation:	120						

14. Rationale for Change(s) – if rationale involves accreditation requirements, please include specific references to those.

See attached sheet

15. List below the typical semester by semester program for a major. If multiple options are available, attach a separate sheet for each option.

YEAR 1 – FALL: **(e.g. "BIO 103; 3 credits")**	See attached sheet for Mathematics option and Physics Option	**YEAR 1 – SPRING:**	_____
YEAR 2 - FALL :	_____	**YEAR 2 – SPRING:**	_____
YEAR 3 - FALL:	_____	**YEAR 3 - SPRING:**	_____
YEAR 4 - FALL:	_____	**YEAR 4 - SPRING:**	_____

NEW UNDERGRADUATE PROGRAM FORM

Signature Routing Log

General Information:

Major Name and Degree Title: Bachelor of Science in Education - STEM Education and <content area> (Mathematics or Physics)

Proposal Contact Person Name: Margaret Mohr-Schroeder Phone: 257-3073 Email: m.mohr@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
STEM Education	2/22/2011	Jennifer Wilhelm / / jennifer.wilhelm@uky.edu	
C+C Comm	3/28/11	Doug Smith / 7-1824 / dcsmit1@uky.edu	
College of Ed	4/19/11	Steve Parker / 7-5243 / sparker@uky.edu	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision[4]
Undergraduate Council	11/8/2011	Sharon Gill	
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

The Department of STEM Education was approved by the Board of Trustees on February 22, 2011. It will be fiscally implemented on July 1, 2011.

[4] Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

UNIVERSITY OF KENTUCKY see blue.

Department of Science, Technology, Engineering, & Mathematics Education
Curriculum Contract
Bachelor of Science in Education with Rank III Certification
Double Major in STEM Education and _____

STEM PLUS – Producing Leaders for Urban/rUral Schools

Please TYPE

Name					
Email					
Address				**State**	**Zip**
	Street		**City**		
Phone					
	Home	**Work**	**Cell/Other**	**Semester of Admission to Program**	

Required General Education Core: (31 hours)

May overlap with content major requirements. May not overlap with Content Support courses.

Course	Title	Term	Grade	Credits
Intellectual Inquiry				
	The Nature of Inquiry in the Natural, Physical, & Mathematics Sciences			3
	The Nature of Inquiry in the Social Sciences			3
	The Nature of Inquiry in the Humanities			3
	The Nature of Inquiry in the Arts & Creativity			3
Communications				
	Writing I			3
	Communication			3
Quantitative Reasoning				
MA 113 or MA 137	Mathematical, Logical and Statistical Foundations			4
STA 210	Statistical Reasoning			3
Citizenship				
	U.S. Citizenship			3
	Global Citizenship			3

Required STEM Education Major Core: (27 hours)

Course	Title	Term	Grade	Credits
SEM 110*	Introduction to STEM Education			2
EDP 202*	Human Development and Learning			3
EDS 516*	Principles of Behavior Management and Instruction			3
SEM 421*	STEM Methods I			3
SEM 422*	STEM Methods II			3
SEM 435*	STEM Student Teaching in the Secondary School			10
EPE 301W*	Education and American Culture			3

** Requires field experience hours*

Specialization STEM Content Coursework. Choose your content area below.

[+] Eligible to meet a Gen Ed Requirement

Mathematics **(36 hours)**

Course	Title	Term	Grade	Credits
Mathematics Core Courses				
MA 113[+]	Calculus I			4
MA 114	Calculus II			4
MA 213	Calculus III			4
MA 261	Introduction to Number Theory			3
MA 322	Matrix Algebra and its Applications			3
Mathematics Sequence, Choose one. May substitute a different sequence with prior faculty approval.				
MA 361	Elementary Modern Algebra I ***AND***			3
MA 362	Elementary Modern Algebra II			3
MA 416	Principles of Operations Research ***AND***			3
MA 417	Principles of Operations Research II			3
				3
				3
Required Mathematics Electives				
MA 310	Mathematics Problem Solving for Teachers			3
MA/STA 320	Introduction to Probability			3
MA 330	History of Mathematics			3
MA 341	Topics in Geometry			3
Optional Courses				
MA 214	Calculus IV			3

Physics **(48 hours)**

Course	Title	Term	Grade	Credits
CHE 105[+]	General Chemistry I			3
CHE 107[+]	General Chemistry II			3
PHY 231	General University Physics			4
PHY 232	General University Physics II			4
PHY 228	Optics, Relativity, & Thermal Physics			3
PHY 306	Theoretical Methods of Physics			3
PHY 335	Data Analysis for Physicists			3
PHY 361	Principles of Modern Physics			3
PHY 401G	Special Topics in Physics and Astronomy for elementary, middle school, and high school teachers			3
PHY 460W	Active Learning Laboratory for Secondary Majors			4
AST 310	Topics in Astronomy and Astrophysics			3
MA 113[+]	Calculus I			4
MA 114	Calculus II			4
MA 213	Calculus III			4

STEM Content Support Courses – take up to 120 hours required for graduation

Select from each area of interest. You may not double count these courses with your major content course requirements or General Education requirements. Students should take courses in the STEM areas outside of their content/certification area. This list is not inclusive. All courses should be approved by advisor before taking.

Course	Title	Term	Grade	Credits
Mathematics/Statistics				

STA 291	Statistical Method			3
MA 501/502	Seminar in Selected Topics			3
OR/STA 524	Probability			3
EDC/EDP/EPE 522	Educational Tests and Measurements			3
SEM 525	Mathematics Clinic			3
Engineering				
EGR XXX	SysSTEM			3
EGR 101	Introduction to Engineering			4
EGR 199	Technology and Society			3
EGR 199	Global Energy Issues			3
Technology				
CS 115	Introduction to Computer Programming			3
TEL 201	Communication Technologies and Society			3
INF 401G	Informatics Fundamentals			3
EDC 543	Digital Game Based Learning and Instruction			3
EDC 544	Use and Integration of Instructional Media			3
CS 215	Introduction to Program Design, Abstraction, and Problem Solving			3
CS 221	First course in computer science for engineers			2
CS 316	Web Programming			3
Science				
CHE 105	General College Chemistry I			3
CHE 111	General College Chemistry Lab I			1
BIO 148	Principles of Biology I			3
BIO 155	Principles of Biology Laboratory I			2
PHY 231/241	General University Physics			4
PHY 241	General University Physics Laboratory			1
GLY 220	Principles of Physical Geology			4
Total Credit Hours				

Minimum 120 credit hours required for graduation and Rank III certification

Continuous Assessment

Checkpoint	Date
Satisfactory Entry Review	
Satisfactory Mid-point Review	
Satisfactory Exit Portfolio/Review	

Satisfactory Exit Portfolio/Review

Student Signature Date

Advisor Signature Date

Rationale for STEM PLUS Program

In Spring 2011, the STEM Education Faculty submitted an innovative undergraduate secondary certification program (called *STEM PLUS – Preparing Leaders for rUral/Urban Schools*). STEM PLUS program participants will earn a Bachelors of Science in Education with a double major in STEM Education and their content major (i.e., mathematics, physics, forthcoming--chemistry, biology, earth science, physical science, computer science) with secondary teaching certification (grades 8-12) in one or more state-certifiable STEM subjects in just 4 years. In addition, a proposal for a STEM Education major will be submitted that will allow College of Arts and Sciences and College of Engineering students to add on secondary mathematics, science, and/or computer science certification to their current degree program (see attached support letters). The STEM Education major will serve as the secondary major within their Arts and Sciences or Engineering degree program. There currently does not exist an undergraduate certification option for secondary mathematics, science or computer science students at UK. This degree program and major will allow for greater flexibility and multiple pathways towards becoming a STEM teacher.

There will be two undergraduate secondary education programs transferred to the.new STEM Education Department in science and mathematics. Although these are Bachelor Degree programs, they do not lead to certification. A student who is within this program must continue on to the Master's with Initial Certification (MIC) program in order to be certified. However, data from the past 10 years of these two undergraduate programs have revealed that over 60% of the graduates do not go on to the MIC program. A majority of graduates decide to pursue alternative certification routes from other colleges or universities such as Eastern Kentucky University, Morehead State University, Georgetown College, and Northern Kentucky University. The main reason for these students pursuing their certification elsewhere is the financial burden of an intensive, full-time, one calendar year, Master's degree program such as the MIC. The STEM PLUS program will replace the existing secondary mathematics and science undergraduate programs. Current students in the undergraduate mathematics and science education programs (99 total) will have the option of transferring into the STEM PLUS program or finishing out their current program which does not lead to certification. If they choose to finish out their current program, we will continue to advise and foster them into the MIC Mathematics and Science Program. In early discussions with students, juniors and seniors (approximately 35) were interested in finishing out their current programs and the remaining students were interested in transferring to the new program when it became available. Future STEM PLUS students will be the result of recruiting high school students to become STEM teachers and choose UK to pursue their bachelor's degree and certification. We will utilize an Introduction to STEM Education Course, UK Admissions Office, websites, brochures, and other additional media means to recruit for the STEM PLUS Program and STEM Education Major Option. Figure 3 below represents graduation rates for the current programs and projected graduation rates (highlighted in yellow) for the STEM PLUS program.

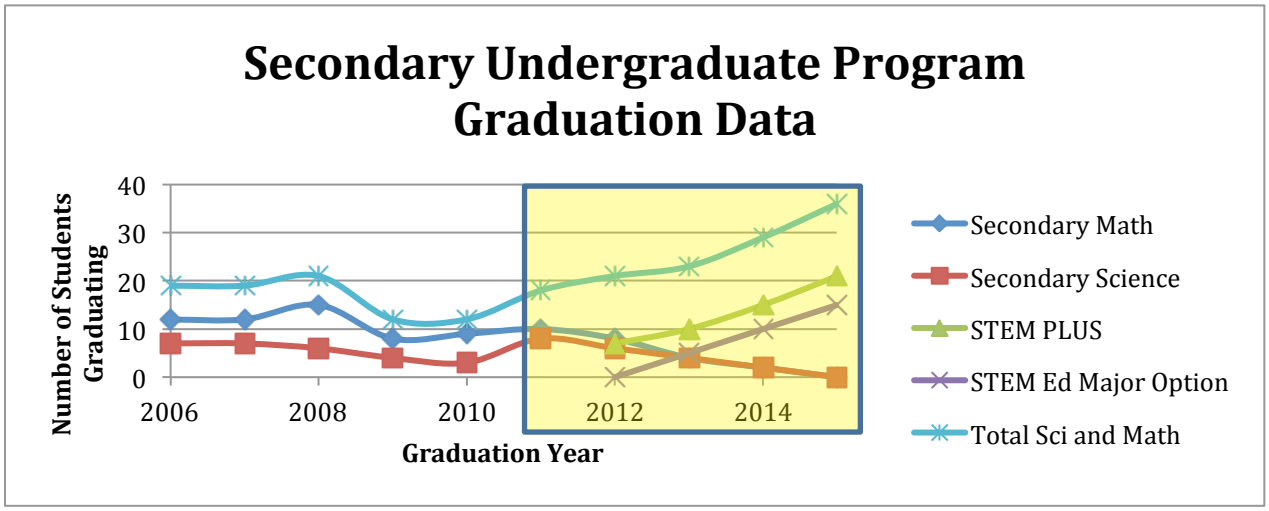


Figure 3. *Current and Projected Secondary Undergraduate Program Graduation Data*

UK is a member of the *Science and Mathematics Teacher Imperative* (SMTI) and *The Learning Collaborative* (TLC), initiated by President Lee Todd and sponsored by the Association of Public and Land-Grant Universities (APLU). SMTI/TLC commits to "transform middle and high school science, technology, engineering and mathematics (STEM) education by preparing a new generation of world-class science and mathematics teachers." The SMTI Initiative includes 125 public research universities—including 12 university systems. As part of the initiative, UK had to commit to increasing the number of STEM teachers the university produces. President Todd and College of Education Dean Mary John O'Hair committed to tripling the number of secondary STEM teachers produced by 2014. Figure 4 below shows the current number of certified middle school and high school mathematics and science teachers graduating from UK. The highlighted yellow section represents the projected growth as a result of our undergraduate STEM Education Initiatives within our proposed new STEM Education Department. This tripling of numbers will help to meet the demand for highly qualified STEM teachers in secondary classrooms.

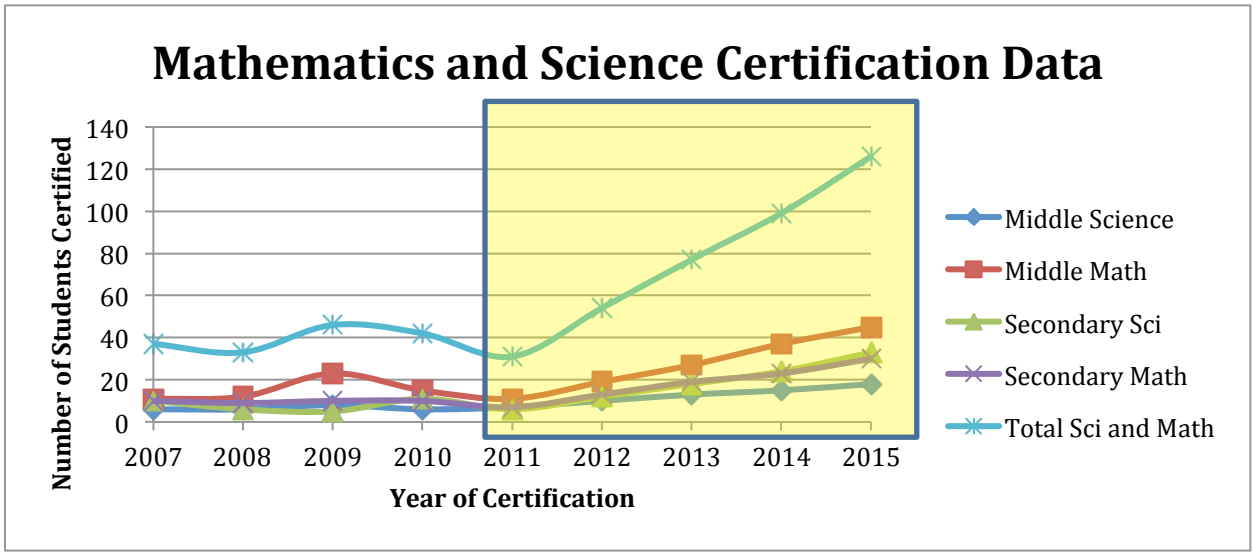


Figure 4. *Current and Projected Mathematics and Science Certification Data*

The lack of highly qualified mathematics and science teachers in middle and high school classrooms in the United States is a crisis that is well established. For example, unqualified teachers (i.e., out-of-field teachers) teach about 56% of high school students taking physical science and 27% taking mathematics. These percentages are magnified in high-poverty areas. Students enrolled in high minority schools have less than a 50% chance of having a science or mathematics teacher who has both a degree and license in the discipline taught (Darling-Hammond, 1999). Judy Jeffrey, a leader in the National Council of Chief State School Officers and the director of the Iowa State Department of Education, says, "In any given year, I have more openings for physics teachers than I can fill because I can't find highly qualified teachers in this field." This is compounded with the attrition of K – 12 teachers. Over the coming decade, approximately two-thirds of K – 12 teachers will either retire or leave the workforce. Of that, about 200,000 are secondary mathematics and science teachers (COSEPUP, 2007). The shortage of science and mathematics teachers is evident in the American Association for Employment in Education (AAEE) 2007 report, *Educator Supply and Demand in the United States* (see Figure 5 below).

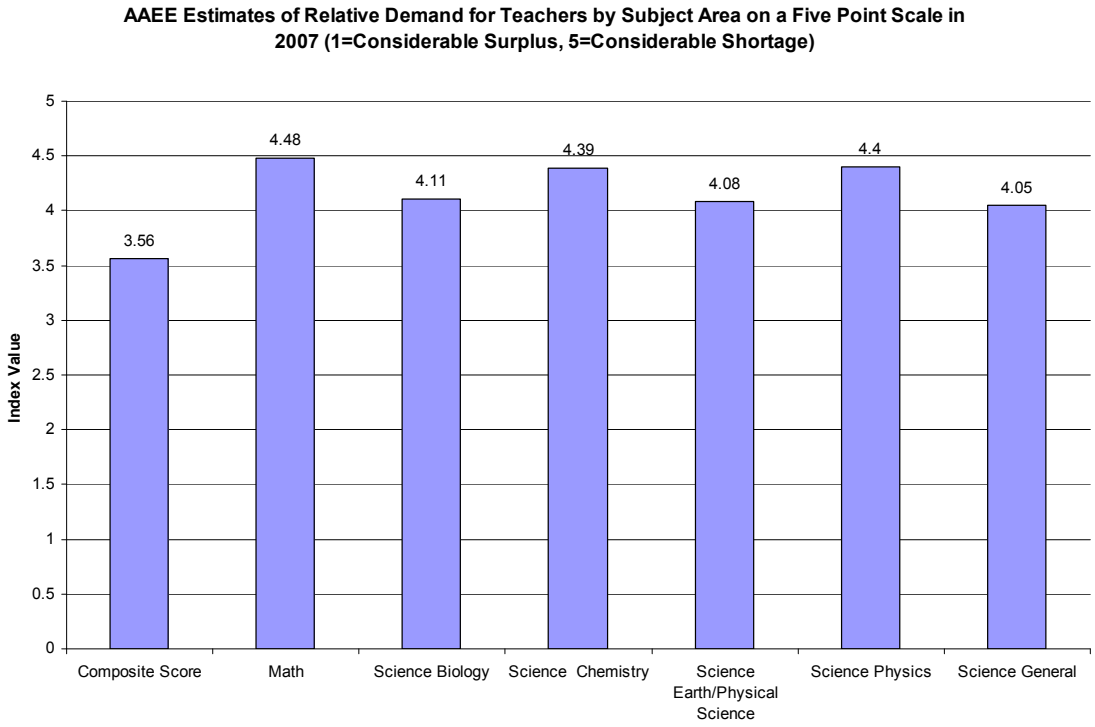


Figure 5. *Relative Demand for STEM Teachers by Subject Area*

At the state level, the Kentucky Department of Education annually compiles a list of certification shortage areas based on data provided by the Education Professional Standards Board (EPSB). Mathematics and science certification areas have been on the list since its inception in the 1990's. A review of the emergency issuances during the 2009-2010 school year indicates the reason for this inclusion. During this school year, the last for which there is a full year's set of data, the EPSB issued a total of 461 emergency certificates to districts in Kentucky. Of that number, 123 certificates were in the areas of biology, chemistry, physics, earth/space science (all grades 8-12), mathematics (grades 8-12), middle school science (grades 5-9), and middle school mathematics (grades 5-9). (see Executive Director Phil Rogers' letter of support)

The shortage and lack of qualified mathematics and science teachers has had a detrimental effect on the job market. A 2007 *Jobs for the Future* report remarks that three-quarters of students in America are not prepared for college studies in mathematics, science, engineering, and technology. Thus, employers are left to remediate gaps in knowledge and skills, as students are unable to apply their science education in a STEM work environment. Furthermore, according to a National Association of Manufacturers survey, 51% of employers state their graduates are "deficient in math and science" (Foster, 2010). If the U.S. is to be a leader in engineering, technology, and innovation in the global market, the state of science and mathematics education must be reversed.

We believe the addition of the STEM PLUS undergraduate degree program and the STEM Education Major Option will help to address state and national STEM teacher shortages. These two options, in addition to the current MIC Mathematics and Science Programs, will help to meet the SMTI/TLC commitment of tripling our STEM teachers and help meet the demand for more STEM teachers in the Commonwealth. The current draft of the STEM PLUS program has been vetted through the following departments: Mathematics, Biology, Physics, Chemistry, Civil Engineering, Mechanical Engineering, Chemical Engineering, Electrical Engineering, and Computer Sciences. All of the department chairs whole-heartedly embraced and approved the STEM PLUS initiative and the option of adding a second major to their current degree programs. In addition, Deans Lester and Kornbluh, Colleges of Engineering and Arts and Sciences, respectively, are supportive of the proposed programs and pathways.

Sample Degree Plan - Mathematics

Fall 1	**15**	**Spring 1**	**16**
MA 113/QR1	4	MA 114	4
Comm 1	3	Comm 2	3
Int. Inq. 1	3	Int Inq 2	3
Cit 1	3	Cit 2	3
SEM 110	2	STA 210	3
Fall 2	**16**	**Spring 2**	**15**
MA 213	4	MA 261	3
MA 322	3	MA 320	3
STEM Elec 1	3	STEM Elec 2	3
Int Inq 3	3	Int Inq 4	3
EDP 202	3	EPE 301W	3
Fall 3	**15**	**Spring 3**	**15**
MA Seq 1	3	MA Seq 2	3
MA 341	3	MA 310	3
EDS 516	3	MA 330W	3
STEM Elec 3	3	SEM 421	3
STEM Elec 4	3	STEM Elec 5	3
Fall 4	**13**	**Spring 4**	**12**
SEM 422	3	SEM 435	10
STEM Elec 6	3	STEM Elec 9	2
STEM Elec 7	3		
STEM Elec 8	4		
TOTAL	120		

Sample Degree Plan - Physics

Fall 1	**14**	**Spring 1**	**16**
MA 113/QR1	4	MA 114	4
Comm 1	3	PHY 228	3
PHY 231	4	CHE 105	4
Cit 1	3	Cit 2	3
		SEM 110	2
Fall 2	**15**	**Spring 2**	**15**
MA 213	4	PHY 306	3
PHY 232	4	PHY 361	3
PHY 335	1	Int Inq 1	3
CHE 107	3	Comm 2	3
EDP 202	3	EPE 301W	3
Fall 3	**15**	**Spring 3**	**16**
AST 310	3	PHY 401G	4
Int Inq 2	3	Int Inq 3	3
EDS 516	3	STEM Elec 2	3
STA 210	3	SEM 421	3
STEM Elec 1	3	STEM Elec 3	3
Fall 4	**14**	**Spring 4**	**12**
SEM 422	3	SEM 435	10
PHY 460W	4	STEM Elec 5	2
Int Inq 4	3		
STEM Elec 4	4		
TOTAL	120		

Schroeder, Margaret

From: Ng, Kwok-Wai
Sent: Monday, February 14, 2011 2:41 PM
To: Schroeder, Margaret
Subject: Re: Support for Undergraduate Program

Dear Professor Mohr-Schroeder,

I am writing to support the creation of two additional options for mathematics and science certification in the College of Education: 1) teaching certification of physics majors by extra 29 hours of Education major courses, and 2) creation of a BS in STEM Education within the College of Education. Students of option 2) will have double majors in STEM Education and Physics since the curriculum will cover the course work of the new BA program of the Physics and Astronomy Department. Our new BA program targets at students who may not want to be a physicist, but plan to work in a profession that requires a good knowledge of physics. This will be a good match with your proposal.

We all know that there is a severe shortage in high school physics teachers nationwide. In Kentucky, many high schools cannot offer physics class because of this shortage. Some high schools use non-physics teachers to teach the subject. The new options is a step in the right direction to ease the situation. This also provides more options to our physics majors in their future career.

Sincerely yours,
Kwok-Wai Ng
DUS
Department of Physics and Astronomy
University of Kentucky
Tel: 859-257-1782 (Office)
257-4796 (Lab)

On 1/31/2011 12:12 PM, Schroeder, Margaret wrote:
Hi all-

Thank you all so much for taking the time to meet with Jennifer Wilhelm and I about creating additional options for mathematics and science certification for our students. We really feel like we have a very strong program going forward!

At this point, I am in need of an "**email of support"** from you as Chairs and DUSs in support of the undergraduate program. This would be specifically for two things: 1) the creation of a stand-alone STEM Education option in which any student in a content major (BA for Arts & Sciences) may add certification by adding the 29 hour Education major and 2) the creation of a bachelor of science in education in STEM Education and the content area(s) to be run out of the College of Education. The content department would still get "credit" for the major as they would be double majors. Students would follow the list of courses we created at each of the meetings.

Many of you are planning for the upcoming year and future and so I wanted to give you a "forecast" of where we think the program is headed. We currently have approximately 70 students in the current mathematics and science undergraduate programs (that do not lead to certification). We anticipate approximately 40 of these transferring to the new option. We anticipate approximately 30 additional students beginning with the Fall 2012 school year. We estimate that each student will take 9 hours of content coursework or more each semester of their 4 year program. This would generate a minimum of $2160 per student per year based on the current $120 per student model.

Please email me or send me a hard copy of your letter of support for these options at your earliest convenience.

Thanks!

Margaret Mohr-Schroeder, Ph.D.
Assistant Professor of Mathematics Education
STEM Education Program
University of Kentucky
105C TEB
Speed Sort: 0017

Schroeder, Margaret

From: Mike Cavagnero <mike@pa.uky.edu>
Sent: Wednesday, February 02, 2011 8:42 AM
To: Schroeder, Margaret
Cc: Wilhelm, Jennifer
Subject: Re: Support for Undergraduate Program

Dear Margaret,

I am writing to reiterate my support for the new STEM Department in the College of Education, and in particular, for the new degree programs for future high school physics teachers. The scarcity of qualified high school physics teachers is tragic, and needs to be addressed as soon as possible. It is obvious that UK should be making degree options in science teaching as flexible as possible, in order to attract students from both the core sciences and from education. A certification option for our physics majors, complemented by a core-content supplement for education majors, should attract qualified students from both worlds.

Our departmental faculty look forward to working with you to continue pressing this agenda.

With Best Wishes,
Mike Cavagnero, Chair
UK Department of Physics & Astronomy

Dr. David Royster
Outreach Professor of Mathematics
Department of Mathematics
759 Patterson Office Tower
Lexington, KY 40506-0047

859-257-1258, (FAX: 859-257-4078)
david.royster@uky.edu
http://www.ms.uky.edu/~droyster

Dr. Margaret Mohr-Schroeder
Department of STEM Education
109 Taylor Education Building
University of Kentucky
Lexington, KY 40506-0017

Dear Dr. Schroeder,

I am writing to extend my support as the Director of Undergraduate Studies in the Department of Mathematics in support of the STEM Education undergraduate program in your department.

We are always interested in creating better teachers of mathematics for the state of Kentucky and we would like to do everything that we can to support these students in their preparation for the classroom. We feel that the options put forth below will be advantageous for the students and will work hard to make certain that these future teachers get the best that the Mathematics Department has to offer. We feel that option of a double major in Mathematics and STEM Education would be very helpful for these students and would offer us the opportunity to more closely align courses to the necessary pedagogical content knowledge for teaching secondary mathematics.

The creation of a STEM Education option for students majoring in Mathematics to add certification to teach in the state of Kentucky by adding the 29-hour STEM Education major is a nice model with which I have had experience at other universities. It tends to work very well and seamlessly for the students. The creation of a Bachelor of Science in Education in STEM Education with specific content areas is a new idea that will serve students well. Either of these options would help to prepare teachers of mathematics for their classrooms. I anticipate the opportunity for undergraduate students to work seamlessly between our two departments, and it will be very good to have the opportunity for our interested faculty to be able to work seamlessly with both departments.

Again, I support and commend the creation of the STEM Education undergraduate program in your department and look forward to working with you and the department in the future.

droyster

Dr. David C. Royster,
Outreach Professor of Mathematics
University of Kentucky

UNIVERSITY OF KENTUCKY

Dept of Civil Engineering
161 Raymond Building
Lexington, KY 40506-0281

859 257-4856
fax 859 257-4404

www.engr.uky.edu/ce

January 31, 2011

Margaret Mohr-Schroeder, Ph.D.
Assistant Professor of Mathematics Education
STEM Education Program
University of Kentucky
105C TEB
Campus 0017

Dear Dr. Mohr-Schroeder,

The purpose of my letter is to support your initiative to create a stand-alone STEM Education option in which any student pursuing a content major (BA for Arts & Sciences) may add certification by adding the 29 hour Education major. In addition, I support the creation of a bachelor of science in education with a focus in STEM (Science, Technology, Engineering, and Mathematics) Education with the content area(s) to be run from the College of Education.

Please feel free to share my support of your initiatives.

Sincerely,

George E. Blandford
Professor and Chair

UNIVERSITY OF KENTUCKY

College of Arts and Sciences
Office of the Dean
213 Patterson Office Tower
Lexington, KY 40506-0027
Phone: (859) 257-8354
Fax: (859) 323-1073
www.as.uky.edu

July 22, 2009

To Whom It May Concern,

Please accept this letter as an endorsement of the approach to prospective STEM teacher education offered by the STEM PLUS program, proposed by Dr. Margaret Mohr-Schroeder and her team of co-principal investigators, including three members from UK's College of Arts and Sciences. I feel that innovative and ambitious efforts – such as the one outlined in this proposal – will have a demonstrable and beneficial impact, and as a result I wish to commit my full support to the faculty involved in order to help ensure the project's success and longevity.

As Dean of UK's College of Arts and Sciences, I am very much aware of the need for highly effective STEM teachers in K-12 education and the potential impact they have on increasing the number of STEM majors in postsecondary education. I am also increasingly concerned about declining enrollments in and attrition from STEM fields; the dearth of STEM teachers being produced at UK; and the Commonwealth's K-12 system and its need for help in promoting the importance of STEM and preparing its students to achieve in STEM disciplines at the secondary level and beyond. I am convinced that to do this correctly our students (at the University of Kentucky and throughout the Commonwealth) must be taught through pioneering interdisciplinary and multidisciplinary efforts, like the ones outlined in this project.

Furthermore, I firmly believe in a connection between the country's competitiveness and its innovation in the global marketplace and a strong STEM populace. We need a rededication to enticing our young people to major, graduate, and work in the STEM fields and/or STEM education. New approaches – that expose students to interdisciplinary and multidisciplinary curricula – must be part of the solution in order to prepare our students for the realities of the 21st century workplace and world. Such approaches – which serve as the basis of the STEM PLUS program – engage and strengthen students' problem solving skills, their ability to use technology effectively, and their facility with teamwork.

In short, I am pleased to be invited to join the STEM PLUS project's management team; I am happy to offer input and feedback throughout the project's design, assessment, and

implementation phases; and I plan to continue serving as part of the management team when STEM PLUS is scaled up and extended into new areas and with new partnerships, specifically with high-needs rural school districts.

Please do not hesitate to contact me if you have any further questions.

Sincerely,

Mark Lawrence Kornbluh
Dean

MLK:jkt

October 5, 2009

UK
UNIVERSITY OF
KENTUCKY
College of Education

Office of the Dean
103 Dickey Hall
Lexington, KY 40506-0017

859 257-2813
fax 859 323-1046

www.uky.edu/Education

U.S. Department of Education
Teacher Quality Partnership Grants Program

To Whom It May Concern:

I fully endorse the approach and objectives of UK's STEM PLUS – Providing Leaders for rUral Schools – program and will commit resources to help sustain the program for continued success beyond grant funding. Our students, as well as the Commonwealth of Kentucky, are in need of pioneering interdisciplinary efforts such as this one.

I am increasingly concerned about declining enrollments in and attrition from science, technology, engineering, and mathematics (STEM) fields at UK and especially within Kentucky's P-12 system. I believe strongly that Kentucky's efforts to improve the lives of its citizens will not be successful unless we succeed in increasing educational attainment levels, especially in the area of college degrees, and in encouraging our young people to major in and graduate from STEM fields, include STEM Education. As a strong advocate for promising new approaches to preparing students for 21st Century classrooms and workplace, I support participation of our pre-service STEM teachers in vigorous, multi- and transdisciplinary STEM programs such as STEM PLUS and continuing our work with UK's colleges of Engineering and Arts and Sciences through current pre-service teacher programs, Project Lead the Way, the UK BEST Program, and various other STEM programs.

I am committed to ensuring STEM PLUS continues beyond the life of the grant. President Todd recently gave us funding to hire five additional faculty, two at the senior level, in mathematics, science, and engineering education. A majority of these new faculty will be involved in STEM PLUS and will help ensure the continued success of this new program. To ensure additional sustainability of STEM PLUS, I will

- Connect STEM PLUS to the College's new P-20 school-university leadership network to ensure school and district leaders understand and support STEM education efforts
- Host a half-day, annual meeting for community and university leaders interested in learning more about STEM PLUS and ways to contribute
- Serve on the management team to offer input and feedback throughout the program design, assessment, and implementation phases, as well as when program is scaled up and extended to new areas of UK's curriculum and partnerships

- Work with the Department of Curriculum and Instruction to provide a graduate student for STEM PLUS to help with advising, teaching of courses, and research assistance.

In short, I fully support Dr. Margaret Mohr-Schroeder and her team. Innovative, transformative, and interdisciplinary efforts like STEM PLUS will have demonstrable and beneficial impacts for the Commonwealth of Kentucky and the nation.

Sincerely,

Mary John O'Hair

Mary John O'Hair
Dean

UNIVERSITY OF KENTUCKY

Office of the President
101 Main Building
Lexington, KY 40506-0032
www.uky.edu

July 22, 2009

Dr. Peggi Zelinko
Director, Teacher Quality Programs
Office of Innovation and Improvement
U. S. Department of Education
400 Maryland Avenue, SW
Washington, DC 20202

RE: Teacher Quality Partnership Grants Program

Dr. Zelinko:

I am writing to strongly endorse the approach and objectives of the STEM PLUS program. This is an especially exciting and timely proposal that will enable the Partnership Institute for Mathematics and Science Education Reform to expand ongoing efforts to collaborate more comprehensively with prospective teacher educators and high needs rural school districts.

As a "Sputnik Engineer," I am increasingly concerned about declining enrollments in and attrition from STEM fields, the lack of STEM teachers being produced, and in the K-12 system in general. STEM PLUS is a program that will begin to address all of these issues and will offer a model for the nation to help increase the number of mathematics and science teachers with an increased general knowledge of STEM. The STEM PLUS program also has my interest and support because it aligns with major priorities of the University of Kentucky's current draft strategic plan: to develop and implement new programs and strategies to increase student enrollment and diversity, including efforts related to . . . pipeline initiatives with middle and high school students and their teachers; encouraging multidisciplinary education; helping students gain awareness of the important social and environmental contexts for the work they are choosing; to continue to enhance recruitment of majors in the STEM disciplines and provide professional development programs for P-12 mathematics and science teachers in order to create more mathematics and science capacity; and other goals on which this program will have an impact, especially as a pilot and a model for other such programs at the local, regional, and national levels.

As the Association of Public and Land-Grant Universities' (A·P·L·U) Chair, Board of Directors, I am especially supportive of the STEM PLUS program and its contribution to UK's participation in the Science and Mathematics Teacher Imperative (SMTI) and The Leadership Collaborative (TLC). UK has had an immediate impact on

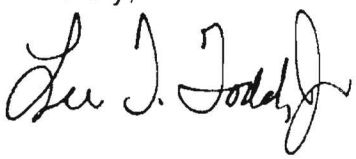
SMTI/TLC because of its Partnership Institute for Mathematics and Science Education Reform and the collaborations that have come out of it. The STEM PLUS program has the potential to become a key component in the preparation and retention of mathematics and science teachers that SMTI/TLC seeks to assemble.

The University of Kentucky's commitment to the enhancement of STEM Education is evidenced by the recent allocation of five new tenure-track positions in mathematics, science, and engineering education (housed in Curriculum and Instruction) into the Partnership Institute for Mathematics and Science Education Reform, increasing the total to seven. Unquestionably, these resources would contribute to the overall goals of the STEM PLUS program.

In short, I am delighted that Dr. Margaret Mohr-Schroeder and her colleagues are creating a comprehensive multidisciplinary approach to the preparation of teachers. I pledge my fullest support for the STEM PLUS program.

Please contact me if you have any questions concerning the support of UK or my personal commitment regarding the STEM PLUS program.

Sincerely,



Lee T. Todd, Jr.
President

UNIVERSITY OF KENTUCKY

Office of the Dean
College of Engineering
351 Ralph G. Anderson Building
Lexington, KY 40506-0503
859 257-1687
859 257-8827
fax 859 323-4922
www.engr.uky.edu

U.S. Department of Education
Teacher Quality Partnership Grants Program

July 22, 2009

To Whom It May Concern:

This letter serves to endorse the approach to prospective STEM teacher education in close partnership with high needs rural school districts proposed in the STEM Providing Leaders for Rural Schools (PLUS) Program authored by Dr. Margaret Mohr-Schroeder and her team of co-principal investigators. As Dean of the College of Engineering at the University of Kentucky, I am very much aware of the need for highly effective STEM teachers in K-12 education and the potential impact they have on increasing the number of STEM majors in postsecondary education. Our students at the University of Kentucky and may I say, the Commonwealth of Kentucky, is in need of pioneering interdisciplinary and multidisciplinary efforts like this one.

I am increasingly concerned about declining enrollments in and attrition from STEM fields at UK, the lack of STEM teachers being produced at UK, and in Kentucky's K-12 system in general as well as the lack of realization of the importance of STEM at the secondary level and its applications.

For our citizens' lives to be improved, U.S. competitiveness and innovation in the global marketplace need to continue to be strong. This will need a rededication of our efforts to encourage our young people to major in and graduate in the STEM fields and/or STEM Education. I am also a strong advocate for promising new approaches to preparing our students for the realities of the 21st century workplace, which includes interdisciplinary and multidisciplinary efforts as a part of STEM curricula.

Because I feel innovative ambitious efforts such as this proposal will have a demonstrable and beneficial impact in these areas, I wish to help ensure the success and longevity of the project by committing the curriculum writing assistants needed from our College and the appropriate support for our faculty involved in the project.

I am also delighted to be invited to join the project's management team and will be happy to offer input and feedback throughout the project design, assessment, and implementation phases and to continue to serve as part of the management

team when STEM PLUS is scaled up and extended into new areas and new partnerships with high needs rural school districts.

Please do not hesitate to contact me if you have any further questions.

Sincerely,

Thomas W. Lester
Dean
College of Engineering

EDUCATION PROFESSIONAL STANDARDS BOARD

Steven L. Beshear
Governor

100 Airport Road, 3rd Floor, Frankfort, Kentucky 40601
Phone: 502-564-4606 Fax: 502-564-7080
www.kyepsb.ky.gov

Phillip S. Rogers, Ed.D.
Executive Director

November 16, 2010

Academic Organization and Structure Committee
College of Education
University of Kentucky
166 Taylor Education Building
Lexington, KY 40506-0001

Dear Committee Members:

We have been contacted by the university to comment on the need for mathematics and science teachers across the Commonwealth. As the authorized agency for the certification of Kentucky's educators, we have first-hand knowledge regarding the shortage areas for educator certification. This belief is based on our issuance each year of emergency certifications for all content areas in K-12 education.

The Kentucky Department of Education annually compiles a list of certification shortage areas and this list is based on data provided by the EPSB. Mathematics and science certification areas have been on that list since its inception in the 1990's. A review of the emergency issuances during the 2009-2010 school year indicates the reason for this inclusion. During this school year, the last for which we have a full year's set of data, the EPSB issued a total of 461 emergency certificates to districts in Kentucky. Of that number, 123 of these certificates were in the areas of biology, chemistry, physics, earth/space science (all grades 8-12), mathematics (grades 8-12), middle school science (grades 5-9), and middle school mathematics (grades 5-9).

We believe that these data, illustrating that 27% of all emergency issuances last school year were in science and mathematics, make a strong case for the need for new and expanded programs in our state institutions for these teaching disciplines. Without going into data from previous school years, we can verify that a similar situation has existed for many years in Kentucky.

We would support any efforts to expand teacher preparation programs in the areas of science and mathematics, and we welcome any requests you may have for more information regarding this area.

Sincerely,

Phillip S. Rogers
Executive Director