

Brothers, Sheila

From: Schroeder, Margaret <m.mohr@uky.edu>
Sent: Tuesday, March 20, 2018 2:39 PM
To: McCormick, Katherine; Brothers, Sheila
Cc: Mark, Kristen; Criswell, Brett
Subject: Proposed new MAT: Secondary STEM Education
Attachments: MAT STEM proposal_SAPCfinalreduced.pdf

Proposed New MAT: Secondary STEM Education

This is a recommendation that the University Senate approve, for submission to the Board of Trustees, the establishment of a new MAT degree: Secondary STEM Education, in the Department of Science, Technology, Engineering and and Mathematics Education within the College of Education.

Rationale:

The proposed 31-hour hybrid program will provide candidates interested in teaching secondary STEM disciplines with a Master of Arts in Teaching (MAT), allowing them to teach appropriate courses in grades 8-12 in Kentucky. The program is designed to be completed in 3 consecutive semesters (summer, fall, spring), although it could be completed over two years if desired. The required coursework includes a sequence of STEM education methods and seminar courses, as well as courses in core education areas such as educational psychology, special education, education policy, literacy, and assessment. Consistent with other teacher preparation courses at UK, the MAT in Secondary STEM Education will follow a clinical model with a sequence of university research/industry externships (summer), diverse field placements in K12 schools (fall) and student teaching in K12 schools (spring). The United States continues to face drastic shortages in STEM teachers, especially in Kentucky. A key way to address this problem is to provide multiple, flexible programs offering different pathways into STEM teaching. Traditional benchmark institutions and institutions across Kentucky all offer a MAT route to certification. The proposed MAT in Secondary STEM Education program will be the most compact program in the state (e.g., can be completed in 1 calendar year), and will have unique components such as the summer externships.

This new degree program will not require any new resources. A letter of feasibility from the Dean and the Provost are included, per the senate rules. The program anticipates approximately 20 new students each year being admitted to the program.

Statement from SAPC: After hearing the concerns of both the Department of Curriculum & Instruction and the Department of STEM Education at the meeting, we considered both sides of the argument. It seemed that any of the concerns brought forth by the Department of Curriculum and Instruction were related to the potential of future programs, not the program currently under consideration. Certainly, any future programs should be considered carefully, as are all new programs. The proposal was evaluated based on our charge to consider programs based on *academic excellence, the need, and*

the impact, desirability, and priority of the new academic program in relation to other programs. This program did meet all of those criteria.

The revised proposal is attached.

Kristen Mark led the discussion and voting on the proposal at the SAPC meeting and will be presenting the proposal at Senate Council and Senate since this proposal arises from SAPC Chair Margaret Mohr-Schroeder's Department.

Thanks!
Margaret

[Margaret J. Mohr-Schroeder, PhD](#) | Associate Professor of STEM Education - Mathematics | [SAPC University Senate Committee Chair](#) | [University Senator/Senate Council Member](#) | [STEM PLUS Program Co-Chair](#) | [Department of STEM Education](#) | [University of Kentucky](#) | www.margaretmohrschroeder.com | [Schedule a Meeting with Me](#)

Brothers, Sheila

From: Nikou, Roshan
Sent: Tuesday, March 06, 2018 3:34 PM
To: Brothers, Sheila; Ett-Mims, Joanie; Jackson, Brian A; McCormick, Katherine; Nikou, Roshan; Price, Cleophus; Timoney, David
Subject: Transmittals
Attachments: STEM MAT Proposal with attachments final.pdf

TO: Katherine McCormick, Chair and Sheila Brothers, Coordinator
Senate Council

FROM: Brian Jackson, Chair and Roshan Nikou, Coordinator
Graduate Council

At the February 08 meeting, Graduate Council conditionally approved the STEM MAT proposal pending receipt of a MOU signed by both C&I and STEM. On March 01, we received notification from UK legal counsel that a signed MOU was not required. With this condition no longer applicable, the proposal is now being forwarded to Senate Council for review on the understanding that members of the Graduate Council have significant concerns with the apparently ongoing disagreements between C&I and STEM, and with the narrow margin of approval for this proposal at the college level.



Roshan Nikou, MA
Graduate Council Coordinator
101 Ezra Gillis Building | Lexington, KY 40506-0033
(859)257-1457 | www.gradschool.uky.edu
roshan.nikou@uky.edu

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1. This form has two sections. Section A contains information required by the University Senate and Registrar's office and Section B contains information required by two external entities, the CPE (Council on Postsecondary Education) and SACS-COC (Southern Association of Colleges and Schools Commission on Colleges). Although only Section A is required for University Senate approval, every question must be answered to receive CPE approval. Please write "not applicable" wherever that is the appropriate response, leaving no area blank.

2. The CPE requires that a pre-proposal and full proposal be submitted. The pre-proposal is submitted after a proposed program has received college-level approval. Answers to questions identified with a * by the question number on this form should be used for the CPE's pre-proposal. Such questions are in both Section A and Section B. Please email institutionaleffectiveness@uky.edu for more information about the CPE's [pre-proposal process](#). The CPE's full proposal requires completion of both Sections A and B of this form and is submitted after approval by UK's Board of Trustees.

3. Once approved at the college level, your college will send the proposal to the appropriate Senate academic council (HCCC and/or GC) for review and approval. Once approved at the academic council level, the academic council will send your proposal to the Senate Council office for additional review via a committee and then to the Senate for approval. Once approved by the Senate, the Senate Council office will send the proposal to the appropriate entities for it to be placed on an agenda for the Board of Trustees. The contact person listed on the form will be informed when the proposal has been sent to committee and other times as appropriate.

SECTION A – INFORMATION REQUIRED BY UNIVERSITY SENATE

1. Basic Information: Program Background and Overview

1a	Date of contact with Institutional Effectiveness ¹ :	7/5/17
	<input checked="" type="checkbox"/> Appended to the end of this form is a PDF of the reply from Institutional Effectiveness.	
1b	Home College: <i>College Of Education</i>	
1c	Home Educational Unit (school, department, college ²): <i>STEM Education Department</i>	
1d*	Degree Type (Master's of Science, Master's of Business Administration, etc.): <i>MAT</i>	
1e*	Program Name (Biology, Finance, etc.): <i>Secondary STEM Education</i>	
1f*	CIP Code (provided by Institutional Effectiveness): <i>13.1206</i>	
1g	Is there a specialized accrediting agency related to this program?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
	If "Yes," name: <i>Council for Accreditation of Teacher Preparation (CAEP)</i>	
1h	Was this particular program ever previously offered at UK but subsequently suspended?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	If "Yes," describe. (300 word limit)	

¹ You can reach Institutional Effectiveness by phone or email (257-2873 or institutionaleffectiveness@uky.edu).

² Only interdisciplinary graduate degrees may be housed at the college level.

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1i*	Requested effective date:	<input checked="" type="checkbox"/> Fall semester following approval.	OR	<input type="checkbox"/> Specific Date ³ : <i>Fall 20</i>
1j*	Anticipated date for granting first degree(s): <i>May 2019</i>			
1k*	Contact person name: <i>Brett Criswell</i>	Email: <i>brett.criswell@uky.edu</i>	Phone: <i>859-257-8974</i>	

2. Program Overview

2a*	Provide a brief description of the proposed program. (300 word limit)
	<i>The proposed program will provide candidates interested in teaching secondary STEM disciplines with a Master of Arts in Teaching (MAT), allowing them to teach appropriate courses in grades 8-12. Candidates will need an undergraduate degree (or recognized equivalent) in the STEM discipline to be admitted. Additionally, they will need to have passed the GRE or equivalent Praxis exams. Once admitted, the program is designed to be completed in 3 consecutive semesters (summer, fall, spring), although it could be completed over two years if desired. It will require candidates to attain 31 credits. The required coursework will include a sequence of methods / seminar classes, as well as classes in core education areas such as educational psychology, special education, education policy, literacy, and assessment. The candidates will also need to complete six elective credits from options (within the College of Education or the College of Arts & Sciences) to be approved by the appropriate program chair. As with other teacher preparation programs at UK, the MAT in Secondary STEM Education will follow a clinical model with a sequence of university research / industry externships (summer), diverse field placements (fall), and student teaching (spring) occurring through the three semesters. There will be checkpoints at the end of the summer and fall semester to ensure that candidates are successfully progressing through the program. Candidates will need to successfully complete the Praxis exam in their area of certification (summer or fall), as well as the Principles of Learning and Teaching (PLT) Praxis (spring). The remaining exit requirements for program completion including a passing mark on the master's exam that will be given in the spring and completion of an online portfolio of key assignments tagged with accompanying standards (also spring). Meeting the exit requirements will result in an approval for certification to accompany the approval to receive the master's degree.</i>
2b	(similar to 13a) What is the need for the proposed program? For example, is there a shortage of trained professionals or has an accrediting/professional/government body expressed a need for this type of program? Provide justification and evidence to support the need and demand for this proposed program. Include any data on student demand; career opportunities at the regional, state, and national levels; and any changes or trends in the discipline(s) that necessitate a new program. (300 word limit)
	In October 2016, EdWeek published an article titled Is STEM Education in Permanent Crisis? (http://www.edweek.org/ew/articles/2016/10/26/is-stem-education-in-permanent-crisis.html) The article discussed how the US has constantly faced a shortage of STEM teachers. The situation is only getting worse as teacher preparation programs across the country are experiencing reduced enrollments, including those programs that prepare STEM teachers. A 2017 article in The Messenger (http://www.the-messenger.com/news/local/article_1e3cd656-28f8-11e7-8c6d-f770318c2d10.html) shows that this situation applies equally to Kentucky. The only way to address this problem is to provide multiple programs offering different pathways into STEM teaching. Several years ago, the STEM Education Department began its STEM PLUS undergraduate program to allow individuals to get a degree in a STEM major, along with an education degree and teaching certificate. This provides one pathway into STEM teaching. The Department of Curriculum & Instruction has the Master's with Initial Certification (MIC) program, and that program has included options that allow one to teach mathematics or one of the sciences at the secondary level. When the STEM Education

³ Programs are effective the semester following approval. No program will be made effective unless all approvals, up through and including Board of Trustees and CPE approval, are received.

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	Department formed, the expectation was that the MIC options associated with math and science teacher preparation would come under the auspices of the Department. The proposed MAT in Secondary STEM Education is the outcome of that. The MIC English and Social Studies will still remain in Curriculum & Instruction.
2c*	<i>(similar to 11a) List the program objectives. These objectives should deal with how students will benefit from the program, both tangibly and intangibly. Give evidence that they will benefit. (300 word limit)</i>
	<i>The program objectives are derived from the Council for Accreditation of Educator Preparation (CAEP) standards (http://www.caepnet.org/standards/introduction) and are as follows: (1) ensure that candidates develop a deep understanding of the critical concepts and principles of their STEM field and are able to use STEM-specific practices flexibly to advance the learning of all students toward attainment of college- and career-readiness standards; (2) ensure that effective partnerships (including with STEM industries) and high-quality clinical practice are central to preparation so that candidates develop the knowledge, skills, and professional dispositions necessary to demonstrate positive impact on secondary STEM students' learning and development; (3) demonstrate that the quality of candidates is a continuing and purposeful part of our responsibility from recruitment, at admission, through the progression of courses and clinical experiences, and to decisions that completers are prepared to teach effectively and are recommended for certification; (4) demonstrate the impact of our completers on secondary STEM students' learning and development, classroom instruction, and schools, and the satisfaction of its completers with the relevance and effectiveness of their preparation; (5) maintain a quality assurance system comprised of valid data from multiple measures, including evidence of candidates' and completers' positive impact on secondary STEM students' learning and development and support continuous improvement that is sustained and evidence-based, and that evaluates the effectiveness of our completers.</i>
2d*	List the student learning outcomes (SLOs) for the proposed program. (300 word limit) (More detailed information will be addressed in Section A, part 5.)
	<i>The student learning outcomes (SLOs) for the program are derived from a synthesis of the ten InTASC Model Core Teaching Standards (http://www.ccsso.org/Documents/2011/InTASC_Model_Core_Teaching_Standards_2011.pdf) into two overarching SLOs: (1) The candidate demonstrates Professional Readiness. Candidates demonstrate the ability to plan, implement, and assess effective instruction on a consistent basis; (2) The candidate demonstrates Professional Dispositions. Candidates demonstrate ethical practice, concern for continuous professional learning, capacity to collaborate with various stakeholders, and a potential for leadership. The first SLO focuses on the core skills that a teacher needs to be effective in the classroom and corresponds to InTASC standards 1 – 8. The second SLO emphasizes the mindset and attitudes required of an effective teacher and correlates with InTASC standards 9 – 10.</i>
2e	Provide the rationale and motivation for the program. Give reference to national context, including equivalents at benchmark institutions. (150 word limit)
	<i>From a national perspective, the Holmes Group report Tomorrow's Teachers (https://eric.ed.gov/?id=ED270454) strongly encouraged the approach of a 5th-year teaching certification approach, where teacher candidates attain an undergraduate degree in the major and then complete a 1-year master's program leading to certification. This was especially encouraged in the STEM disciplines. Traditionally, such programs are labeled as Master's of Arts in Teaching (MAT) programs, while UK has historically identified its program as Master's with Initial Certification (MIC). MAT programs in STEM-related fields exist at almost all benchmark institutes; for instance, the University of Louisville, University of Georgia, University of Virginia, and Penn State University all have comparable programs. Within Kentucky, EKV, WKU, and Morehead State University all have MAT programs. The proposed MAT in Secondary STEM Education program will be the most compact program in the state, and will have unique components (e.g. summer externships).</i>
2f	Describe the proposed program's uniqueness within UK. (250 word limit)

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	<p><i>As noted in 2e, the proposed MAT in Secondary STEM Education program will be compact in terms of credits (31) and timeline. The typical timeline – three semesters to completion – distinguishes it from master’s programs in other colleges. For instance, the chemistry master’s program maps out a 2-year timeline (minimum) and this is typical of other master’s programs across the university. Despite the abbreviated timeline, candidates still gain significant practical experience applying the content of their coursework through their clinical placements, thus mirroring the research experiences found in other programs. Further, the expectation that candidates will complete an industry externship / informal STEM education experience in their first summer provides a connection to the community outside of UK that is not found in many master’s programs. Moreover, the master’s exam for the MAT in Secondary STEM Education program will involve an application-based scenario where candidates will have to analyze a video of actual classroom teaching in a STEM setting individually, and then collaborate with peers in their cohort to develop a consensus analysis of the video, on which they present to the committee. The STEM Education Department and College of Education feels that this is a unique exam structure that supports the analytical and collaborative skills need for success in the target occupation of teaching.</i></p>		
2g	Describe the target audience. (150 word limit)		
	<p><i>There will mainly be two target audiences for this program. The first would be candidates who would come into the program directly out of an undergraduate STEM major (mathematics, biology, chemistry, etc.). The second audience would be individuals with a STEM undergraduate degree – as well as perhaps an advanced degree in a STEM field – who either choose to enter teaching after spending some time in the workplace or before / after completing an advance degree in a STEM field. The candidate’s workplace would not necessarily need to have a STEM focus, as long as the individual has an undergraduate STEM degree. It is imperative that the program allow for a quick pathway into teaching (as in the typical 3-semester route), but also be flexible for candidates who may have to work while completing the degree (for which we will have a 2-year option).</i></p>		
2h*	Does the program allow for any concentrations?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If “Yes,” name the concentration(s). (Specific course requirements will be described in Section A, part 7.)		
	Concentration #1:		
	Concentration #2:		
	Concentration #3:		
2j*	Are necessary resources available for the proposed new program? (A more detailed answer is requested in Section A, part 4.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2k	Describe how the proposed program will be administered, including admissions, student advising, retention, etc. (150 word limit)		
	<p><i>Recruitment and advising of candidates in the MAT in Secondary STEM Education program will be undertaken by the two program chairs: one for math and one for science. The chairs will provide initial information to candidates showing interest in the program and direct them to the online application. An administrative assistant will process the applications in coordination with the graduate school. Viable candidates will be interviewed by the program chair and one other member of the MAT in Secondary STEM Education program faculty. The program faculty will vote on admission. Upon acceptance, candidates will receive an official letter. The program chair will initially advise all candidates on program requirements and plan a course of study. Candidates will meet with program chairs following the summer and fall semesters to ensure that they are on course to meet program requirements and remediation plans will be developed if they are not.</i></p>		
2l	Are multiple units/programs collaborating to offer this program?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

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	If "Yes," please discuss the resource contribution(s) from each participating unit/program. (150 word limit) (Letters of support will be addressed in Part A, section 7.)		
	<i>There are four departments who will contribute to the MAT in Secondary STEM Education program by offering courses that will be part of the program of study: Curriculum & Instruction (C&I); Educational, School & Counseling Psychology (EDP), Early Childhood, Special Education, and Rehabilitation Counseling (EDS), Educational Policy Studies & Evaluation (EPE). Each program will be responsible for 1 – 2 courses within the MAT STEM program of study. The chairs for each department were contacted in the spring of 2017 about the new program and the course needs. Each chair obtained approval from the departmental faculty to support the inclusion of those courses in the program. Emails indicating this faculty approval for each department will be provided with the new program paperwork.</i>		
2m	Are there any UK programs, which the proposed program could be perceived as replicating?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "Yes," give a rationale for why this is not duplication, or is a necessary duplication. (250 word limit)		
	<i>The MIC in Secondary Education program, housed in the department of Curriculum & Instruction, currently produces candidates with certifications in math, science, English and social studies. When the Dept of STEM Education was created in 2011, the math and science arms of the MIC program were to transfer over to the new department. However, the MIC graduate program was submitted as a general Secondary Education program with no official concentrations. Since the current MIC program does not specify particular pathways producing candidates with certification in specific areas, a new degree had to be proposed. The MAT in Secondary STEM Education program is a new program focused on producing candidates with secondary certifications in the STEM areas (math, and the science disciplines of biology, chemistry, earth science, and physics). This new program is not a true duplication because, at the university level, the MIC program does not specify certification areas. Further, once the MAT in Secondary STEM Education is approved, the MIC math and science pathways in the Department of Curriculum and Instruction will no longer exist. No suspension is necessary because there are no official concentrations. The STEM Education department recognizes and acknowledges the concerns raised by the Department of C&I regarding the fear of expanding the MAT in Secondary STEM Education program to elementary and middle school levels. It is not our intention to do so. Further, the STEM Education department does not anticipate any changes to our current collaborative relationship with the undergraduate C&I-run elementary and middle school programs.</i>		
	If "Yes," two pieces of supporting documentation are required.		
	<input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is a letter of support from the unit chair/director who may perceive this program as a replicate. <input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is verification that the chair/director of the other unit has agreement from the faculty members of the unit. This typically takes the form of meeting minutes.		
2n	Will the faculty of record for the proposed new master's degree be the graduate faculty of the department/school offering the proposed new degree?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "No," please describe the faculty of record for the proposed master's program, including: selection criteria; term of service; and method for adding/removing members. Will the existing director of graduate studies (DGS) in the department/school be the DGS for this proposed master's degree?		
2o	Will the program have an advisory board ⁴ ?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," please describe the standards by which the faculty of record will select members of the advisory board, the duration of service on the board, and criteria for removal. (150 word limit)		

⁴ An advisory board includes both faculty and non-faculty who are expected to advise the faculty of record on matters related to the program, e.g., national trends and industry expectations of graduates.

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	If "Yes," please list below the number of each type of individual (as applicable) who will be involved in the advisory board.
	Faculty within the college who are within the home educational unit.
	Faculty within the college who are outside the home educational unit.
	Faculty outside the college who are within the University.
	Faculty outside the college and outside the University who are within the United States.
	Faculty outside the college and outside the University who are outside the United States.
	Students who are currently in the program.
	Students who recently graduated from the program.
	Members of industry.
	Community volunteers.
	Other. Please explain:
	Total Number of Advisory Board Members

3. Delivery Mode	UK DLP and eLearning Office ⁵
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3a*	Initially, will any portion of the proposed program's core courses be offered via distance learning ⁶ ?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "Yes," please indicate below the percentage of core courses that will be offered via distance learning.		
(check one)	1% - 24% <input type="checkbox"/>	25% - 49% <input type="checkbox"/>	50% - 74% <input checked="" type="checkbox"/>
	75 - 99% <input type="checkbox"/>	100% <input type="checkbox"/>	
	NOTE: Programs in which 25% or more of the program will be offered via distance learning may need to submit a substantive change prospectus to SACS. Please contact institutionaleffectiveness@uky.edu for assistance. <i>The prospectus is required by SACS, but it is NOT required for Senate review.</i>		

3b*	If any percentage of the program will be offered via the alternative learning formats below, check all that apply, below.
	<input checked="" type="checkbox"/> Distance learning.
	<input checked="" type="checkbox"/> Courses that combine various modes of interaction, such as face-to-face, videoconferencing, audio-conferencing, mail, telephone, fax, email, interactive television, or World Wide Web.
	<input checked="" type="checkbox"/> Technology-enhanced instruction.
	<input checked="" type="checkbox"/> Evening/weekend/early morning classes.
	<input type="checkbox"/> Accelerated courses.
	<input checked="" type="checkbox"/> Instruction at nontraditional locations, such as employer worksite.
	<input type="checkbox"/> Courses with multiple entry, exit, and reentry points.
	<input checked="" type="checkbox"/> Modularized courses.

3c	<p>Give pedagogical rationale for the use of alternative delivery modes in the proposed program. Consider the aspects below and elaborate as appropriate. (200 word limit)</p> <ul style="list-style-type: none"> • Synchronous and asynchronous components. • Balance between traditional and non-traditional aspects. • Hybrid elements. <p><i>The reasons for the alternative delivery modes are varied in relation to the courses in which they will be utilized.</i></p>
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⁵ For questions about alternative delivery modes, please contact UK's Distance Learning Programs and e-Learning office (<http://www.uky.edu/DistanceLearning/>).

⁶ Per the Southern Association of Colleges and Schools Commission on Colleges (SACS) definition of distance education, distance education is a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous.

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For instance, a new course in the program, SEM 521 – Foundations of STEM Teaching, will include a university research / industry externship experience because individuals who will teach in STEM areas should have those experiences in order to authentically represent the nature of STEM to their students. Evening courses will be offered in the fall and spring in order to (1) provide viable electives for candidates (fall) and (2) account for the schedules of candidates during student teaching (spring). Distance learning and technology-enhanced courses will be offered to (1) model current best pedagogical practices that candidates may then want to replicate in their own teaching contexts and (2) provide more flexibility to candidates in terms of when and from where they take courses. The latter rationale is critical as we try to create an MAT in Secondary STEM Education program that meets the needs of a host of potential candidates, including career changers.

4. UK Resources

4a*	Will the program's home educational unit require new or additional faculty?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," provide a plan to ensure that appropriate faculty resources are available, either within UK or externally, to support the program. Note whether the new and additional faculty will be part-time or full-time faculty. If "No," explain why. (150 word limit)		
	If "Yes," when will the faculty be appointed? (150 word limit)		
4b*	Will the program's home educational unit require additional non-faculty resources, e.g. classroom space, lab space, or equipment?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," provide a brief summary of additional non-faculty resources that will be needed to implement this program over the next five (5) years. If "No," explain why. (150 word limit)		
4c	Will the program include courses from another educational unit(s)?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "Yes," list the courses and identify the other educational units and subunits that have approved the inclusion of their courses. (150 word limit)		
	<i>Curriculum & Instruction ⇒ EDC 533 Teaching Literacy Across Disciplines, 3 cr.</i> <i>Educational, School & Counseling Psychology ⇒ EDP 658 Problems in Educational Psychology, 1 cr; EDP 560 Assessment in School Data Analysis, 3 cr</i> <i>Early Childhood, Special Education, and Rehabilitation Counseling ⇒ EDS 516 Principle of Behavior Management & Instruction, 3 cr</i> <i>Educational Policy Studies & Evaluation ⇒ EPE 773 Seminar in Education Policy Study and Evaluation, 1 cr</i>		
	If "Yes," two pieces of supporting documentation are required. <input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is a letter of support from the other units' chair/director from which individual courses will be used. The letter must include demonstration of true collaboration between multiple units ⁷ and impact on the course's use on the home educational unit. <input checked="" type="checkbox"/> Check to confirm that appended to the end of this form is verification that the chair/director of the other unit has consent from the faculty members of the unit. This typically takes the form of meeting minutes.		

⁷ Show evidence of detailed collaborative consultation with such units early in the process

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4d	<i>(similar to question 19)</i> Fill out the faculty roster below for full-time and part-time faculty teaching major core courses in the proposed new master's program.		
<p align="center">NAME</p> <p align="center">List name & identify faculty member as FT (full-time) or PT (part-time).</p>	<p align="center">FACULTY CIP CODE⁸</p> <p align="center">List the applicable CIP Code for the faculty member.</p>	<p align="center">MAJOR CORE COURSES IN THE PROGRAM</p> <p align="center">List the major core courses in the program that the faculty member will teach and the frequency of the offering (e.g. "every spring")</p>	<p align="center">OTHER QUALIFICATIONS</p> <p align="center"><i>If applicable, list any other qualifications and comment on how they pertain to the courses in the program the faculty member will teach. If not applicable, mark with "n/a."</i></p>
<i>Dr. Brett Criswell (FT)</i>	13.1316	<i>SEM 521 – Foundations of STEM Teaching (4 cr); SEM 634 – Pedagogy in the Secondary Schools (3 cr)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses</i>
<i>Dr. Lisa Amick (FT)</i>	13.1311	<i>SEM 521 – Foundations of STEM Teaching (4 cr); SEM 631 – Pedagogy in the Secondary Schools (3 cr)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses</i>
<i>Dr. Margaret Mohr-Schroeder (FT)</i>	13.0301	<i>SEM 631 – Pedagogy in the Secondary Schools (3 cr); SEM 746 – Subject Area Instruction in the Secon</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses</i>
<i>Dr. Molly Fisher (FT)</i>	13.1311	<i>SEM 631 – Pedagogy in the Secondary Schools (3 cr)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses.</i>
<i>Dr. Laurie Henry (FT)</i>	42.2806	<i>EDC 533 – Teaching Literacy Across Disciplines (3 cr)</i>	<i>Dr. Henry has had specific experiences developing and using materials associated with STEM literacy.</i>
<i>Dr. Ken Tyler (FT)</i>	42.2703	<i>EDP 658 Problems in Educational Psychology (1 cr)</i>	N/A
<i>Dr. Tom Guskey (FT)</i>	13.0601	<i>EDP 560 Assessment in School Data Analysis (3 cr)</i>	<i>Dr. Guskey has done presentations on assessment to the MIC STEM classes for several years and will be using those experiences in designing this course.</i>

⁸ Consult your college's associate dean for faculty affairs for specific assistance with Classification of Instructional Programs codes (CIP codes).

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<i>Dr. Joe Ferrare (FT)</i>	<i>13.0699.01</i>	<i>EPE 773 Seminar in Education Policy Study and Evaluation (1 cr)</i>	<i>N/A</i>
<i>Dr. Sally Shepley (FT)</i>	<i>13.1001</i>	<i>EDS 516 Principle of Behavior Management & Instruction (3 cr)</i>	<i>N/A</i>

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5. Assessment – Program Assessment and Student Learning Outcomes (SLOs)

5a	Referring to program objectives, student benefits, and the target audience (questions 2c and 2g), explain how the <i>program</i> will be assessed, which is different from assessing student learning outcomes. Include how the faculty of record will determine whether the program is a success or a failure. List the benchmarks, the assessment tools, and the plan of action if the program does not meet its objectives. <i>(250 word limit)</i>
	<i>There will be a number of sources of data to assess whether objectives identified in (2c) are being met. First, faculty of record will maintain yearly data related to candidates' performance on the key assignments; examining these data yearly as well as longitudinally will allow us to determine the extent to which objective (1) is met. That data will feed into our annual SLO report that will allow further analysis of the extent to which objective (1) is being met. Second, in the student teaching semester, faculty of record will obtain data from student teaching observations and mid-term and final evaluations by supervisors and by cooperating teachers; this will provide insights into the extent to which objectives (3) and (5) are being met. In the candidates' first year in the classroom, they will complete the Kentucky Teacher Internship Program (KTIP), and the faculty of record will use data from that to determine whether the program is meeting objectives (3) – (5). A supplementary source of data related to KTIP reports will be the Kentucky New Teacher Survey given by the EPSB biannually (http://www.kyepsb.net/TestingResearch/Statistics/StateRptCard/). Feedback from members of the program faculty, particularly K-12 teachers, will help to provide data related to objective (2). Finally, the overall CAEP accreditation, which is undertaken every seven years, will provide a thorough and holistic report of the extent to which the entire set of program objectives are met. The faculty of record will use the fall reporting periods as a formative assessment opportunity and will use a summer review of program data to make necessary program revisions annually.</i>
5b	<i>(related to 2d and 14.c)</i> Based on the SLOs from question 2c, append a PDF of the program's curriculum map ⁹ to the end of this form.
5c	Append an assessment plan ¹⁰ for the SLOs to the end of this form.

6. Non-Course Requirements

6a	Will the program require completion of a bachelor's degree from a fully accredited institution of higher learning?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	If "No," explain below. <i>(150 word limit)</i>		
6b	The Graduate School requires applicants to have an overall GPA of 2.75 on undergraduate work. Will the program have a higher undergraduate GPA requirement?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
	If "Yes," describe below. <i>(150 word limit)</i>		

⁹ Course mapping (or "curricular mapping") is a representation of how faculty intend to approach and assess each of the student learning outcomes identified for the courses for the degree program, with an emphasis on only those courses required for all degree candidates. It is a master chart that indicates which objectives are being met, to what extent, and how often. This identifies whether an objective is "introduced," "developed," and/or "mastered" within a given course; it may be helpful also to chart any classroom-based assessment measures used to demonstrate that claim.

¹⁰ An assessment plan is typically a tabular grid that illustrates the artifacts, rubrics, assessment team, and periods of assessment for the SLOs.

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6c	Will the proposed program include requirements for testing (e.g. GRE, GMAT, TOEFL) to be considered for admission?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
If "Yes," name each test and describe the specific requirements, scores, etc. below. (150 word limit)			
<i>A complete set of GRE scores are required for this program; required scores are in line with state certification/ benchmark requirements. If candidates do not successfully achieve the required GRE scores, the state allows them to take the comparable Praxis test.</i>			
6d	Will the program have a world language requirement?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If "Yes," describe below. (150 word limit)			
6e	The Graduate School allows transfer of up to nine credits or 25% of course work. Please describe transfer credit limitations below for the proposed program. (150 word limit)		
Candidates are allowed to transfer up to 9 credits into the MAT in Secondary STEM Education program. These courses would need to be either disciplinary STEM courses (e.g. biology, mathematics, etc.) at the graduate level or education courses at the graduate level. Other graduate courses could be accepted (e.g. computer science) with advisor approval.			
6f	Will the program have a thesis requirement (Plan A)? (If "Yes," explain the requirements below. If "No," proceed to question 6g)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
6g	Will the program have a non-thesis requirement (Plan B)? (If "Yes," explain the requirements below. If "No," proceed to question 6h)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
If "Yes," explain the requirements below.			
Candidates in the program will have to engage in a university research / industry externship / informal STEM teaching & learning experience in their first [summer] semester. The non-thesis requirement will be for them to translate some component of that experience into curriculum that they can enact in their fall field experience or spring student teaching placement. Candidates will be evaluated on the curricular product they create; the elements of the evaluation rubric are (1) clear connection to KY Academic Standards, (2) full integration of STEM practices (from the standards), (3) inclusion of inter-disciplinary (STEM) connections, (4) focus on a real-world problem / phenomenon, and (5) logical development of content. This project will be undertaken in the SEM 631 / 634 course and completed in SEM 746 as necessary.			
6h	Provide the final examination criteria.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
The Master's exam is given to the candidates late March – early April. Candidates are given access to a sample of classroom video (from within their discipline) and asked to conduct an analysis according to the Professional Noticing framework. They have an hour and a half to complete this individual analysis, which is then submitted electronically to their committee. The candidates are then placed in groups to complete a re-analysis of the same video segment – an analysis in which consensus must be reached. This group analysis is then presented to the committee (of 3 STEM education faculty), and committee members ask questions following the group presentation. The candidates are evaluated on their individual analysis using a rubric and our also evaluated on their group analysis and their collaboration. They must achieve an average rating of Developing (given the levels of Exemplary, Developing, Ineffective) across the set of rubric elements to receive a passing score for the exam.			

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6i	Describe termination criteria.	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	The following are the set of requirements for successful completion of the program: (1) A passing grade in all courses and an overall GPA of 3.0 and (2) a passing score on the Master's Exam.		

7. Course Requirements.

7a	Document the total credit hours required by level below. At least two-thirds of the minimum requirements for the master's or specialist degree must be in regular courses, and at least half of the minimum course requirements (excluding thesis, practicum, or internship credit) must be in 600- or 700-level courses.			
	400G-level: 0	500-level: 13	600-level: 4	700-level: 8

7b*	What is the total number of credit hours required for the degree? ¹¹ (e.g. 24, 32)	31
	If an explanation about the total credit hours is necessary, use the space below. (150 word limit)	
	<i>The difference between the credits identified in 7a. (25) and the number identified in 7b. (31) is due to the fact that candidates are required to take 6 elective credits, and it cannot be determined at what level (500 – 700) those will be taken.</i>	

*Use the grids below to list core courses, electives, courses for a concentration, etc.
Use the course title from the Bulletin or from the most recent new/change course form.*

7c* **Program Major Core Courses.** These courses are required for all students in the program and include prerequisite courses. Check the appropriate box to describe the course as either “program core” or “prerequisite.”

Prefix & Number	Course Title	Type of Course	Credit Hrs	Course Status ¹²
SEM 521	Foundations of STEM Teaching	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	4	New
SEM 631 or SEM 634	Mathematics Pedagogy in the Secondary Schools OR Science Pedagogy in the Secondary Schools	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	3	No Change
SEM 746	Subject Area Instruction in the Secondary Schools	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	7	No Change
EDC 533	Teaching Literacy Across Disciplines	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	3	No Change
EDP 658	Problems in Educational Psychology	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	1	No Change
EPE 773	Seminar on Education Policy, Study & Evaluation	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	1	No Change
EDS 516	Principles of Behavior Management & Instruction	<input checked="" type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite	3	No Change
EDP 560	Assessment in School Data Analysis	<input checked="" type="checkbox"/> Pgm Core	3	New

¹¹ A non-thesis option (Plan B) requires that six or more graduate credit hours of course work be submitted in lieu of a thesis.

¹² Use the drop-down list to indicate if the course is a new course (“new”), an existing course that will change (“change”), or if the course is an existing course that will not change (“no change”).

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		<input type="checkbox"/> Prerequisite		
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
		<input type="checkbox"/> Pgm Core <input type="checkbox"/> Prerequisite		Select one....
Total Core Courses Credit Hours:			25	
7d	Is there any narrative about prerequisite courses for the program that should be included in the Bulletin? If "Yes," note below. (150 word limit)		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
7e	Is there any narrative about core courses for the program that should be included in the Bulletin? If "Yes," note below.		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Program Guided Electives¹³ (Guided electives for <u>all</u> students in the program.)				
7f*	Does the program include any guided electives? (If "Yes," indicate and note the specific courses in the grid below. If "No," indicate and proceed to question 7i.)		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
7g*	Using the grid provided, list the guided electives below.			
Prefix & Number	Course Title	Credit Hrs	Course Status ¹⁴	
SEM 770	<i>Special Topics in STEM Education</i>	3	No Change	
SEM 620	<i>Equity in STEM Education</i>	3	No Change	
SEM 613	<i>Technology for Model-Based Inquiry in STEM Education</i>	3	No Change	
SEM 610	<i>Teacher Leadership in STEM Education</i>	3	No Change	
SEM 604	<i>History of STEM Education</i>	3	No Change	
SEM 603	<i>Curriculum & Instruction in STEM Education</i>	3	No Change	
SEM 504	<i>Project-Based STEM Education</i>	3	No Change	
EGR 599	<i>Topics in Engineering: Robotics</i>	3	No Change	

¹³ Guided electives are available to all students in the program and are organized as groups of elective courses, from which a student chooses one (or two, or three, etc.).

¹⁴ Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").

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			Select one....
			Select one....
<i>Total Credit Hours as Guided Electives:</i>		<i>6</i>	
7h	Is there any narrative about guided electives courses that should be included in the Bulletin? If "Yes," note below. (150 word limit)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<i>Candidates will choose 6 hours of elective courses from the list of program options or as approved by their advisor.</i>			
Program Free Electives¹⁵. (Free electives for <u>all</u> students in the program.)			
7i*	Does the program include any free electives? (If "Yes," indicate and proceed to question 7j. If "No," indicate and proceed to 7l.)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
7j*	What is the total number of credit hours in free electives?	<i>0</i>	
7k	Provide the free electives courses language that will be included in the Graduate School Bulletin. (150 word limit)		
Courses for a program's concentration(s).			
Click HERE for a template for additional concentrations ¹⁶ .			
7l	Does the program include any concentrations? (If "Yes," indicate and proceed to question 7m. If "No," indicate and proceed to 7p.)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
7m	Concentration name:		
Prefix & Number	Course Title (Check the appropriate box to describe the course as "a core course for the concentration" or "an elective course for the concentration.")	Credit Hrs	Course Status ¹⁷
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core		Select one....

¹⁵ Program free electives are available to all students in the program (regardless of any concentration(s)) and the choice of which course(s) to take is up to the student. Courses are not grouped but can be described as "student must take three courses at the 600-level or above."

¹⁶ Append a PDF with each concentration's courses to the end of this form.

¹⁷ Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change")

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		<input type="checkbox"/> Elective		
		<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
		<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
		<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
		<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....

7n	Provide concentration-related language that should be included in the Graduate School Bulletin. (150 word limit)
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7o	Does the program have an additional concentration? (If "Yes," indicate and proceed to question 7p. If "No," indicate and proceed to 7r.)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
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7p	Concentration #2 Name:	
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Prefix & Number	Course Title (Check the appropriate box to describe the course as "a core course for the concentration" or "an elective course for the concentration.")	Credit Hrs	Course Status ¹⁸
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....
	<input type="checkbox"/> Core <input type="checkbox"/> Elective		Select one....

<i>Total Credit Hours, Concentration #2:</i>		
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7q	Provide concentration-related language that should be included in the Graduate School Bulletin for the second
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¹⁸ Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change")

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	concentration. (150 word limit)

7r	Is there anything else about the proposed program that should be mentioned? (150 word limit)
	No

8. Degree Plan

8a Create a degree plan for the proposed program by listing in the table below the courses that a typical student would take each semester. Use the spaces for “Year 3” only if necessary. If multiple concentrations are available, click [HERE](#) for a template for additional concentrations. Append a PDF with each concentration’s semester-by-semester program of study to the end of this form.

YEAR 1 - FALL:	<i>SEM 631 / 634, EDP 658, EPE 773, EDS 516, 1 or 2 electives</i>	YEAR 1 - SPRING:	<i>SEM 746, EDP 560, 1 elective</i>
YEAR 2 - FALL :		YEAR 2 - SPRING:	
YEAR 3 - FALL:		YEAR 3 - SPRING:	

8b With reference to the degree plan above, explain how there is progression in rigor and complexity in the courses that make up the program. (150 word limit)

First, it needs to be noted that there are 2 summer courses that could not be listed in 8a.: SEM 521 and EDC 533. Second, there are two visible ways the progression in terms of rigor and complexity can be illustrated. One is that the STEM education sequence – SEM 521, SEM 631 / 634, SEM 746 – addresses increasingly more sophisticated pedagogical techniques and the assignments are more demanding. The other is that the clinical experiences associated with the program involve greater demands and independent work from the candidates as they go from a summer research experience / externship to a field experience with limited responsibilities to student teaching where they eventually become responsible for a full teaching load.

9. Approvals/Reviews

Information below does not supersede the requirement for individual letters of support from educational unit administrators and verification of faculty support (typically takes the form of meeting minutes).

	Reviewing Group Name	Date Approved	Contact Person Name/Phone/Email
9a	(Within College) In addition to the information below, attach documentation of department and college approval. This typically takes the form of meeting minutes but may also be an email from the unit head reporting department- and college-level votes.		
	STEM Education	8-15-17	Jennifer Wilhelm / (859) 257-1291 / jennifer.wilhelm@uky.edu
			/ /
			/ /
			/ /

9b (Collaborating and/or Affected Units)

	EDP	4-21-17	Jeff Reese / (859) 257-4909 / jeff.reese@uky.edu
	EPE	5-2-17	Beth Goldstein / (859) 257-2705 / bethg@uky.edu
	EDS	5-2-17	Margaret Bausch / (859) 257-8810 / meb@uky.edu
	EDC	5-4-17	Jared Stallones / (859) 257-3230 / jared.stallones@uky.edu
			/ /

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			/	/
			/	/
			/	/
			/	/
9c	(Senate Academic Council)		Date Approved	Contact Person Name
	Health Care Colleges Council (if applicable)			
	Graduate Council		2/8/18	Roshan Nikou

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SECTION B – INFORMATION REQUIRED BY CPE AND SACS	
10. Program Overview – Program Quality and Student Success	
10a*	<p>Highlight any distinctive qualities of the proposed program. Are any faculty nationally or internationally recognized for expertise in this field? Does this program build on the expertise of an existing locally, nationally, or internationally recognized program at UK? (300 word limit)</p> <p><i>In developing the MAT in Secondary STEM Education program, we used input from several critical stakeholder groups: current secondary science teachers in the Bluegrass region, graduates of our STEM teacher preparation programs, and business / industries. Based on surveys given to the first two groups and informal input from the third group, we have identified key features to include in the program: (1) a compact program in terms of credits (31) and timeline (3 consecutive semesters); (2) a flexible program that would allow for a longer timeline (2 years) if desired; (3) a 3-semester sequence of STEM-focused methods / seminar courses; (4) an initial summer externship in a STEM-related business / industry; (5) more attention to classroom management and to special needs students through a course offered by our EDS department; and (6) a significant focus on assessment through the inclusion of a separate assessment course, as well as the weaving of assessment into the 3 methods / webinar courses. Additionally, there will be significant collaborations with the literacy instructors to integrate STEM-specific literacy principles into the literacy course. Also, the program will have a heavy clinical experience and an application-based master's exam. Faculty within the program (e.g. Drs. Criswell and Mohr-Schroeder) have been active in discussions around the issue of authentic externship experiences in the state. Another faculty member (Dr. Amick) is active in the work of National Board. Finally, several faculty members (e.g. Dr. Wilhelm, Dr. Fisher, Dr. Thomas, Dr. Jong, and Dr. Krall) are leading national efforts around professional noticing, which will be a coordinating framework within the program.</i></p>
10b*	<p>(similar to 2b) What are the intended student learning outcomes (SLOs) of the proposed program? Address one or more of the five areas of learning – broad, integrative knowledge; specialized knowledge; intellectual skills; applied learning; and civic learning. (300 word limit)</p> <p><i>The student learning outcomes (SLOs) for the program are derived from a synthesis of the ten InTASC Model Core Teaching Standards (http://www.ccsso.org/Documents/2011/InTASC_Model_Core_Teaching_Standards_2011.pdf) into two overarching SLOs: (1) The candidate demonstrates Professional Readiness. Candidates demonstrate the ability to plan, implement, and assess effective instruction on a consistent basis; (2) The candidate demonstrates Professional Dispositions. Candidates demonstrate ethical practice, concern for continuous professional learning, capacity to collaborate with various stakeholders, and a potential for leadership. The first SLO focuses on the core skills that a teacher needs to be effective in the classroom and corresponds to InTASC standards 1 – 8. The second SLO emphasizes the mindset and attitudes required of an effective teacher and correlates with InTASC standards 9 – 10.</i></p>
10c	<p>Clearly state the student admission, retention, and completion standards designed to encourage high quality. (300 words)</p> <p><i>Students are encouraged to apply in the fall or spring semester, prior to the summer in which they intend to start the program. The application process includes an online application and an interview with program faculty. The interview with program faculty is meant to help identify and select candidates with specific teacher dispositions who can be successfully cultivated in the program. Students must also meet minimum GRE requirements (143-quantative, 150-verbal, 4.0-writing) and have an overall incoming GPA of 2.75 as well as a GPA of 2.75 in their selected STEM content area courses (mathematics for example). Setting these minimum standards is key to getting high quality candidates because effective teachers must be sound in their content knowledge before they are able to teach it to their students. Students are supported throughout the program by their program chair who meets with them on a regular basis, completes a midterm conference with each student, as well as an exit interview at the completion of the program. Additional retention supports include monthly meetings of the program chairs to discuss student concerns, program development, and to collaborate with colleagues in the Arts & Sciences to strengthen the program further. For students to complete the program they must pass all required courses in the program including doing the required assignments, maintain an overall GPA of 3.0, and successfully complete the required master's examination.</i></p>
10d*	<p>Describe how the proposed program will articulate with related programs in the state. Include the extent to which student transfer has been explored and coordinated with other institutions. Note: Convert all draft articulation</p>

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	agreements related to this proposed program to PDF and append to the end of this form. (300 word limit)
	<i>Given that the proposed program is completed in 3 consecutive semesters (summer-fall-winter) within a 1-year time frame, there does not seem to be merit in exploring articulation agreements with other programs.</i>
11. Mission: Centrality to the Institution's Mission and Consistency with State's Goals	
11a*	(similar to question 2c) List the objectives of the proposed program? These objectives should deal with the specific institutional and societal needs that the program will address. (300 word limit)
	<i>The program objectives are derived from the Council for Accreditation of Educator Preparation (CAEP) standards (http://www.caepnet.org/standards/introduction) and are as follows: (1) ensure that candidates develop a deep understanding of the critical concepts and principles of their STEM field and are able to use STEM-specific practices flexibly to advance the learning of all students toward attainment of college- and career-readiness standards; (2) ensure that effective partnerships (including with STEM industries) and high-quality clinical practice are central to preparation so that candidates develop the knowledge, skills, and professional dispositions necessary to demonstrate positive impact on secondary STEM students' learning and development; (3) demonstrate that the quality of candidates is a continuing and purposeful part of our responsibility from recruitment, at admission, through the progression of courses and clinical experiences, and to decisions that completers are prepared to teach effectively and are recommended for certification; (4) demonstrate the impact of our completers on secondary STEM students' learning and development, classroom instruction, and schools, and the satisfaction of its completers with the relevance and effectiveness of their preparation; (5) maintain a quality assurance system comprised of valid data from multiple measures, including evidence of candidates' and completers' positive impact on secondary STEM students' learning and development and support continuous improvement that is sustained and evidence-based, and that evaluates the effectiveness of our completers.</i>
11b*	Explain how the program objectives above in item 11a support at least two aspects of UK's institutional mission and academic strategic plan ? (150 word limit)
	<i>Within the description of the vision for graduate education, the strategic plan describes the goal of creating programs that "transform our students into accomplished scholars and professionals who contribute to the Commonwealth, the nation, and the world through their ... teaching, and service." We believe that programmatic features such as the research / externship experiences, professional noticing framework, infusion of principles from national board, etc. will all create new teachers ready to address the challenges of 21st-century teaching. Within the description of the vision for graduate education, the strategic plan describes the goal of creating programs that "Leverage leading-edge technology, scholarship, and research in innovative ways to advance the public good ... " We believe that key assignments of the program (e.g. Bringing Big Data into the Classroom and Problems of Practice) will produce graduates prepared to interact not just with students and colleagues, but with various members of their school communities.</i>
11c*	How do the program objectives above in item 11a support at least two aspects of the Council on Postsecondary Education's (CPE) Strategic Agenda and the statewide implementation plan? (300 word limit)
	<i>In the CPE Strategic Agenda, strategy 1.1 under the diversity and inclusiveness objective states, "Increase cultural competence among students, staff and other postsecondary professionals so that everyone is welcomed, valued, supported, and accommodated." There are numerous features of our program – e.g. summer experiences associated with informal science settings and the three diverse fall field placements – and multiple assignments in the program – e.g. the Critical Incident Reflections and the Funds of Knowledge – that push our candidates to not only value and celebrate diversity themselves, but also engender this attitude towards diversity in their students. Under objective 3, strategy 3.1 states, "Work with GEAR UP KY, KDE, KHEAA, educational providers, community-based organizations and other statewide partners to improve college and career awareness through outreach initiatives." Our program is already partnering with KY FAME and LIFT (https://lift.technology) to develop coordinated summer externships with teachers (both pre- and in-service). There is a plan to extend this effort to K-12 student internships available to diverse populations, and the graduates of the MAT in Secondary STEM program will be positioned to support those internships. Finally, this program supports standard 3.2 (Expand the availability of flexible, affordable, competency-based postsecondary programs, as well as strategies like employer partnerships and Project Graduate, to support working-age adults in the pursuit of job-enhancing postsecondary credentials) because it allows candidates to have a flexible pathway to obtain teacher certification and an advanced degree. Candidates can complete this program in one or two years, full time or part time, and also have flexibility in regards to their practicum and student teaching placements. This helps bring accessibility to students who are working or</i>

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	<i>who do not have the financial means to complete traditional advanced degrees.</i>
11d*	If an approval letter from an Education Professional Standards Board (EPSB) is required, check the box below and append a PDF version of the letter to this form. <input type="checkbox"/> (E.g. any program leading to teacher, principal, or superintendent certification, rank change, etc.)
12. Resources	
12a*	How will the program support or be supported by other programs within the institution? For example, shared faculty, shared courses, collaborative research, etc. (300 word limit) <i>Within the core coursework of the MAT in Secondary STEM Education program, there are courses provided by 4 other departments within the college of education: Curriculum & Instruction will offer EDC 533 – Teaching Literacy Across Disciplines; Educational, School & Counseling Psychology will provide EDP 658 – Problems in Educational Psychology and EDP 560 – Assessment in School Data Analysis; Early Childhood, Special Education, and Rehabilitation Counseling will offer EDS 516 – Principle of Behavior Management & Instruction; and Educational Policy Studies & Evaluation will provide EPE 773 – Seminar in Education Policy Study and Evaluation. The expertise provided by those other departments, especially in areas like literacy and school-wide assessment approaches, will be invaluable to providing a well-rounded program experience. Also, the elective courses may draw on faculty from the College of Arts & Sciences; e.g. the course EGR 599 – Special Topics in Engineering: Robotics was co-taught by a STEM Education faculty member along with a College of Engineering faculty member in the summer of 2016. From a research standpoint, candidates in the program will be connected with faculty in the College of Arts & Sciences for their summer research / externship experience as appropriate. Additionally, there will be research collaborations between various members of the college of education that will support work in the program. For instance, two STEM Education faculty are currently working with one of the literacy faculty on a project to enhance the use of mobile devices in K-12 STEM classrooms. This project will last at least two years, into the time during which this program is set to be launched.</i>
12b	What will be the projected “faculty-to-student in major” ratio? (150 word limit) <i>The projected enrollment for the MAT in Sec STEM Education program will be 10-15 students in the math line and an additional 10-15 students in the science line each year. In the STEM Department there are 8 full time professors (Assistant, Associate, and Full included) and these professors will be teaching 20 of the 31 program required credit hours. The faculty to student ratio for these SEM courses will be approximately 1:15. The other 11 credit hours will be taught outside of the department (EDC, EDP, EPE, EDS) and those faculty to student ratios are projected to be 1:25, as those departments are much larger and students from other programs will be mixed into those courses.</i>
12c	Describe the library resources available ¹⁹ to support this program. Access to the qualitative and quantitative library resources must be appropriate for the proposed program and should meet recognized standards for study at a particular level or in a particular field where such standards are available. Adequacy of electronic access, library facilities, and human resources to service the proposed program in terms of students and faculty will be considered. (300 word limit) <i>It is important to note that this program does not have the research expectations associated with other master’s programs. Candidates do not have to complete a research project or a thesis. There are assignments within the program that require some exploration of educational research, and candidates need to access such research for their master’s exam, but the electronic archives available through the UK library are sufficient for that. There are no special software packages to which are candidates need access, so, again, the resources generally available at UK are sufficient. The STEM Education department keeps a small library in our main office that has resources related to the new national standards and best pedagogical practices. Faculty regularly use student instructional fees to update that library from NCTM and NSTA offerings. Additionally, the College of Education has a library well stocked with critical resources such as reform-based curricula and trade books supporting math and science instruction.</i>

¹⁹ Please contact Institutional Effectiveness (institutionaleffectiveness@uky.edu) for more information.

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12d	<p>Describe the physical facilities and instructional equipment available to support this program. Physical facilities and instructional equipment must be adequate to support a high-quality program. Address the availability of classroom, laboratory, and office space, as well as any equipment needs. (300 word limit)</p> <p><i>After being established as a separate department several years ago, STEM Education has been effectively resourced by the College of Education. There is sufficient office space for both faculty and graduate students. This will only affect candidates in the MAT in Secondary STEM Education program indirectly, though, because our candidates will not function as TAs or RAs as this program will not employ such positions. The short, intense duration of the program does not allow for candidates in it to hold these kinds of positions. In terms of classroom space, the STEM Education department has generally been given full control of Taylor Ed rooms 201 and 204, which were both designed as STEM classrooms (with sinks, gas jets, and a fume hood in the case of TEB 204). The department has also used instructional funds and salary savings to add other critical resources to these rooms, such as a smartboard in TEB 201 and data collection probeware in TEB 204. We continue to monitor the kinds of technology that K-12 schools are using with their students and making sure we invest in equipping the rooms in Taylor Ed with such materials as appropriate. Finally, there is no need for research laboratories because this is not the kind of work our candidates will do, but we do have the laboratory equipment in TEB 201 and 204 that models what is used to teach STEM in K-12 settings.</i></p>
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13. Demand and Unnecessary Duplication

13a*	<p>Provide justification and evidence to support the need and demand for this proposed program. Include any data on student demand, employer demand, career opportunities at any level, or any recent trends in the discipline that necessitate a new program. (300 word limit)</p> <ul style="list-style-type: none"> • This evidence is typically in the form of surveys of potential students, enrollments in related programs at the institution, employer surveys, and current labor market analyses. • Anecdotal evidence is insufficient. Demonstrate a systematic collection of data, thorough study of the data, and a reasonably estimated student demand for the program. • Provide evidence of student demand at state and national levels. <p><i>In October 2016, EdWeek published an article titled Is STEM Education in Permanent Crisis? (http://www.edweek.org/ew/articles/2016/10/26/is-stem-education-in-permanent-crisis.html) The article discussed how the US has constantly faced a shortage of STEM teachers. The situation is only getting worse as teacher preparation programs across the country are experiencing reduced enrollments, including those programs that prepare STEM teachers. A 2017 article in The Messenger (http://www.the-messenger.com/news/local/article_1e3cd656-28f8-11e7-8c6d-f770318c2d10.html) shows that this situation applies equally to Kentucky. The only way to address this problem is to provide multiple programs offering different pathways into STEM teaching. Several years ago, the STEM Education Department began its STEM PLUS undergraduate program to allow individuals to get a degree in a STEM major, along with an education degree and teaching certificate. This provides one pathway into STEM teaching. The Department of Curriculum & Instruction has the Master's with Initial Certification (MIC) program, and that program has included options that allow one to teach mathematics or one of the sciences at the secondary level. When the STEM Education Department formed, the expectation was that the MIC options associated with math and science teacher preparation would come under the auspices of the Department. The proposed MAT in Secondary STEM Education is the outcome of that.</i></p>
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13b	<p>Clearly state the degree completion requirements for the proposed program. (150 word limit)</p> <p><i>The following are the set of requirements for successful completion of the program: (1) A passing grade in all courses and an overall GPA of 3.0 and (2) passing score on the Master's Exam.</i></p>
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13c*	<p>Will this program replace or enhance any existing program(s) or tracks (or concentrations or specializations) within an existing program? (300 word limit)</p>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>If "Yes," explain: <i>The MIC in Secondary Education program, housed in the department of Curriculum & Instruction, has previously produced candidates with certifications in math and science. At the university level, this program is considered a generalized degree program for producing candidates certified to teach at the secondary level. At this level, the program does not specify particular pathways producing candidates with certification in specific areas. The MAT in Secondary STEM Education program is a new program and it would be focused on producing candidates with secondary certifications in the STEM areas (math, and the science disciplines of biology, chemistry,</i></p>			

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	<i>earth science, and physics). This new program is not a true duplication because, at the university level, the MIC program does not specify certification areas.</i>
13d	<p>Identify the primary feeders for the program. (150 word limit)</p> <p><i>Since our program requires a bachelor's degree (or equivalent) of a STEM discipline, the undergraduate programs in Biology, Chemistry, Geology, Physics, Mathematics, Statistics, Engineering, and Computer Science, are the primary feeders. We also get candidates from the workforce who have been working as scientists, accountants, or mathematicians and now want to bring their practicing STEM skills into the classroom. Lastly, career changers are another feeder into our program. These candidates are often working in non-STEM jobs but have always had a passion for the STEM disciplines and for teaching. With a few courses in the STEM disciplines, then completion of our program, are ready to make a career change.</i></p>
13e	<p>Describe the student recruitment and selection process. (300 word limit)</p> <p><i>Current recruitment efforts include maintaining a current website with program information, sending email blasts to all current UK undergraduate students in STEM disciplines, non-traditional student email blasts to students who have expressed interest in secondary education, email blasts to former students who graduated in STEM fields within the past 5 years, attending undergraduate STEM student clubs, speaking during senior seminar courses for the undergraduate STEM programs, tabling at career fairs and college fairs, advertising via STEM organizations/careers, and working with interested students through email and individualized visits to campus. Future recruitment plans include working with the Directors of Communications in the College of Education to target students using social media and Google word searches, posting flyers in targeted buildings around campus, developing new strategies to target non-traditional students and career changers, and a college wide open house where available programs are showcased.</i></p>
13f*	<p>Specify any distinctive qualities of the proposed program. (300 word limit)</p> <ul style="list-style-type: none"> • <i>Are any of your faculty nationally or internationally recognized for expertise in this field?</i> • <i>Does this program build on the expertise of an existing locally, nationally, or internationally recognized program at your institution?</i> • <i>Do you have any specialized research facilities or equipment that are uniquely suited to this program?</i> <p><i>In developing the MAT in Secondary STEM Education program, we used input from several critical stakeholder groups: current secondary science teachers in the Bluegrass region, graduates of our STEM teacher preparation programs, and business / industries. Based on surveys given to the first two groups and informal input from the third group, we have identified key features to include in the program: (1) a compact program in terms of credits (31) and timeline (3 consecutive semesters); (2) a flexible program that would allow for a longer timeline (2 years) if desired; (3) a 3-semester sequence of STEM-focused methods / seminar courses; (4) an initial summer externship in a STEM-related business / industry; (5) more attention to classroom management and to special needs students through a course offered by our EDS department; and (6) a significant focus on assessment through the inclusion of a separate assessment course, as well as the weaving of assessment into the 3 methods / webinar courses. Additionally, there will be significant collaborations with the literacy instructors to integrate STEM-specific literacy principles into the literacy course. Also, the program will have a heavy clinical experience and an application-based master's exam. Faculty within the program (e.g. Drs. Criswell and Mohr-Schroeder) have been active in discussions around the issue of authentic externship experiences in the state. Another faculty member (Dr. Amick) is active in the work of National Board. Finally, several faculty members (e.g. Dr. Wilhelm, Dr. Fisher, Dr. Thomas, Dr. Jong, and Dr. Krall) are leading national efforts around professional noticing, which will be a coordinating framework within the program.</i></p>
13g	<p>Provide any evidence of a projected net increase in total student enrollments to the campus as a result of the proposed program. (300 word limit)</p> <p><i>We have been averaging about 9 candidates per year in our teacher preparation programs across both math and science over the last 5 years. Given that we have placed 100% of our graduates in teaching positions and have had additional requests for candidates, we believe there is room to grow the number in each cohort. It seems that cohorts of ~12 candidates each in math and science would be appropriate to meet regional demand. Ideally, with a new program that is housed in the STEM Education department and has specific features that we believe makes the program unique, we can grow the program to that number. We also intend to increase recruiting efforts to try to get</i></p>

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to that level of enrollment in the program.

13h Use table below to estimate student demand for the first five years following implementation.

Academic Year	# Degrees Conferred	Majors (headcount)
		Fall Semester
2018 - 2019	20	20
2019 - 2020	20	20
2020 - 2021	22	22
2021 - 2022	24	24
2022 - 2023	24	24

13i Clearly describe all evidence justifying a new program based on changes in the academic discipline or other academic reasons. (300 word limit)

We highlight a couple of factors that justify the new program. First, industries, both regionally and nationally, have expressed concern about the number of students leaving our K-12 schools prepared for the STEM careers that are available. With an increase in these STEM job opportunities, this concern becomes magnified. An obvious solution to this concern is to prepare STEM teachers who better understand the needs of these careers and an ability to connect their content to the knowledge required in them. The summer methods course coordinated with a research / externship experience (SEM 521) is designed to align with this solution. We will also be working to provide informal STEM teaching and learning experiences (e.g. a collaboration with KY Science Center around summer camps offered in Lexington) to help our candidates better understand how to make STEM accessible to diverse students. The second factor is the change that is occurring in the STEM assessments in Kentucky. KDE rolled out a new science assessment system in 2016-2017, and it will be fully activated next year; a similarly-structured math assessment system is set to follow. We need to prepare candidates for working within these systems to help our students learn to their maximum potential. That is the reason that we have instituted a separate assessment course as another critical program feature. As noted previously, the critical elements of the MAT in Secondary STEM Education program are based on input from key stakeholder groups including regional secondary STEM teachers, graduates of our existing teacher preparation programs, and businesses / industries.

13j Has the Council on Postsecondary Education identified similar programs?²⁰ Yes No
 If "Yes," the following questions (5h1 – 5h5) must be answered.

(1) Does the program differ from existing programs in terms of curriculum, focus, objectives, etc.? (150 word limit) Yes No

If "Yes," explain: There are a number of similar (MAT) programs across the state – e.g. EKV, Morehead State University, University of Louisville, WKU. We believe that all of these programs are needed, as they serve different regions of the state. A STEM-focused program that can serve the needs of the Bluegrass region is likewise critical. We believe there will be several unique aspects to the proposed MAT in Secondary STEM Education program: (1) the summer research / externship experience, (2) the partnerships with informal STEM learning groups (e.g. KY Science Center and 4-H), (3) the collaboration with the special education program through EDS 516 to better understand how to work with special needs students, and (4) the assessment course focused on modern assessment practices aligned with the new KY [science] assessment system. These aspects will be critical to producing the kind of STEM educators needed in the 21st century.

(2) Does the proposed program serve a different student population (e.g., students in a different geographic area or nontraditional students) from existing programs? (150 word limit) Yes No

If "Yes," explain: We believe that all programs need to consider how to make themselves as flexible as possible to make themselves appealing and accessible to career changers. We have had several candidates from that demographic over the last few years, and would like the program to be even more amenable to their needs. As

²⁰ Please contact Institutional Effectiveness (institutionaleffectiveness@eku.edu) for help with this question.

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	<i>such, we are going to allow a 2-year pathway through the program so that individuals who might want to work while completing the program can do so.</i>		
(3)	Is access to existing programs limited? (150 word limit)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<i>If "Yes," explain: We would suggest that candidates are looking for programs that are (1) as flexible as possible in terms of timeline and (2) as compact as possible in terms of credits. We are proposing an extremely compact program (31 credits in 3 consecutive semesters), while increasing the flexibility of the program by allowing candidates to complete it in two years if they would like to continue to work.</i>		
(4)	Is there excess demand for existing programs? (150 word limit)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<i>If "Yes," explain: We can assert that there are many individuals who are seeking programs of this nature and who are not quite satisfied with existing options across the state. We have maintained lists of individuals each year with whom we have had some level of discussion about the master's options available. There are significant percentages who do not choose our program (or others across the state). In some cases, we cannot be sure why they do not choose the existing MIC program or other similar program, but we must assume that there are programmatic features that are not satisfactory. Other individuals are clear that their decisions not to enroll are related to factors such as the intense, full-time nature of the program. We believe that our proposed program may address some of these concerns.</i>		
(5)	Will there be collaboration between the proposed program and existing programs? (150 word limit)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<i>If "yes," explain the collaborative arrangements with existing programs. If "no," explain why there is no collaboration with existing programs.</i> <i>There could be collaboration with the MIC in Secondary Education program that exists in the Department of Curriculum & Instruction. Both programs prepare secondary school (high school) teachers and so there is value in sharing intellectual resources related to running such preparation programs. The MAT in Secondary STEM Education faculty will coordinate with the MIC faculty chairs to organize semi-annual meetings in order to engage in sharing of such intellectual resources.</i>		
13k*	Are there similar programs in other Southern Regional Education Board (SREB) states in the nation?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<i>If "Yes," please answer the questions below to demonstrate why this proposed program is needed in addition to the one(s) currently in existence.</i>		
13k. i*	Identify similar programs in other SREB states and in the nation.		
	MAT at Kennesaw State University; MAT at Georgia State University; MAT at Eastern Tennessee University; MAT at Austin Peay State University; MAT at Clemson University; MAT at Coastal Carolina University; MAT at South Carolina State University; MAC at West Virginia University; MAT Marshall University; MAT at University of Central Florida		
13k.ii*	Does the program differ from existing programs in terms of curriculum, focus, objectives, etc.?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
	<i>If "Yes," explain. (300 word limit)</i> <i>We believe that our program shares a lot of similarities with the programs listed above. Most are compact programs (less than two years if completed on the traditional timeline) and have STEM-specific methods courses combined with general education courses (in educational psychology, special education, literacy, etc.). We do not believe that the proposed program needs to be significantly different from these programs, because each region needs to have a university offering a program of this nature to meet local as well as statewide teacher needs. Nonetheless, we were not able to find any programs among those listed in 13k.(i) that had the summer research / externship experience or the close collaboration with informal STEM learning institutions that will be critical components of the proposed program. As noted in previous responses, we believe that these components will help address concerns expressed by industries across the state and the country related to preparing teachers who cannot make real-world connections.</i>		

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13k.iii*	Does the proposed program serve a different student population (e.g., students in a different geographic area and non-traditional students) from existing programs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>If "Yes," explain. (300 word limit)</p> <p>We don't want to suggest that this new program will be geared entirely for a different population than other similar programs. However, a major concern in thinking about the nature and structure of this program has been to make it appealing and accessible to career changers. We have had several candidates from that demographic over the last few years, and would like the program to be even more amenable to their needs. As such, we are going to allow a 2-year pathway through the program so that individuals who might want to work while completing the program can do so.</p>			
13k.iv*	Is access to existing programs limited?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>If "Yes," explain. (300 word limit)</p> <p>We would suggest that candidates are looking for programs that are (1) as flexible as possible in terms of timeline and (2) as compact as possible in terms of credits. We are trying to create a highly flexible program in terms of allowing candidates to complete it in a traditional 3-semester timeframe or extending completion to two years if candidates would like to continue to work.</p>			
13k.v*	Is there excess demand for existing similar programs?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<p>If "Yes," explain. (300 word limit)</p> <p>We can assert that there are many individuals who are seeking programs of this nature and who are not quite satisfied with existing options in other states. We have maintained lists of individuals each year with whom we have some level of discussion about the master's options available. There are significant percentages who do not choose our program (or others in different states). In some cases, we cannot be sure why they do not choose the existing MIC program or other similar program, but we must assume that there are programmatic features that are not satisfactory. Other individuals are clear that their decisions not to enroll are related to factors such as the intense, full-time nature of the program. We believe that our proposed program may address some of these concerns.</p>			
13k.vi*	Will there be collaboration between the proposed program and existing programs?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<p>If "No," explain. (300 word limit)</p> <p>Given the intensive 1-year nature of this program, there does not seem to be any substantive reason to consider collaboration with other programs. There would not be a benefit to either our program or other similar programs that exist in terms of enrollment or resources to engage in such collaborative arrangements.</p>			
13l	Would your institution like to make this program available through the Academic Common Market ²¹ ?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
13m	<p>Clearly describe evidence of employer demand. Such evidence may include employer surveys, current labor market analyses, and future human resources projections. Where appropriate, evidence should demonstrate employers' preferences for graduates of the proposed program over persons having alternative existing credentials and employers' willingness to pay higher salaries to graduates of the proposed program. (300 word limit)</p>		
<p><i>In the last five years, 100% of the graduates obtaining initial certification in math & science teaching who have sought a teaching job in a secondary school have obtained one. Beyond that, we have received a minimum of 6 emails per year from regional administrators asking us if we have any math or science candidates available, and we have been able to meet that need (a record of these email communications for science can be provided). Further, at least one email per year has specified the fact that the administrator contacting the program chairs about the availability of candidates feel the graduates of the UK teacher preparation programs are among the best</i></p>			

²¹ Please contact Institutional Effectiveness (institutionaleffectiveness@uky.edu) for more information.

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	<i>prepared for the teaching profession. Given that the proposed program will include features suggested in surveys by current teachers and businesses / industries, a high level of respect for the program would be anticipated.</i>
13n*	Describe the types of jobs available for graduates, average wages for these jobs, and the number of anticipated openings for each type of jobs at the regional, state, and national levels. <i>As we have noted in multiple previous responses, EdWeek published an article titled <i>Is STEM Education in Permanent Crisis?</i> (http://www.edweek.org/ew/articles/2016/10/26/is-stem-education-in-permanent-crisis.html) in October 2016. The article discussed how the US has constantly faced a shortage of STEM teachers. The situation is only getting worse as teacher preparation programs across the country are experiencing reduced enrollments, including those programs that prepare STEM teachers. A 2017 article in <i>The Messenger</i> (http://www.themessenger.com/news/local/article_1e3cd656-28f8-11e7-8c6d-f770318c2d10.html) shows that this situation applies equally to Kentucky. Thus, programs focusing on recruiting and retaining STEM teacher candidates are critical. Further, as we have also discussed in multiple previous responses, graduates from our existing teacher preparation programs have enjoyed 100% placement of completers seeking to attain a teaching position. A majority of the candidates have obtained positions locally, but we have had individuals who have taken teaching jobs across the state as well as in different states. Given that the STEM teacher shortages are a national issue, then there will continue to be teaching positions available in other states for those who would seek such positions.</i>
14. Assessment and Oversight	
14a*	Describe how each program-level student learning outcome will be assessed and how assessment results will be used to improve the program. (250 word limit) An assessment plan has been created and the plan has been appended to this document.
14b*	Describe <i>program</i> evaluation procedures for the proposed program. These procedures may include evaluation of courses and faculty by students, administrators, and departmental personnel as appropriate. Program review procedures shall include standards and guidelines for the assessment of student outcomes implied by the program objectives and consistent with the institutional mission. (300 word limit) <i>The STEM Education department houses an undergraduate teacher certification program (STEM PLUS) and this MAT in STEM Education would follow a similar evaluation plan. STEM PLUS is evaluated through the yearly SACS and SLO reports. These reports have focused on meeting programmatic goals in terms of student enrollment and of student learning outcomes. And those reports have resulted in regular, substantive improvements in this program. For example, data from our Analysis of Assessment assignment (that will be included in the new program) indicated that STEM teacher candidates demonstrated some deficiencies in terms of analyzing student assessment data. The faculty added content to the STEM methods courses to address that. (In anticipating this issue in the new program, we have added a specific assessment course.) We will use these same reports in the MAT in Secondary STEM Education program to complete internal evaluations. We also use the New Teacher Survey as an external evaluation measure and have responded to concerns raised by that data. For instance, the NTS data from two years ago suggested our STEM education candidates were not strong in their leadership skills, so we have embedded programmatic features (notably the Problem of Practice assignment) to improve this situation. We will also continue to use feedback from our accreditation evaluations to direct future changes in the program. We are already working to meet the requirements set by the new CAEP standards. Finally, we use input from the members of our program faculty, which includes K-12 teachers and STEM education alumni, to target areas of growth for the program. Given the effectiveness of these evaluation instruments in the STEM PLUS program, we intend to replicate all of these in our MAT in Secondary STEM Education program.</i>
14c	Identify both the direct and indirect methods by which the intended student learning outcomes (SLOs) will be assessed. (300 word limit) <i>An assessment plan has been created and the plan has been appended to this document.</i>
14d	Procedures for Course Mapping of SLOs (related to question 5b)
14d.i	Which components will be evaluated, i.e. course mapping? (300 word limit) <i>A Curriculum Map Has Been Included In The Assessment Plan And All Of The Information Required Here Is Contained Within The Curriculum Map.</i>

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14d.ii	When will components be evaluated? (150 word limit)
	<i>A curriculum map has been included in the Assessment Plan and all of the information required here is contained within the curriculum map.</i>
14d.iii	When will the data be collected? (150 word limit)
	<i>A curriculum map has been included in the Assessment Plan and all of the information required here is contained within the curriculum map.</i>
14d.iv	How will the data be collected? (150 word limit)
	<i>A curriculum map has been included in the Assessment Plan and all of the information required here is contained within the curriculum map.</i>
14d.v	What will be the benchmarks and/or targets to be achieved? (150 word limit)
	<i>The rubrics for both the Student Teaching Observation Form and Final Student Teaching Evaluation have ratings of Demonstrated, Partially Demonstrated, and Not Demonstrated. Each component within the rubrics has multiple elements to it. It is expected that all candidates would have an overall rating that would be between 'Demonstrated' and 'Partially Demonstrated' on the last of their four Student Teaching Observation Forms as the triumvirate of teacher candidate, cooperating teacher, and supervisor should be working to move the teacher candidate towards proficiency on each of these standards. Likewise, on the Final Student Teaching Evaluation, teacher candidates would be expected to have achieved at least a 'Partially Demonstrated' for each standard and 'Demonstrated' rating across the majority of standards. Failure to achieve these ratings may require that candidates spend additional time in their student teaching placement or not be advocated for certification until a remediation plan is established.</i>
14d.vi	What individuals or groups will be responsible for data collection? (150 word limit)
	<i>The main data collection work will be completed by the co-chairs for this program: Dr. Lisa Amick and Dr. Brett Criswell. They will be responsible for collating the math and science (respectively) data for each cohort, as well as tabulating that data across the different years of the program. This will support our reporting and accreditation efforts. Additionally, Dr. Margaret Mohr-Schroeder and Dr. Molly Fisher will contribute to data collection, as they will potentially teach the course (SEM 746) in which key data will be generated. All four individuals listed are faculty members within the STEM Education department. Finally, Dr. Gerry Swan will assist with data collection by helping to update the OTIS platform that we will use in the program as the storehouse for our portfolios and therefore our key assignments.</i>
14d.vii	How will the data and findings be shared with faculty? (150 word limit)
	<i>The STEM Education Department has monthly meetings. Those meetings provide opportunities to address any relevant departmental issues. This has included discussing strengths and weaknesses of our various undergraduate and graduate programs. The individuals in charge of collecting and analyzing programmatic data will be responsible for presenting data to the other STEM education faculty concerning program quality at those meetings. Additionally, all program reports (e.g. SACS, SLOs) will be made available to faculty teaching within the program through an appropriately-secure platform.</i>
14d.viii	How will the data be used for making programmatic improvements? (150 word limit)
	<i>In the existing STEM Education program (STEM PLUS), faculty have used the data to make programmatic changes suggested by patterns within that data. For instance, our Analysis of Assessment data had showed that candidates generally needed improvement in terms of identifying specific responses to low student assessment scores. As a result, we have included numerous activities related to that skill within the program. We will continue to look for patterns in our assessment data to identify both program strengths and weaknesses. The program faculty – consisting of STEM Education faculty, STEM faculty (e.g. chemistry, biology, physics), and K-</i>

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	<i>12 teachers – will be a vehicle for exploring the cause of candidate weaknesses and the best programmatic changes to make in order to address them. Additionally, program chairs and other relevant faculty will meet during the summer to review data from the past year and identify clear needs for the upcoming year.</i>
14d.ix	<p>What are the measures of teaching effectiveness? (150 word limit)</p> <p><i>In December 2015, the Strategic Evaluation Task Force in the UK College of Education submitted its final report on a teaching evaluation system. The system had 5 components to it: (1) Student evaluations, (2) Syllabi reviews, (3) Peer reviews, (4) Faculty reflective statements, and (5) Formative evaluations. The goal was to create a holistic picture of the teaching performance demonstrated by all faculty. That system was put in place for the 2016-2017 academic year. The level of implementation will continue to increase as for the 2017-2018 school year and beyond as better mechanisms for completing syllabi and peer reviews are put in place. Faculty in the STEM Education Department are expected to show evidence of effective teaching by drawing on the data from these 5 different measures. This includes identification of plans for improvement for weaknesses identified from the data sources.</i></p>
14d.x	<p>What efforts to improve teaching effectiveness will be pursued based on these measures? (150 word limit)</p> <p><i>In annual evaluations, faculty within the STEM Education Department are expected to discuss the analysis of the teaching evaluation data overviewed above and describe particular efforts they are undertaking to make improvements based on that data analysis. The following year, in the annual review process, the faculty are expected to present information about the results of their improvement efforts and data support any claims about improvements. There are also discussions between faculty members resulting from the peer reviews, which include classroom observations. Those discussions center around feedback for suggested improvements and identify action plans for bringing those improvements to fruition.</i></p>
14d.xi	<p>What are the plans to evaluate students' post-graduate success? (150 word limit)</p> <p><i>In the candidates' first year in the classroom, they will complete the Kentucky Teacher Internship Program (KTIP), and the faculty of record will use data from that to determine whether the program is meeting objectives. A supplementary source of data related to KTIP reports will be the Kentucky New Teacher Survey given by the EPSB biannually (http://www.kyepsb.net/TestingResearch/Statistics/StateRptCard/). This provides feedback from administrators and mentor teachers as to how candidates are doing at the beginning of their careers. Additionally, program faculty will continue to work with candidates through efforts such as our Noyce grant (http://www.uky.edu/pimser/programs/NOYCE/), where monthly meetings and a summer retreat allow us to interact with recent graduates to identify areas of strength and weakness. This allows us to help our graduates continue to grow, while also providing a feedback mechanism concerning effective and ineffective aspects of our program.</i></p>
15. Cost and Funding of the Proposed Program²²	
15a	<p>Will this program require additional resources? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p> <p>If "Yes," please provide a brief summary of additional resources that will be needed to implement this program over the next five years. (300 word limit)</p>
15b	<p>Will this program impact existing programs and/or organizational units within your institution? (300 word limit) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>If "Yes, briefly describe.</p> <p><i>As noted previously, there currently exists an MIC in Secondary Education program that produces individuals with certifications in math and science. As part of the original proposal for the STEM Education department, a plan was set forth in which both an undergraduate and graduate STEM certification programs would come under the auspices of the STEM Education department. The MAT in Secondary STEM Education program being proposed here is the realization of that plan and will allow candidates to attain certification to teach math and science in high schools. Housing the program in the STEM Education department allows for STEM-specific programmatic</i></p>

²² For questions about cost and funding of the program, please contact your department chair, business officer, or associate dean for academic affairs.

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needs to be met, such as providing candidates the opportunity to participate in industry externships or informal STEM teaching and learning experiences.

15c

Provide adequate documentation to demonstrate sufficient return on investment to the state to offset new costs and justify approval for the proposed program. (300 word limit)

In July of 2016, Hal Heiner, Secretary of the Education & Workforce Development Cabinet, convened a group of educators (at both K-12 and higher ed levels) to discuss his concern about preparing workers for 21st-century jobs in STEM. The clear message was that industries and businesses will not remain in the state or will not come into the state if we do not prepare students more effectively for these careers. A first step towards responding to this concern occurred this summer when KY FAME (<http://kyfame.com>), in conjunction with LIFT (<https://lift.technology>) and KAM (<http://kam.us.com>) launched a statewide initiative to provide industry externships to teachers. STEM Education faculty from UK have been involved in this initiative, and we have integrated that feature – industry externships – in our new MAT in Secondary STEM Education program design. Additionally, the UK STEM Education faculty have partnered with 4-H, with the KY Science Center, with the KY Center for Mathematics, and with the growing Teen Science Café Network to support connections to informal STEM learning in ways that are beneficial to both the UK teacher candidates and the informal groups. We will integrate these partnerships into the new MAT in Secondary STEM Education program experience. While there is really no cost associated with the implementation of this program, there should be ample return on investment to the state for supporting this program. We will be doing everything that we can within the program to continue to respond to the call to action made by Secretary Heiner in that 2016 meeting. We believe this program will produce some of the best-prepared K-12 STEM teachers in the state, helping the students, our schools and their communities be ready for what the future holds.

16.* Budget Funding Sources, by Year of Program

All the fields in number 16 are required for the CPE's pre-proposal form. Estimate the level of new and existing resources that will be required to implement and sustain the program using the spreadsheet below. Please answer in terms of dollar amounts. All narratives have a 100-word limit.

Total Resources Available from Federal Sources (Federal sources include grants, earmarks, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	82,673	1,116,494	749,999	209,012	360,656

Narrative/Explanation: *As will be the case with most of the responses in this section (1) there will be no new resources required for this program as we are modifying an existing program for which sufficient resources have existed and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.*

Total Resources Available from Other Non-State Sources (Non-state sources include philanthropies, foundations, individual donors, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	63,200	507,794	8,200	17,038	91,189

Narrative/Explanation: *As will be the case with most of the responses in this section (1) there will be no new resources required for this program as we are modifying an existing program for which sufficient resources have existed and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.*

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State Resources (State sources include general fund revenue, grants, pass-thru funds, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	63,200	50,059	144,295	310,052	222,554
Narrative/Explanation:	<i>As will be the case with most of the responses in this section (1) there will be no new resources required for this program as we are modifying an existing program for which sufficient resources have existed and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Internal (The source and process of allocation and reallocation should be detailed, including an analysis of the impact of the reduction on existing programs and/or organization units.)²³:	1st Year	2nd Year	3rd Year	4th Year	5th Year
(New) Allocated Resources	0	0	0	0	0
(Existing) Reallocated Resources	11,652.55	18,985.10	25,814	25,214.14	39,038.34
Narrative/Explanation:	<i>As will be the case with most of the responses in this section (1) there will be no new resources required for this program as we are modifying an existing program for which sufficient resources have existed and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Student Tuition (Describe the impact of this program on enrollment, tuition, and fees.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	406160	406160	446,776	478392	487392
Existing	1500000	1,693,332	928308	544278	713437
Narrative/Explanation:	13				
<u>Total Funding Sources</u>	1st Year	2nd Year	3rd Year	4th Year	5th Year
<u>Total New</u>	406160	406160	446776	478392	478392
<u>Total Existing</u>	1720726	3386664	1856616	1105594	1426875
<u>TOTAL FUNDING SOURCES</u>	2126886	3792824	2303392	1592986	1905267
17. Breakdown of Program Expenses/Requirements⁴					
(Please note – all the fields in number 17 are required for the CPE's pre-proposal form.)					
Staff: Executive, Administrative & Managerial (Include salaries and whether new hires will be part time or full time.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	33,754.50	32,468.00	34,075.50	34,399	35,802

²³ The source and process of allocation and reallocation should be detailed, including an analysis of the impact of the reduction on existing programs and/or organizational units.

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Narrative/Explanation ²⁴ :	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Other Professional (Include salaries.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative/Explanation:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Faculty (Include salaries and whether new hires will be part time or full time.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	\$489,842.00	\$495,568.78	\$540,328.94	\$524,996.94	\$625,533.36
Narrative/Explanation ²⁵ :	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Graduate Assistants (Include salaries and/or stipends.)²⁶	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	57,278.20	52,599.97	29,600	68,236	80,982
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Student Employees (Include salaries and/or stipends.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Equipment and Instructional	1st Year	2nd Year	3rd Year	4th Year	5th Year

²⁴ Discuss whether new hires will be full-time or part-time.

²⁵ If new hires are involved, explain whether new hires will be full-time or part-time.

²⁶ Identify the number of assistantships/stipends to be provided, include the level of support for each.

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Materials					
New	0	0	0	0	0
Existing	11,366.29	14,271	14,062.12	15,808.78	15,686.01
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Library (Include new journal subscriptions, collections, and electronic access.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Contractual Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Academic and/or Student Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Other Support Services	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Faculty Development (Include travel, conference fees, consultants, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year

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New	0	0	0	0	0
Existing	11,200	6,000	7,000	7,000	8,000
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Assessment (Include personnel, software tools, data collection tools, survey administration, outside consulting services, etc.)	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Student Space and Equipment	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Other	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	0	0	0	0	0
Narrative Explanation/Justification:	<i>As will be the case with most of the responses in this section (1) there will be no new expenses required for this program as duties previously performed by the DGS office in EDC will reside in the DGS office for STEM and (2) the data for Existing is data taken from a recent department self study and represents information from 2011-2016.</i>				
Total Expenses/Requirements	1st Year	2nd Year	3rd Year	4th Year	5th Year
New	0	0	0	0	0
Existing	\$580,874.70	\$580,636.75	\$604,004.43	\$627,631.84	\$742,316.91
TOTAL Program Budgeted Expenses/Requirements:					
GRAND TOTAL	1st Year	2nd Year	3rd Year	4th Year	5th Year
Total Funding Sources	<u>\$1,720,726.00</u>	<u>\$3,386,664.00</u>	<u>\$1,856,616.00</u>	<u>\$1,105,594.00</u>	<u>\$1,426,875.00</u>
Total Expenses/Requirements	<u>\$580,874.70</u>	<u>\$580,636.75</u>	<u>\$604,004.43</u>	<u>\$627,631.84</u>	<u>\$742,316.91</u>
TOTAL NET COST:				<u>\$477,962.16</u>	<u>\$684,558.09</u>

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\$1,139,851.30 \$2,806,027.25 \$1,252,611.57

18. Course Descriptions

18a Program Core Courses (includes pre-major and pre-professional courses)

Prefix & Number	Course Description (from the Bulletin or the most recent new/change course form)
SEM 521	<i>This course is intended to help future mathematics/science teachers build a theoretical background and gain the practical skills needed to begin to develop themselves as effective teachers in secondary classrooms. Students will be introduced to, and gain hands-on experience with a variety of instructional materials appropriate for teaching mathematics/science at the secondary level. Students are encouraged to be creative and reflective in developing, implementing, and evaluating practices associated with teaching concepts and skills. A strong emphasis is placed upon helping students to formulate an understanding of how to integrate the mathematical and scientific practices with the core ideas of the disciplines to develop deep conceptual understanding. The experiences in this course are designed to prepare teachers who will work among diverse populations and constantly be in tune with best practices and their implementation as a way to improve education in Kentucky and beyond. The course will focus on developing a number of general pedagogical skills; the integration of math and science candidates into this single class will enrich the conversations around such topics. SEM 521 will be taught as a hybrid course, with weekly face-to-face meetings paired with online modules that can be completed asynchronously. The course will have an accompanying university research / industry externship / informal STEM education experience associated with it for variable hours and variable cre</i>
SEM 631/63	<i>Through campus and school-based experiences, students will learn how to engage young people in learning mathematics and how to make decisions about planning instruction and develop assessment based on a sound knowledge base for applying content, materials, and methods (including educational technology) appropriate for high school students.</i>
SEM 746	<i>Students will teach in their subject areas in the schools full-time, per week. meet regularly to discuss teaching effectiveness and strategies for improvement and develop their professional portfolios.</i>
EDC 533	<i>This course provides an in-depth study of theories and teaching methods for integrating literacy (including digital literacy) instruction into content area classrooms at the K-12 levels. Instructional strategies, procedures, and assessments designed to increase vocabulary learning and comprehension of expository texts are emphasized.</i>
EDP 658	<i>Special topics in psychological theories and research applicable to educational practices.</i>
EPE 773	<i>Examination of selected problems in educational policy studies and evaluation.</i>
EDS 516	<i>Basic principles of applied behavior analysis and modification which employ social learning theory and operant conditioning models are taught. Emphasis is placed on designing individualized learning environments, selecting and implementing behavior management strategies, writing behavior objectives, and performing task analyses.</i>
EDP 560	<i>Our goal in this course is to provide students with the basic assessment literacy they need to be effective teachers, instructors, school leaders, and policy makers. By modeling the best of assessment practice and engaging students in detailed discussions on the development, interpretation, and use of assessments, we hope to offer an engaging learning experience that will help you become deeply knowledgeable and highly skilled in this vital area of modern education.</i>

18b Program Guided Electives Courses (for the major)

Prefix &	Course Description (from the Bulletin or the most recent new/change course form)
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Number	
SEM 504	<i>SEM 504 will give students the opportunity to explore STEM contents, technologies, instructional strategies, and assessments necessary in designing and developing a research-based, interdisciplinary, project-enhanced environment. In SEM 504 students will experience, evaluate, and design interdisciplinary, project-enhanced environments within STEM classrooms. Although this course is designed as a distance course, there are some required face-to-face meetings.</i>
SEM 603	<i>This course introduces fundamental issues related to curriculum and instruction in STEM programs. Major topics addressed will include (but will not be limited to), defining STEM education, its curricula, purposes, and past and present social and political influences affecting the development and focus of STEM education. Additional discussion will address the stakeholders of STEM education that participate in the development, testing, implementation, and assessment of STEM curricula. A major focus of the course will be on the review of selected STEM curricular programs that reflect research-based best practices in STEM education.</i>
SEM 604	<i>The History of STEM Education course will begin with researching the background and development of each individual component of STEM (i.e. Science, Technology, Engineering, and Mathematics) Education. This will follow with a historical comparison of these components highlighting their similarities as well as their differences. The course will conclude with a study of the entity, STEM Education, from the early 19th century America to the present focusing on reports and documents that have connected the Science, Technology, Engineering, and Mathematics disciplines and shaped current research and reform efforts.</i>
SEM 610	<i>This course introduces the fundamental issues related to classroom research, especially through the lens of action research, and what it means to be a teacher leader in the areas of STEM. Practical application will be the primary focus simultaneously with learning and learning to lead. Collaboration and group work is a hallmark of action research; students in this course will demonstrate their abilities to design, diagnose, plan, implement, observe, and reflect in cooperation with classmates. The various roles and skills necessary to be an effective researcher will be discussed, as well as important issues related to empowerment, contextualization, ethical considerations, and validity. In addition, students will examine action research through the lens of innovation and their role as a future teacher leader.</i>
SEM 613	<i>This course is designed to teach effective uses of educational technologies towards engagement in modeling-based inquiry in STEM Education. Students will learn the key components of facilitating modeling-based inquiry through their own building of accurate conceptual models of explanations of key STEM theories and underlying concepts. Utilizing technologies implemented in authentic STEM practice, students will learn how to facilitate pupils' use of technologies to allow them to make controlled observations, analyze data, recognize patterns, propose and revise their models of explanation, and communicate their models to their peers.</i>
SEM 620	<i>This course is a seminar designed to study equity issues in the teaching and learning of STEM disciplines in P-20 education. A primary focus will be on enhancing teachers' ability to use research and reflection for learning and leading. Throughout the course the relationship between theory and practice will be emphasized in an attempt to understand some of the complexities and challenges in addressing issues of equity in mathematics learning and teaching.</i>
SEM 770	<i>This course is a seminar of topical offerings with variable topics in the study of philosophy, principles, trends and research associate with STEM Education. This seminar is designed to cover topical issues around current research and strategies in STEM Education as they relate to P-20 implementation. STEM Education is transdisciplinary and constantly changing. This course will address content specific and transdisciplinary issues within the context of new directives and initiatives.</i>
	<i>It needs to be noted that only two courses from this list -- equivalent to 6 credits -- are required to be taken by students in order to meet the requirements of this program.</i>

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19. Specific faculty involved in the degree program.

(similar to question 4d) Fill out the SACS²⁷-required faculty roster below, for full-time and part-time faculty teaching in the program. Abbreviations for the NAME and COURSES TAUGHT columns are below the table. Please contact Institutional Effectiveness (institutionaleffectiveness@uky.edu) for help with this question.

NAME List name & Identify faculty member as F or P.	COURSES TAUGHT Include term; course prefix, number and title; & credit hours. (D, UN, UT, G)	ACADEMIC DEGREES AND COURSEWORK List relevant courses taught, including institution and major. List specific graduate coursework, if needed	OTHER QUALIFICATIONS AND COMMENTS Note qualifications and comments as they pertain to course taught.	NEW COURSES Include course prefix, number, and title.
<i>Dr. Brett Criswell (FT)</i>	<i>SEM 521 – Foundations of STEM Teaching (4 cr; G); SEM 634 – Pedagogy in the Secondary Schools (3 cr; G); SEM 746 – Subject Area Instruction in the Secondary Schools (7 cr; G)</i>	<i>PhD in Curriculum & Instruction with an emphasis in Science Education (Penn State University)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses.</i>	<i>SEM 521 – Foundations of STEM Teaching (4 cr)</i>
<i>Dr. Lisa Amick (FT)</i>	<i>SEM 521 – Foundations of STEM Teaching (4 cr; G); SEM 631 – Pedagogy in the Secondary Schools (3 cr; G); SEM 746 – Subject Area Instruction in the Secondary Schools (7 cr; G)</i>	<i>EdD in Curriculum & Instruction (University of Illinois)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses.</i>	<i>SEM 521 – Foundations of STEM Teaching (4 cr)</i>
<i>Dr. Margaret Mohr-Schroeder (FT)</i>	<i>SEM 631 – Pedagogy in the Secondary Schools (3 cr; G); SEM 746 – Subject Area Instruction in the Secondary Schools (7 cr; G)</i>	<i>PhD in Curriculum and Instruction with an emphasis in Mathematics Education (Texas A&M University)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses.</i>	

²⁷ Southern Association of Colleges and Schools Commission on Colleges (SACS).

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<i>Dr. Molly Fisher (FT)</i>	<i>SEM 631 – Pedagogy in the Secondary Schools (3 cr; G)</i>	<i>Ph.D. in Curriculum and Instruction with an Urban Mathematics Education specialization (University of North Carolina at Charlotte)</i>	<i>Drs. Criswell, Amick, Mohr-Schroeder, & Fisher will alternate the teaching of the 631 and 746 courses.</i>
<i>Dr. Laurie Henry (FT)</i>	<i>EDC 533 Teaching Literacy Across Disciplines (3 cr; G)</i>	<i>Ph.D. in Cognition and Instruction with an emphasis on literacy and technology (University of Connecticut)</i>	<i>Dr. Henry has had specific experiences developing and using materials associated with STEM literacy.</i>
<i>Dr. Ken Tyler (FT)</i>	<i>EDP 658 Problems in Educational Psychology (1 cr; G)</i>	<i>Ph.D. in Developmental Psychology (Howard University)</i>	<i>Dr. Tyler has taught this course within the existing MIC program for several years.</i>
<i>Dr. Tom Guskey (FT)</i>	<i>EDP 560 Assessment in School Data Analysis (3 cr; G)</i>	<i>Ph.D. in Educational Psychology (University of Chicago)</i>	<i>Dr. Guskey has done presentations on assessment to the MIC STEM classes for several years and will be using those experiences in designing this course</i>
<i>Dr. Joe Ferrare (FT)</i>	<i>EPE 773 Seminar in Education Policy Study and Evaluation (1 cr; G)</i>	<i>Ph.D. Curriculum Theory & Research (University of Wisconsin-Madison)</i>	<i>Dr. Ferrare has taught this course within the existing MIC program for a couple of years.</i>
<i>Dr. Sally Shepley (FT)</i>	<i>EDS 516 Principle of Behavior Management & Instruction (3 cr; G)</i>	<i>PhD in Special Education (University of Georgia)</i>	<i>Dr. Shipley has taught this course within her dept. for a couple of years.</i>

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FT = full time PT= part time	D = developmental UN = undergraduate nontransferable		UT = undergraduate transferable G = graduate	

MAT in Secondary STEM Education Program – Assessment Plan – CPE Version

The student learning outcomes (SLOs) for the program are derived from a synthesis of the ten InTASC Model Core Teaching Standards ([http://www.ccsso.org/Documents/2011/InTASC Model Core Teaching Standards 2011.pdf](http://www.ccsso.org/Documents/2011/InTASC%20Model%20Core%20Teaching%20Standards%202011.pdf)) into two overarching SLOs: (1) The candidate demonstrates Professional Readiness. Candidates demonstrate the ability to plan, implement, and assess effective instruction on a consistent basis; (2) The candidate demonstrates Professional Dispositions. Candidates demonstrate ethical practice, concern for continuous professional learning, capacity to collaborate with various stakeholders, and a potential for leadership. The first SLO focuses on the core skills that a teacher needs to be effective in the classroom and corresponds to InTASC standards 1 – 8. The second SLO emphasizes the mindset and attitudes required of an effective teacher and correlates with InTASC standards 9 – 10.

5b. Curriculum Map

Course	SLOs Addressed	Level of Expected Completion
SEM 521 Foundations of STEM Teaching	Both SLOs	Introduce → This 1 st STEM methods course is intended to begin candidates' development with regard to both program SLOs.
EDC 533 Teaching Literacy Across Disciplines	Both SLOs	Introduce → The literacy course will supplement the 1 st methods course by providing understanding of how to use literacy to develop curricula.
SEM 631/634 Pedagogy in the Secondary Schools	Both SLOs	Developed → The 2 nd STEM methods course is discipline-specific (math or science) and is intended to continue the candidates' development with regard to both programs SLOs.
EDP 658 Problems in Educational Psychology	Both SLOs	Developed → The ed psych course will supplement the 2 nd methods course by providing understanding of how students learn content.

EPE 773 Seminar in Education Policy Study and Evaluation	Both SLOs	Developed → The ed policy course will support candidates in understanding the politics of schools, which should assist in their collaborative work across contexts.
EDS 516 Principle of Behavior Management & Instruction	Both SLOs	Developed → The special ed course will support candidates development of classroom management skills, ability to work with special needs students, and understanding of collaborative teaching.
SEM 746 Subject Area Instruction in the Secondary Schools	Both SLOs	Mastered → This student teaching seminar, partnered with the student teaching placement, is designed to complete candidates' development with regard to both programs SLOs
EDP 560 Assessment in School Data Analysis	Both SLOs	Mastered → The assessment course will assist candidates in developing a consistent approach to assessment, designing assessment, and, most importantly, analyzing assessment data.

5c. Assessment Plan

Artifact Used	SLOs Addressed	Course Collected	Use Described
Student Teaching Observation Form	Both SLOs	SEM 746	The student teaching observation form has elements aligned with the Kentucky Teacher Performance Standards and therefore fully addresses the SLOs that have been identified for this program. The observation form will be scored 4 times during the student teaching semester for candidates. It will be scored by the student teaching supervisor for each candidate who will also have a post-observ-

			<p>tion conference with each candidate and a consultation with the candidate's cooperating teacher to help inform the scoring. The scores will be submitted into OTIS (https://otis.coe.uky.edu) by the supervisor so that they can be reviewed by the SEM 746 course instructor as well as the appropriate program chairs (one for math and one for science). The supervisors, course instructor, and program chairs will be able to communicate around this data and what it is suggesting about candidates' progress towards program goals.</p>
Final Student Teaching Evaluation Form	Both SLOs	SEM 746	<p>The student teaching observation form has elements aligned with the Kentucky Teacher Performance Standards and therefore fully addresses the SLOs that have been identified for this program. A trio of individuals – the candidate her/himself, the candidate's cooperating teacher, and the student teaching supervisor all complete the same form at the mid-point of student teaching to ensure that the candidate is where s/he needs to be in her/his development, and identify areas for improvement. This form is again completed at the end of the candidate's student teaching experience, with both sets of scores (mid-term and final evaluation) being submitted through OTIS. This allows the scores to be reviewed by the SEM 746 course instructor as well as the appropriate program chairs (one for math and one for science). The supervisors, course instructor, and program</p>

			chairs will be able to communicate around this data and what it is suggesting about candidates' progress towards program goals.
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1. The rubric for the Student Teaching Observation Form is an accompanying document.
2. The rubric for the Final Student Teaching Evaluation Form is an accompanying document.

STEM Education Department

August 15, 2017 Minutes

Attendees: Jennifer Wilhelm, Margaret Schroeder, Cindy Jong, Molly Fisher, Lisa Amick, Brett Criswell (via Zoom), Becky Krall and Jonathan Thomas

Minute Taker: Stephanie Carpenter

Location and Time: 201 TEB: 9:30am

Meeting was called to order at 9:35. Approval of Minutes from 05-02-17 Approved. Motion made by Jonathan and seconded by Margaret.

ALL-Spring 2018 Schedule

Reviewed and made necessary changes to the Spring 2018 schedule

DGS and Grad Student Update:

TA openings- GA position filled, 1 TA position has been filled. 1/2 RA Position (Margaret) and 1/2 TA position remaining to be filled

4 New Masters Students and 6 new PH.D students could be potential candidates

1 EPE candidate would like to switch to STEM Ed and another potential candidate that would like to shadow Cindy and Jonathan first

Potential candidate could be coming from C&I department

Molly will reach out to other departments to fill open TA/RA positions

Monday August 28th in TEB 204; Molly will meet with new graduate students.

***Dinner will be served**

Molly will be hosting a graduate social at her home on Sunday September 17th

Math will bring "savory" snack and science will bring "sweet" snack

\$500 from Block funding will be available for graduate and MIC students to be used for Travel. Must be presenting?

UK official means of communication:

Official means of communication to students should be through canvas or UK email. Texting is not recommended

K-Day

Margaret, Jonathan, Lisa, Becky and Cindy will be available to work the table

MAT STEM education Degree Proposal-

Proposal is completed

Need to find out EPSB requirements

Need Faculty CIP code

Gary (Point of contact) for changing MAT certification program

Rosetta (Point of contact) for creating new degree program

SEM 521 still needs approval

Curriculum contract needed (Lisa will work on)

****Motion to approve MAT STEM Program with stated revisions made by Margaret and seconded by Jonathan resulting in unanimous approval****

REU meeting Tuesday August 29th at 4pm in TEB 108

Former REU students will speak with new REU students

Updates needed for former REU students (where are they now and what are they doing)

****Dinner served****

SSMA Conference Update (Margaret)

Finalizing schedule

Potential openings may be available for graduate students to present

Only 6 graduate students signed up to present

Need to confirm speakers

Need to create work schedule (All grad students need to participate)

Discussed a good amount of time to block off for work times

Fall Maker Fair will now be known as UK STEM Day

Saturday October 21st 9:00am – noon

Location-TBD (looking at local school facilities)

Booth for students in our SEM courses. Will count as part of the course

Tables will be set up for elementary, middle and secondary levels

Invite other departments/colleges to participate (Engineering, Ag & Arts and Sciences)

Invite local businesses to participate or sponsor the event (Big A\$\$ Solutions, Alltech, Awesome Inc)

Margaret will send out an example syllabus blurb for everyone to include.

Budget:

Salary Savings will be calculated next month to allow time for DOE's to be processed and updated

Trying to order (K-12) textbooks with Math instructional supply funds will be a challenge because we are a higher education.

OTHER:

District mandate has been made that science has to be taught every day in schools

Next department meeting will be Friday September 15th 9:30-11:30 in TEB 204

Nominations sought for LTJ Award (Lisa will send out email containing more information)

Senate Committee voted two days for graduation

Fri & Sun (Derby Weekend)

Fri & Sat (Non Derby weekend)

College of Education (Graduate and Undergraduate) will always be the second day day at 2pm

Meeting Adjourned at 11:10 after motion made by Jonathan and seconded by Molly

MAT Secondary STEM Education Updated Proposal

Weber, Ann D <ann.weber@uky.edu>

Thu, Nov 2, 2017 at 10:34 AM

To: "Schroeder, Margaret" <m.mohr@uky.edu>, "Stallones, Jared" <jared.stallones@uky.edu>

Cc: "Criswell, Brett" <brett.criswell@uky.edu>, "Sandidge, Rosetta" <rosetta.sandidge@uky.edu>, "Rintamaa, Margaret" <mrint00@uky.edu>, "Wilhelm, Jennifer" <jennifer.wilhelm@uky.edu>, "Fisher, Molly" <molly.fisher@uky.edu>, "Amick, Lisa R" <lisa.amick@uky.edu>

Hi all,

I want to jump in here and hopefully clarify a few things. I believe that 13.1206 is the best code to use for this program, given the options available. I have also spoken with Melissa Bell at CPE, and while things are in flux right now, she agreed that this was our best path forward. The undergraduate STEM education major is structured identically to the SkyTeach program at WKU, and we will be submitting a request to move that program to 13.1206 in the next week or two and I expect that to be approved. Generally speaking, we try to align CIP codes within a department for all the degrees, so it makes sense to also use that code at the graduate level.

I don't recommend creating two separate degrees in this case, since the College of Education has most often chosen to have one degree with multiple tracks, like the current Masters in Secondary Education which has multiple, discipline-specific tracks within one degree umbrella. It would be a break with your current precedents.

I also need to ask that you all route your questions about CPE and academic programs through me, as the CPE liaison for academic affairs. We need to have one point of contact with them so that we are sure that we are all on the same page.

I'm also happy to talk more about this issue and answer any further questions you might have.

Best,

Annie

Annie Davis Weber, Ed.D.

Assistant Provost for Strategic Planning & Institutional Effectiveness

University of Kentucky

355B Patterson Office Tower

STEM MAT

Stallones, Jared <jared.stallones@uky.edu>

Fri, Nov 3, 2017 at 11:51 AM

To: "Wilhelm, Jennifer" <jennifer.wilhelm@uky.edu>, "Schroeder, Margaret" <mmohr2@g.uky.edu>, "Fisher, Molly" <molly.fisher@uky.edu>, "Criswell, Brett" <brett.criswell@uky.edu>, "Amick, Lisa R" <lisa.amick@uky.edu>

Hi all,

The C&I dept. came to consensus this morning that we will support the STEM MAT proposal provided we can execute an MOU that the STEM Ed. Dept. will not use the 13.1206 CIP code to expand into middle, elementary, or other programs and include that MOU in the proposal. If you think we can do this I will send the MOU.

Jared



Jared R. Stallones, Ph.D.

Professor and Chair
University of Kentucky College of Education
Department of Curriculum and Instruction
337 Dickey Hall | Lexington, KY 40506-0017
859-257-3230 | jared.stallones@uky.edu | education.uky.edu/edc/



Jared R. Stallones, Ph.D.

Professor and Chair
University of Kentucky College of Education
Department of Curriculum and Instruction
337 Dickey Hall | Lexington, KY 40506-0017
859-257-3230 | jared.stallones@uky.edu | education.uky.edu/edc/

image001[6].png
39K [View](#) [Download](#)

COMPOSE

Help with Items on a Substantive Change Form



Inbox x Archives/MIC Alternative Program Work x



Brett Criswell Hello Raeanne & Ann, I am a faculty ... Aug 31 (7 days ago) ☆

5 older messages



Brett Criswell That's fine. We have been completing ... Sep 5 (2 days ago) ☆



Weber, Ann D 3:48 PM (2 hours ago) ☆

to me, RaeAnne, Margaret, Jennifer, Lisa ▾



Dear Brett,

As we discussed this afternoon, I do not believe that the new program you are proposing represents a significant departure for the University of Kentucky as a whole, and as such is not a reportable substantive change. You should feel free to move ahead with your proposal using our internal Senate and external CPE processes.

Please let me know if I can help along the way.

Thanks,

Annie

Annie Davis Weber, Ed.D.

Assistant Provost for Strategic Planning & Institutional Effectiveness
SACSCOC Accreditation Liaison

University of Kentucky
355B Patterson Office Tower
Lexington, KY 40506

Inbox (101)

- Starred
- Important
- Sent Mail

Drafts (724)

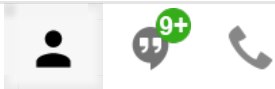
[Imap]/Drafts

Archives

- 4-H Collaborati...
- Advanced Kentu...
- AERA Conferen...
- Alpha Sigma Chi
- Annual Evaluati...



Brett ▾





Brett Criswell <brett.criswell@gmail.com>

Request for Support for MIC STEM Program Changes

Reese, Robert J <jeff.reese@uky.edu>

Fri, Apr 21, 2017 at 4:18 PM

To: "Guskey, Thomas R" <guskey@uky.edu>, Brett Criswell <brett.criswell@gmail.com>

Cc: "Amick, Lisa R" <lisa.amick@uky.edu>, "Wilhelm, Jennifer" <jennifer.wilhelm@uky.edu>, "Schroeder, Margaret" <mmohr2@g.uky.edu>

Agreed. Tom's e-mail reminded me to let you know Brett, that the EDP faculty approved of EDP 560 and 658 being listed on your degree plan for MIC STEM. Good luck with getting the proposal approved, I know it it's a lot of work!

Thanks, Jeff

Jeff Reese, PhD
Professor & Department Chair
Educational, School, & Counseling Psychology
245 Dickey Hall
University of Kentucky
Lexington, Kentucky 40506
[\(859\) 257-4909](tel:(859)257-4909) (office)
[\(859\) 257-5662](tel:(859)257-5662) (Fax)

From: tguskey@gmail.com <tguskey@gmail.com> on behalf of Thomas Guskey <guskey@uky.edu>

Sent: Friday, April 21, 2017 4:14:32 PM

To: Brett Criswell

Cc: Reese, Robert J; Amick, Lisa R; Wilhelm, Jennifer; Schroeder, Margaret

Subject: Re: Request for Support for MIC STEM Program Changes

[Quoted text hidden]

Remove label



More

Changes in MIC Math-Science Program



Archives/MIC Alternative Program Work x



Brett Criswell

Ap

Hello Dr. Goldstein, I am the chair of the MIC Secondary Science program. We ...

5 older messages



Beth L. Goldstein <bethg@coe.uky.edu>

May 2 ☆

to me

Brett,

The EPE faculty have been consulted about the proposed changes to the MIC Math-Science Program curriculum. We are in agreement that EPE 773 continue to be a part of the new program.

Dr. Beth L. Goldstein,
Chair

Department of Educational Policy Studies & Evaluation
131 Taylor Education Building
University of Kentucky
Lexington, KY 40506-0001

Phone: [859/257-2705](tel:8592572705)



Brett Criswell <brett.criswell@gmail.com>

May 2 ☆

to Beth, Margaret, Jennifer, Lisa

Thank you very much Beth! We are making good progress on this and appreciate your department's support.

COMPOSE

Support for the New MIC Sci-Ma Program



Archives/MIC Alternative Program Work x



Brett Criswell Margaret, I just wanted to check in with you about the... May 2 ☆



Bausch, Margaret <meb@email.uky.edu> May 2 ☆

to Justin, Melinda, Amy, Robert, Sally, Allan, Kera, me ▾

Hi Brett,

I have consulted with the EDS faculty and I am pleased to report that the EDS faculty are in full support of the change in the STEM curriculum, specifically of the change in the course requirement for STEM majors from EDS 604 to EDS 516. I also informed the EDS faculty that the STEM and EDS agreed to continue to work collaboratively to ensure that students in both EDS and STEM have access to EDS 516. This collaboration may be in the form of joint faculty, Teaching Assistants, or other collaboratively agreed upon mechanisms. Please let me know if you need additional information.

Thank you and I look forward to our continued collaboration.

Sincerely,
Margaret



Brett Criswell <brett.criswell@gmail.com> May 3 ☆

to Margaret, Jennifer, Lisa, Margaret ▾

Thanks you very much Margaret! We are excited about this program change and about collaborating with your department to the benefit of all of our pre-service teachers.



Click here to [Reply](#), [Reply to all](#), or [Forward](#)

Inbox (95)

- Starred
- Important
- Sent Mail
- Drafts (724)**
- [Imap]/Drafts
- Archives
 - 4-H Collaborati...
 - Advanced Kentu...
 - AERA Conferen...**
 - Alpha Sigma Chi
 - Annual Evaluati...**

Brett ▾

Requesting a Letter of Support for EGR 599

Anderson, Kimberly <kimberly.anderson@uky.edu>

Thu, Mar 8, 2018 at 2:14 PM

To: "Johnson, Michael" <mike.johnson@uky.edu>, "Criswell, Brett" <brett.criswell@uky.edu>
Cc: "Walcott, Bruce" <bruce.walcott@uky.edu>, "Schroeder, Margaret" <m.mohr@uky.edu>

I support this also. Please let me know what you need from us.

Kim

KIMBERLY WARD ANDERSON
Associate Dean for Administration and Academic Affairs, College of Engineering
Professor of Chemical Engineering
Director, NSF REU Program on Engineered Bioactive Interfaces and Devices

355J F. Paul Anderson Building
College of Engineering
University of Kentucky
Lexington, KY 40506

[859-257-1864](tel:859-257-1864)

kimberly.anderson@uky.edu<mailto:kimberly.anderson@uky.edu>

From: "Johnson, Michael" <mike.johnson@uky.edu>

Date: Thursday, March 8, 2018 at 1:46 PM

To: "Criswell, Brett" <brett.criswell@uky.edu>, "Anderson, Kimberly" <kimberly.anderson@uky.edu>

Cc: "Walcott, Bruce" <bruce.walcott@uky.edu>, "Schroeder, Margaret" <m.mohr@uky.edu>

Subject: RE: Requesting a Letter of Support for EGR 599

Hi Brett,

Absolutely, ECE is happy to continue supporting this EGR 599 class under the same structure as we have in the past. This has worked well, and if you had other courses you wanted to propose that had shared instruction from engineering faculty and sufficient technical content to be listed under EGR (or EE or CPE) numbers, we would be happy to consider them also.

Mike

=====
Dr. Michael T. Johnson
Professor and Chair, Electrical and Computer Engineering
FPAT 453, (859) 257-0717
University of Kentucky
<http://johnson.engineering.uky.edu/>

From: Criswell, Brett

Sent: Wednesday, March 07, 2018 3:07 PM

To: Anderson, Kimberly <kimberly.anderson@uky.edu>; Johnson, Michael <mike.johnson@uky.edu>

Cc: Walcott, Bruce <bruce.walcott@uky.edu>; Schroeder, Margaret <m.mohr@uky.edu>

Subject: Requesting a Letter of Support for EGR 599

Hello Dr. Anderson and Dr. Johnson,

The Department of STEM Education is putting forward a new Master of Arts in Teaching in STEM Education. This new program will replace our current MIC Math and Science options. It is a more innovative, flexible program that focuses on many of the key ideas we have incorporated into our undergraduate program, especially a focus on the science and engineering practices. In the past, our MIC students have taken EGR 599: Robotics in the summer with Bruce and Margaret. We would like to continue that relationship. We anticipate the student population to be about the same, 5-15 people. Per the usual practice, Bruce and Margaret would still need to propose the course to you and Mike and receive

permission first to teach the course.

Senate requires confirmation to include the course as a possible elective and so I'm writing to see if we can continue our current relationship with the EGR 599 course, include it as a possible elective, and continue to revisit as necessary if there are other offerings that we might also include?

Thanks!
Brett Criswell

 **winmail.dat**
23K

**University of Kentucky
Department of STEM Education
Master's Verification Form**

August 2017

**Master of Arts in Teaching – Secondary STEM Education
with Initial (Rank II) Certification for Biology, Chemistry,
Physics, and / or Earth Science (grades 8 – 12)**

Degree: Master of Arts in Teaching
Degree Code: MAT
MIC Cohort: **Choose Year**

Program: Secondary STEM Education
Major Code:
Subject Area: **Choose One**

- Submit the Graduate School's *Application for Degree* to the Director of Graduate Studies by the deadline for the semester in which you plan to graduate through your myUK account.
- Submit this form (Master's Verification) to the Director of Graduate Studies no later than two weeks prior to your written comprehensive examination.
- If your exam occurs before the degree application deadline, you must submit both the *Application for Degree* and *Master's Verification Form* no later than two weeks prior to the exam.
- Teacher certification is processed by Academic Services and Teacher Certification, 166 Taylor Education Building, after your degree posts on your transcript. Certification forms (choose initial certification) and transcript request form are available online: <http://education.uky.edu/AcadServ/content/certification-applications>
- If you request a UK transcript prior to the posting of your degree, indicate "hold for posting of degree"
- Include with this form a copy of your transcript printed from myUK

Please TYPE or PRINT

Name				
	(first)	(last)	(mi / maiden)	Expected Date of Degree
Student ID			E-Mail	
Address				
	Street	City	State	Zip
Phone				
	Home	Work	Other	Date of Admission to MIC Program

(25 credit hours)

Required Coursework (Traditional Timeline)

Course	Title	Completed	Grade	Credits
SEM 521	<i>Foundations in STEM Teaching</i>	Summer TBA	TBA	4
EDC 533	<i>Teaching Literacy Across Disciplines</i>	SU / Fall TBA	TBA	3
SEM 634	<i>Pedagogy in the Secondary School: Science</i>	Fall TBA	TBA	3
EDS 516	<i>Principle of Behavior Management & Instruction</i>	Fall TBA	TBA	3
EDP 658	<i>Problems in Educational Psychology</i>	Fall TBA	TBA	1
EPE 773	<i>Seminar in Educational Policy Studies</i>	Fall TBA	TBA	1
SEM 746	<i>Subject Area Instruction in the Secondary School</i>	Spring TBA	TBA	7
EDP 560	<i>Assessment in School Data Analysis</i>	Spring TBA	TBA	3
Course	Title	Completed	Grade	Credits
		SU / Fall TBA	TBA	3
		SU / Fall TBA	TBA	3
Total Credit Hours				31

A. Admission Requirements

1. Required Basic Skills Testing

Kentucky educator certification requirements are subject to change. Before registering for the test(s), please check the Education Professional Standards Board website at www.epsb.ky.gov for current test requirements and current cut scores. You may also contact the Division of Professional Learning and Assessment at 502.564.5778 or toll free at 888.598.7667. To receive a UK recommendation that you are eligible for a state educator certificate, you must have taken the Kentucky EPSB required examinations and met the Kentucky EPSB cut score requirements.

GRE	Verbal (150)	Quantitative (143)	Analytical (4.0)	Date of Test
Core Academic Skills for Educators	Reading (156)	Math (150)	Writing (162)	Date of Test

2. Required GPAs (minimum 2.75 in each area)

Note: A minimum grade of “C” is required for all Education Core and Content Major courses. In addition, a minimum GPA of 2.75 is required overall, as well as in the Education core, Content Major Courses, and Content Support Courses.

Pre-TEP Content Major	
Pre-TEP Overall	
Master’s Coursework	
Overall	

3. Continuous Assessment Checklist

Checkpoint	Date
Admission to TEP	
Satisfactory Mid-point Review (includes Portfolio review)	
Satisfactory Exit Review (includes Portfolio review)	

4. Admission Criteria for the Program

Admission screening includes thorough reviews by the Program Faculty of each applicant’s current undergraduate coursework, grades, professional experience, experiences working with adolescents, and writing ability. In addition, each applicant is evaluated via an interview with Program Faculty members using a protocol designed to assess the applicant’s knowledge, skills, and dispositions for the teaching of high school science to diverse students. At the time of the interview, applicants are evaluated according to the following criteria:

- Undergraduate degree in the science discipline in which certification is sought or the equivalent of one
- GPA of 2.75 – overall, pre-major content area, and pre-major education area with C or above in the pre-major courses (alternatively, overall GPA can be 3.0 or above for the last 30 hours)
- Successful passing of GRE and/or Core Academic Skills for Educators tests (scores identified by EPSB)
- Demonstration and Documentation of the Partnership for 21st Century Literacies “4 C’s” – Critical Thinking, Communication, Creativity, and Collaboration
- Application materials including documentation of review of the Code of Ethics and the Character and Fitness Form
- Review of professional/academic writing sample
- Verbal communication skills
- Quality of personal references
- Commitment to teaching and science
- Awareness of and value for social diversity
- Experiences with diverse adolescents
- Experiences in multicultural contexts

B. Exit Requirements

1. Course Summary

31-34 hours of graduate credit required for completion

Total number of credits completed

Number of credits completed in courses numbered 600 or above

Number of hours in progress

Total number of credits transferred into program (including UK post-baccalaureate)

List credit hours for any "I", "S", or missing grades

- *If you have any "I", "S", or missing grades, the course instructor must assign a grade before you will be permitted to sit for the final exam. Otherwise, the Director of Graduate Studies must petition the Graduate School for permission to sit for the final exam.*

Successfully complete mid-point assessment review, including presentation of required assessment materials.
Comments:

3.0 minimum GPA earned in all MAT coursework

Applied for Master's Degree with Graduate School

2. Master's Examination Information

Date: _____

Time: _____

Place: _____

Committee Members

_____ (Chair)

Candidate successfully completed master's exam: _____

3. Required PRAXIS II Testing for Kentucky Teacher Certification

Kentucky educator certification requirements are subject to change. Before registering for the test(s), please check the Education Professional Standards Board website at www.epsb.ky.gov for current test requirements and current cut scores. You may also contact the Division of Professional Learning and Assessment at 502.564.5778 or toll free at 888.598.7667. To receive a UK recommendation that you are eligible for a state educator certificate, you must have taken the Kentucky EPSB required examinations and met the Kentucky EPSB cut score requirements.

Required for all students	
Principles of Learning and Teaching: Grades 7-12 (Code 5624; 160 min)	Score: _____; Date of test: _____
Choose Content Area Test	
Biology: Content Knowledge (Code 5235; 146 min)	Score: _____; Date of test: _____
Chemistry: Content Knowledge (Code 5245; 147 min)	Score: _____; Date of test: _____
Earth and Space Sciences: Content Knowledge (Code 5571; 147 min)	Score: _____; Date of test: _____
Physics: Content Knowledge (Code 5265; 133 min)	Score: _____; Date of test: _____

Teacher certification requirements are subject to change. Before registering for the test(s), please refer to the Education Professional Standards Board website at www.kyepsb.net for current requirements or toll free at 888-598-7667

Note:

1. *Student must attach signed copies of all subject matter course listing forms demonstrating completion of all courses with a minimum GPA of 2.75 on each form.*
2. *Student must demonstrate continued adherence to the Kentucky Professional Code of Ethics and have a signed Declaration of Eligibility for a Certificate on file.*

C. Certification Requirements

Certification Checklist:

- Application filed with 166 TEB (with \$30.00 check for 166 TEB processing fee)
- Appropriate Praxis II and PLT exams completed and passed

By signing this form, I verify the above information is accurate. I verify that all aspects of this program have been reviewed and are understood.

Student Signature

Date

To be filled out by the advisor:

By signing this form, I agree this student has completed all coursework requirements needed to obtain a Master's of Arts in Teaching – Secondary STEM Education.

Advisor Signature

Date

To be filled out by the Program Chair:

By signing this form, I agree:

- 1) This student has met EPSB and NCATE standards for teacher certification.
- 2) This student should be recommended for certification.

Program Faculty Chair Signature

Date

To be filled out by Certification Officer:

I verify that all aspects of this program have been reviewed and are understood.

Certification Officer

Date

Transcript Release Statement

For the purpose of teacher certification, the office of Academic Services and Teacher Certification requires transcripts from all previous graduate and undergraduate work in addition to a final UK transcript indicated the awarded Master's Degree.

- If the coursework did not conclude with a degree, a photocopy will be acceptable provided that the copy is legible and the school name is visible
- If you earned a degree from another institution (graduate or undergraduate), you must include an official transcript. In this case, "official" simply means that the transcript is printed on official paper. It is perfectly acceptable if the transcript states "issued to student." This differs from official transcripts in sealed envelopes as required by the Graduate School for admission.
- If coursework was transferred to your UK transcript from any UK related community college, you do not need to include the community college transcript. The grades for those courses will appear on your UK transcript. *The Graduate School will not release transcripts from your file.*

MAT applicants are requested to submit two official transcripts during the admissions process. In the event we have these transcripts on file and they meet the requirements for certification, we will release these transcripts to you per your request. Please indicate that you would like to have the transcripts released by providing us with the information requested below. We will audit your file for the needed documents and they will be included in your examination packet at the time you take your written comprehensive examination. We will contact you if there are any problems so that you will have time to request official transcripts if necessary.

**University of Kentucky
Department of STEM Education
Master's Verification Form**

August 2017

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with Initial (Rank II) Certification for Biology, Chemistry,
Physics, and / or Earth Science (grades 8 – 12)**

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- If your exam occurs before the degree application deadline, you must submit both the *Application for Degree* and *Master's Verification Form* no later than two weeks prior to the exam.
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- If you request a UK transcript prior to the posting of your degree, indicate "hold for posting of degree"
- Include with this form a copy of your transcript printed from myUK

Please TYPE or PRINT

Name				
	(first)	(last)	(mi / maiden)	Expected Date of Degree
Student ID		E-Mail		
Address				
	Street	City	State	Zip
Phone				
	Home	Work	Other	Date of Admission to MIC Program

(25 credit hours)

Required Coursework (Flexible Timeline)

Course	Title	Completed	Grade	Credits
EDC 533	<i>Teaching Literacy Across Disciplines</i>	SU 1 TBA	TBA	3
EDS 516	<i>Principle of Behavior Management & Instruction</i>	FA 1 TBA	TBA	3
EDP 658	<i>Problems in Educational Psychology</i>	FA 1 TBA	TBA	1
EPE 773	<i>Seminar in Educational Policy Studies</i>	FA 1 TBA	TBA	1
EDP 560	<i>Assessment in School Data Analysis</i>	SP 1 TBA	TBA	3
SEM 521	<i>Foundations in STEM Teaching</i>	SU 2 TBA	TBA	4
SEM 634	<i>Pedagogy in the Secondary School: Science</i>	FA 2 TBA	TBA	3
SEM 746	<i>Subject Area Instruction in the Secondary School</i>	SP 2 TBA	TBA	7
Course	Title	Completed	Grade	Credits
		SU / FA TBA	TBA	3
		FA / SP TBA	TBA	3
Total Credit Hours				31

A. Admission Requirements

1. Required Basic Skills Testing

Kentucky educator certification requirements are subject to change. Before registering for the test(s), please check the Education Professional Standards Board website at www.epsb.ky.gov for current test requirements and current cut scores. You may also contact the Division of Professional Learning and Assessment at 502.564.5778 or toll free at 888.598.7667. To receive a UK recommendation that you are eligible for a state educator certificate, you must have taken the Kentucky EPSB required examinations and met the Kentucky EPSB cut score requirements.

GRE	Verbal (150)	Quantitative (143)	Analytical (4.0)	Date of Test
Core Academic Skills for Educators	Reading (156)	Math (150)	Writing (162)	Date of Test

2. Required GPAs (minimum 2.75 in each area)

Note: A minimum grade of “C” is required for all Education Core and Content Major courses. In addition, a minimum GPA of 2.75 is required overall, as well as in the Education core, Content Major Courses, and Content Support Courses.

Pre-TEP Content Major	
Pre-TEP Overall	
Master’s Coursework	
Overall	

3. Continuous Assessment Checklist

Checkpoint	Date
Admission to TEP	
Satisfactory Mid-point Review (includes Portfolio review)	
Satisfactory Exit Review (includes Portfolio review)	

4. Admission Criteria for the Program

Admission screening includes thorough reviews by the Program Faculty of each applicant’s current undergraduate coursework, grades, professional experience, experiences working with adolescents, and writing ability. In addition, each applicant is evaluated via an interview with Program Faculty members using a protocol designed to assess the applicant’s knowledge, skills, and dispositions for the teaching of high school science to diverse students. At the time of the interview, applicants are evaluated according to the following criteria:

- Undergraduate degree in the science discipline in which certification is sought or the equivalent of one
- GPA of 2.75 – overall, pre-major content area, and pre-major education area with C or above in the pre-major courses (alternatively, overall GPA can be 3.0 or above for the last 30 hours)
- Successful passing of GRE and/or Core Academic Skills for Educators tests (scores identified by EPSB)
- Demonstration and Documentation of the Partnership for 21st Century Literacies “4 C’s” – Critical Thinking, Communication, Creativity, and Collaboration
- Application materials including documentation of review of the Code of Ethics and the Character and Fitness Form
- Review of professional/academic writing sample
- Verbal communication skills
- Quality of personal references
- Commitment to teaching and science
- Awareness of and value for social diversity
- Experiences with diverse adolescents
- Experiences in multicultural contexts

B. Exit Requirements

1. Course Summary

31-34 hours of graduate credit required for completion

Total number of credits completed

Number of credits completed in courses numbered 600 or above

Number of hours in progress

Total number of credits transferred into program (including UK post-baccalaureate)

List credit hours for any "I", "S", or missing grades

- *If you have any "I", "S", or missing grades, the course instructor must assign a grade before you will be permitted to sit for the final exam. Otherwise, the Director of Graduate Studies must petition the Graduate School for permission to sit for the final exam.*

Successfully complete mid-point assessment review, including presentation of required assessment materials.
Comments:

3.0 minimum GPA earned in all MAT coursework

Applied for Master's Degree with Graduate School

2. Master's Examination Information

Date: _____

Time: _____

Place: _____

Committee Members

_____ (Chair)

Candidate successfully completed master's exam: _____

3. Required PRAXIS II Testing for Kentucky Teacher Certification

Kentucky educator certification requirements are subject to change. Before registering for the test(s), please check the Education Professional Standards Board website at www.epsb.ky.gov for current test requirements and current cut scores. You may also contact the Division of Professional Learning and Assessment at 502.564.5778 or toll free at 888.598.7667. To receive a UK recommendation that you are eligible for a state educator certificate, you must have taken the Kentucky EPSB required examinations and met the Kentucky EPSB cut score requirements.

Required for all students	
Principles of Learning and Teaching: Grades 7-12 (Code 5624; 160 min)	Score: _____; Date of test: _____
Choose Content Area Test	
Biology: Content Knowledge (Code 5235; 146 min)	Score: _____; Date of test: _____
Chemistry: Content Knowledge (Code 5245; 147 min)	Score: _____; Date of test: _____
Earth and Space Sciences: Content Knowledge (Code 5571; 147 min)	Score: _____; Date of test: _____
Physics: Content Knowledge (Code 5265; 133 min)	Score: _____; Date of test: _____

Teacher certification requirements are subject to change. Before registering for the test(s), please refer to the Education Professional Standards Board website at www.kyepsb.net for current requirements or toll free at 888-598-7667

Note:

1. *Student must attach signed copies of all subject matter course listing forms demonstrating completion of all courses with a minimum GPA of 2.75 on each form.*
2. *Student must demonstrate continued adherence to the Kentucky Professional Code of Ethics and have a signed Declaration of Eligibility for a Certificate on file.*

C. Certification Requirements

Certification Checklist:

- Application filed with 166 TEB (with \$30.00 check for 166 TEB processing fee)
- Appropriate Praxis II and PLT exams completed and passed

By signing this form, I verify the above information is accurate. I verify that all aspects of this program have been reviewed and are understood.

Student Signature

Date

To be filled out by the advisor:

By signing this form, I agree this student has completed all coursework requirements needed to obtain a Master's of Arts in Teaching – Secondary STEM Education.

Advisor Signature

Date

To be filled out by the Program Chair:

By signing this form, I agree:

- 1) This student has met EPSB and NCATE standards for teacher certification.
- 2) This student should be recommended for certification.

Program Faculty Chair Signature

Date

To be filled out by Certification Officer:

I verify that all aspects of this program have been reviewed and are understood.

Certification Officer

Date

Transcript Release Statement

For the purpose of teacher certification, the office of Academic Services and Teacher Certification requires transcripts from all previous graduate and undergraduate work in addition to a final UK transcript indicated the awarded Master's Degree.

- If the coursework did not conclude with a degree, a photocopy will be acceptable provided that the copy is legible and the school name is visible
- If you earned a degree from another institution (graduate or undergraduate), you must include an official transcript. In this case, "official" simply means that the transcript is printed on official paper. It is perfectly acceptable if the transcript states "issued to student." This differs from official transcripts in sealed envelopes as required by the Graduate School for admission.
- If coursework was transferred to your UK transcript from any UK related community college, you do not need to include the community college transcript. The grades for those courses will appear on your UK transcript. *The Graduate School will not release transcripts from your file.*

MAT applicants are requested to submit two official transcripts during the admissions process. In the event we have these transcripts on file and they meet the requirements for certification, we will release these transcripts to you per your request. Please indicate that you would like to have the transcripts released by providing us with the information requested below. We will audit your file for the needed documents and they will be included in your examination packet at the time you take your written comprehensive examination. We will contact you if there are any problems so that you will have time to request official transcripts if necessary.

**Master of Arts in Teaching – Secondary STEM Education
with Initial (Rank II) Certification for mathematics (grades 8 – 12)**

Degree: Master of Arts in Teaching
Degree Code: MAT
MAT in STEM Cohort: **Choose Year**

Major: Secondary STEM Education
Major Code: _____
Subject Area: mathematics

- Submit the Graduate School's *Application for Degree* to the Director of Graduate Studies by the deadline for the semester in which you plan to graduate through your myUK account.
- Submit this form (Master's Verification) to the Director of Graduate Studies no later than two weeks prior to your written comprehensive examination.
- If your exam occurs before the degree application deadline, you must submit both the *Application for Degree* and *Master's Verification Form* no later than two weeks prior to the exam.
- Teacher certification is processed by Academic Services and Teacher Certification, 166 Taylor Education Building, after your degree posts on your transcript. Certification forms (choose initial certification) and transcript request form are available online: <http://education.uky.edu/AcadServ/content/certification-applications>
- If you request a UK transcript prior to the posting of your degree, indicate "hold for posting of degree"
- Include with this form a copy of your transcript printed from myUK

Please TYPE or PRINT

Name				
	(first)	(last)	(mi / maiden)	Expected Date of Degree
Student ID			E-Mail	
Address				
	Street	City	State	Zip
Phone				
	Home	Work	Other	Date of Admission to MIC Program

(25 credit hours)

Required Coursework (Traditional Timeline)

Course	Title	Completed	Grade	Credits
SEM 521	<i>Foundations in STEM Teaching</i>	Summer TBA	TBA	4
EDC 533	<i>Teaching Literacy Across Disciplines</i>	SU / Fall TBA	TBA	3
SEM 631	<i>Pedagogy in the Secondary School: mathematics</i>	Fall TBA	TBA	3
EDS 516	<i>Principle of Behavior Management & Instruction</i>	Fall TBA	TBA	3
EDP 658	<i>Problems in Educational Psychology</i>	Fall TBA	TBA	1
EPE 773	<i>Seminar in Educational Policy Studies</i>	Fall TBA	TBA	1
SEM 746	<i>Subject Area Instruction in the Secondary School</i>	Spring TBA	TBA	7
EDP 560	<i>Assessment in School Data Analysis</i>	Spring TBA	TBA	3
Course	Title	Completed	Grade	Credits
		SU / Fall TBA	TBA	3
		SU / Fall TBA	TBA	3
Total Credit Hours				31

A. Admission Requirements

1. Required Basic Skills Testing

Kentucky educator certification requirements are subject to change. Before registering for the test(s), please check the Education Professional Standards Board website at www.epsb.ky.gov for current test requirements and current cut

scores. You may also contact the Division of Professional Learning and Assessment at 502.564.5778 or toll free at 888.598.7667. To receive a UK recommendation that you are eligible for a state educator certificate, you must have taken the Kentucky EPSB required examinations and met the Kentucky EPSB cut score requirements.

GRE	Verbal (150)	Quantitative (143)	Analytical (4.0)	Date of Test
Core Academic Skills for Educators	Reading (156)	Math (150)	Writing (162)	Date of Test

2. Required GPAs (minimum 2.75 in each area)

Note: A minimum grade of “C” is required for all Education Core and Content Major courses. In addition, a minimum GPA of 2.75 is required overall, as well as in the Education core, Content Major Courses, and Content Support Courses.

Pre-TEP Content Major	
Pre-TEP Overall	
Master’s Coursework	
Overall	

3. Continuous Assessment Checklist

Checkpoint	Date
Admission to TEP	
Satisfactory Mid-point Review (includes Portfolio review)	
Satisfactory Exit Review (includes Portfolio review)	

4. Admission Criteria for the Program

Admission screening includes thorough reviews by the Program Faculty of each applicant’s current undergraduate coursework, grades, professional experience, experiences working with adolescents, and writing ability. In addition, each applicant is evaluated via an interview with Program Faculty members using a protocol designed to assess the applicant’s knowledge, skills, and dispositions for the teaching of high school science to diverse students. At the time of the interview, applicants are evaluated according to the following criteria:

- Undergraduate degree in the science discipline in which certification is sought or the equivalent of one
- GPA of 2.75 – overall, pre-major content area, and pre-major education area with C or above in the pre-major courses (alternatively, overall GPA can be 3.0 or above for the last 30 hours)
- Successful passing of GRE and/or Core Academic Skills for Educators tests (scores identified by EPSB)
- Demonstration and Documentation of the Partnership for 21st Century Literacies “4 C’s” – Critical Thinking, Communication, Creativity, and Collaboration
- Application materials including documentation of review of the Code of Ethics and the Character and Fitness Form
- Review of professional/academic writing sample
- Verbal communication skills
- Quality of personal references
- Commitment to teaching and mathematics
- Awareness of and value for social diversity
- Experiences with diverse adolescents
- Experiences in multicultural contexts

B. Exit Requirements

1. Course Summary

31-34 hours of graduate credit required for completion

Total number of credits completed

Number of credits completed in courses numbered 600 or above

Number of hours in progress

Total number of credits transferred into program (including UK post-baccalaureate)

List credit hours for any "I", "S", or missing grades

- If you have any "I", "S", or missing grades, the course instructor must assign a grade before you will be permitted to sit for the final exam. Otherwise, the Director of Graduate Studies must petition the Graduate School for permission to sit for the final exam.

Successfully complete mid-point assessment review, including presentation of required assessment materials.
Comments:

3.0 minimum GPA earned in all MAT in STEM coursework

Applied for Master's Degree with Graduate School

2. Master's Examination Information

Date: _____

Time: _____

Place: _____

Committee Members

_____ (Chair)

Candidate successfully completed master's exam: _____

3. Required PRAXIS II Testing for Kentucky Teacher Certification

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Required for all students	
Principles of Learning and Teaching: Grades 7-12 (Code 0524; 161 min)	Score: _____; Date of test: _____
Choose Content Area Test	
Mathematics: Content Knowledge (Code 5161; 160 min)	Score: _____; Date of test: _____

Teacher certification requirements are subject to change. Before registering for the test(s), please refer to the Education Professional Standards Board website at www.kyepsb.net for current requirements or toll free at 888-598-7667

Note:

1. Student must attach signed copies of all subject matter course listing forms demonstrating completion of all courses with a minimum GPA of 2.75 on each form.
2. Student must demonstrate continued adherence to the Kentucky Professional Code of Ethics and have a signed Declaration of Eligibility for a Certificate on file.

C. Certification Requirements

Certification Checklist:

- Application filed with 166 TEB (with \$30.00 check for 166 TEB processing fee)
- Appropriate Praxis II and PLT exams completed and passed

By signing this form, I verify the above information is accurate. I verify that all aspects of this program have been reviewed and are understood.

Student Signature

Date

To be filled out by the advisor:

By signing this form, I agree this student has completed all coursework requirements needed to obtain a Master's of Arts in Teaching – Secondary Education.

Advisor Signature

Date

To be filled out by the Program Chair:

By signing this form, I agree:

- 1) This student has met EPSB and NCATE standards for teacher certification.
- 2) This student should be recommended for certification.

Program Faculty Chair Signature

Date

To be filled out by Certification Officer:

I verify that all aspects of this program have been reviewed and are understood.

Certification Officer

Date

Transcript Release Statement

For the purpose of teacher certification, the office of Academic Services and Teacher Certification requires transcripts from all previous graduate and undergraduate work in addition to a final UK transcript indicated the awarded Master's Degree.

- If the coursework did not conclude with a degree, a photocopy will be acceptable provided that the copy is legible and the school name is visible
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I wish to have originals or photocopies of the transcripts released to me by the Director of Graduate Studies, Department of Curriculum and Instruction, for the purpose of teacher certification.

Institution	Years Attended	Degree Awarded

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with Initial (Rank II) Certification for mathematics (grades 8 – 12)**

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Degree Code: MAT
MAT in STEM Cohort: **Choose Year**

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- Include with this form a copy of your transcript printed from myUK

Please TYPE or PRINT

Name				
	(first)	(last)	(mi / maiden)	Expected Date of Degree
Student ID			E-Mail	
Address				
	Street	City	State	Zip
Phone				
	Home	Work	Other	Date of Admission to MIC Program

(25 credit hours)

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Comments:

3.0 minimum GPA earned in all MAT in STEM coursework

Applied for Master's Degree with Graduate School

2. Master's Examination Information

Date: _____

Time: _____

Place: _____

Committee Members

_____ (Chair)

Candidate successfully completed master's exam: _____

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Certification Checklist:

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Date

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Advisor Signature

Date

To be filled out by the Program Chair:

By signing this form, I agree:

- 1) This student has met EPSB and NCATE standards for teacher certification.
- 2) This student should be recommended for certification.

Program Faculty Chair Signature

Date

To be filled out by Certification Officer:

I verify that all aspects of this program have been reviewed and are understood.

Certification Officer

Date

Transcript Release Statement

For the purpose of teacher certification, the office of Academic Services and Teacher Certification requires transcripts from all previous graduate and undergraduate work in addition to a final UK transcript indicated the awarded Master's Degree.

- If the coursework did not conclude with a degree, a photocopy will be acceptable provided that the copy is legible and the school name is visible
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I wish to have originals or photocopies of the transcripts released to me by the Director of Graduate Studies, Department of Curriculum and Instruction, for the purpose of teacher certification.

Institution	Years Attended	Degree Awarded

Proposal for a STEM Education Department within the College of Education

We propose to form a Department of Science, Technology, Engineering, and Mathematics [STEM] Education within the University of Kentucky [UK] College of Education. First and foremost, our proposed department aims to increase and retain Commonwealth and national participation of individuals in the STEM pipeline pre-K through their time in the workforce. Ultimately, our efforts will help fulfill the recent efforts made by President Lee Todd when he joined three other university leaders – University of Kansas’ Chancellor Bernadette Gray-Little, University System of Maryland’s Chancellor and UK alumnus Brit Kirwan, and University of Colorado’s Chancellor Philip P. DiStefano – in presenting President Obama with a letter (see letter and media documents in Appendix C, page 29) signed by leaders from 79 public research universities “to substantially increase the number and diversity of high-quality science and mathematics teachers we prepare, and to build better partnerships among universities, community colleges, school systems, state governments, business and other stakeholders.” To achieve these ambitious and urgent goals requires the concerted efforts of those with a common vision who share focused, relevant expertise in STEM education.

The proposed Department will expand and enhance STEM Education at UK and for the Commonwealth in significant ways. Along with strengthening teacher preparation programs already in place (e.g., Elementary, Middle School, Master’s with Initial Certification, and Advanced Master’s in STEM Education) in continued collaboration with the Department of Curriculum and Instruction, the STEM Education Department will build new bachelor’s and doctoral programs in science, technology, engineering, and/or mathematics education. Our proposal is directly in line with President Barack Obama’s “Educate to Innovate” initiative and his movement to reduce the national shortage of science and mathematics teachers. We believe we can take center stage and serve as a model for other universities in moving the “Educate to Innovate” project forward.

In addition, the new department will lead the Commonwealth in STEM Education research by attracting graduate students as well as future STEM faculty researchers pursuing cutting edge research in these disciplines. We seek to help position the UK College of Education alongside its peers nationally with respect to STEM education research, doctoral education, and STEM teacher education, especially at the undergraduate level. Our plan is to become the top program for preparing future STEM Education faculty members, researchers, and both undergraduate and graduate students. Immediately upon becoming a department, we will submit an undergraduate degree program, which will give STEM and STEM Education majors the opportunity to be certified to teach within four years. This opportunity currently does not exist at UK. Over the long term, the creation of a PhD within the STEM Education Department would be nationally ground-breaking and place UK on the cutting edge among benchmarks. Given the national shortage of PhD graduates to fill vacant faculty positions in STEM education disciplines, UK has the strong potential to fill an important market niche. Thus, we believe this proposal supports UK’s Top 20 goals. This effort would increase the number of doctorates that UK produces and would elevate productivity in the College of Education.

Why a Science, Technology, Engineering, and Mathematics Department?

Since the launch of Sputnik and the passing of the National Defense Education Act of 1958 in its wake (Carney, Chubin, & Malcom, 2008), the U.S. government and non-government organizations have continued to increase their funding of endeavors meant to improve K-20 STEM education, mostly with the ultimate goal of swelling the pipeline of individuals that will, eventually, grow the national STEM workforce (Carney et al., 2008; Kuenzi, 2008). More recent reports such as *A Nation At Risk* (National Commission on Excellence in Education, 1983) and *Rising Above the Gathering Storm* (Committee on Science, Engineering, and Public Policy, 2006) have kept the concern for STEM education reform paramount in the nation's psyche. In recent years, the principal federal agencies charged with distributing funds meant to improve STEM education have been The National Institutes of Health (NIH) and The National Science Foundation (NSF) (Kuenzi, 2008).

Given the main focus of many of these grants and others' required attention to *broader impacts* concerning society at large, the current reality for many postsecondary faculty is that if they wish to compete for federal funding in the current economic climate they need to demonstrate involvement in K-20 STEM education improvement endeavors. This is an especially salient reality for faculty working at research universities where the pressure to secure federal funding is at its greatest and the carrot of funding is especially motivating of faculty (Holley, 2009; Rhoten, 2004). This reality often requires interdisciplinary collaborations, across the natural and social sciences as well as within these umbrella areas. Still, economic realities are just a set of motivations driving interdisciplinary faculty collaborations and the common passions and goals regarding an envisioned collaboration can serve as powerful motivators too (Eddy, 2010). Regardless of the initial motivations, successful interdisciplinary collaborations can allow for great strides with respect to STEM education reform in allowing for postsecondary environments to foster greater understanding of, and solutions for, inadequately addressed by single disciplines' knowledge and practices (Aram, 2004; Holley, 2009; Lattuca, 2001; see also Caruso & Rhoten, 2001).

To help UK meet the call to be more entrepreneurial

None of our benchmark institutions are forming STEM Education departments, precisely one of the reasons why UK should. As President Lee Todd, the provost, and various other stakeholders have endorsed, UK must find ways to be entrepreneurial, lest it be outcompeted or rendered less relevant. According to Schuster and Finkelstein's pivotal work (2006), major changes across the academy nationally are occurring more rapidly than at any other time since the birth of higher education. These changes are driven, mostly, by technological advances and demands of the market. To compete, UK must be open to changes to better meet the need of its citizenry in the modern environment, including changes regarding the restructuring of faculty work in way that capitalizes on market forces (Schuster & Finkelstein, 2006).

To better secure leadership of STEM education research and teaching resides with those trained in STEM education

“The cultural implications of an autonomous interdisciplinary program are significant for an institution. Such programs are afforded the independence granted to traditional colleges and disciplines; they are also granted the autonomy to determine academic policies, faculty hiring, student admissions, and curricular decisions” (Holley, 2009, p. 93). Most research at universities is externally supported (Slaughter & Leslie, 1997) and secured grants now serve as a main organizing factor at research universities, just behind the institution itself and the department (Geiger, 2004; Holley, 2009). Besides the obvious affordances granted an academic department at a university, and including the means to control external research dollars, our proposed STEM Education department will allow for greater oversight of STEM Education, and all that this encompasses, by those that have been training in STEM Education. We recognize the necessary and incredibly important involvement of others in the STEM Education initiative and, in fact, plan to organize our department with its joint appointments of faculty from Arts & Sciences, PIMSER, and Engineering. We also recognize the necessity to secure STEM Education as a department within the College of Education since it is intimately connected to other social sciences through institutional structure at the University of Kentucky.

To better focus on undergraduate and graduate student learning

Recognizing the need to prepare students for their “modern interdisciplinary futures” (Holley, 2009), interdisciplinary programs of study are being offered at most institutions of higher education. Yet interdisciplinary programs move beyond a simply economic model regarding student benefits. They also allow for greater student-centered pedagogy; this occurs with respect to engaging students in practices and knowledge that unite disciplines and in meeting students’ interests in their education pursuits, allowing for more well-rounded, practical, education applicable in an ever-changing world (Haynes, 2002; Holley, 2009). More universities, including our benchmarks, now encourage students’ co-development of interdisciplinary majors. These include the Program In Individualized Studies at the University of Washington, the Gallatin School of Individualized Studies at New York University, the University of Alabama’s New College, and the Interdisciplinary Studies Program at Michigan State. Students in these programs work with an advisor or committee in planning their interdisciplinary program of study that cater to student interest, with, of course, faculty being responsible for making sure student focus is appropriately broad and measurable. Ongoing assessment is measured often in portfolios and culminating projects (Holley, 2009). A department made up of faculty with background in STEM and STEM teacher education within their areas of training, and supported by the structures of a department, secures informed assessment of interdisciplinary, and even transdisciplinary, student work.

Theoretical Framework of the Science, Technology, Engineering, and Mathematics Education Department

All endeavors will be framed with a transdisciplinary design. We define *transdisciplinary* as engagement, investigation, innovation, and praxis addressing present-day issues and problems in a way that explicitly highlights discipline commonalities while respecting disciplinary expertise and practice within and across STEM (Thompson Klein et al., 2001; Nicolescu, 2002).

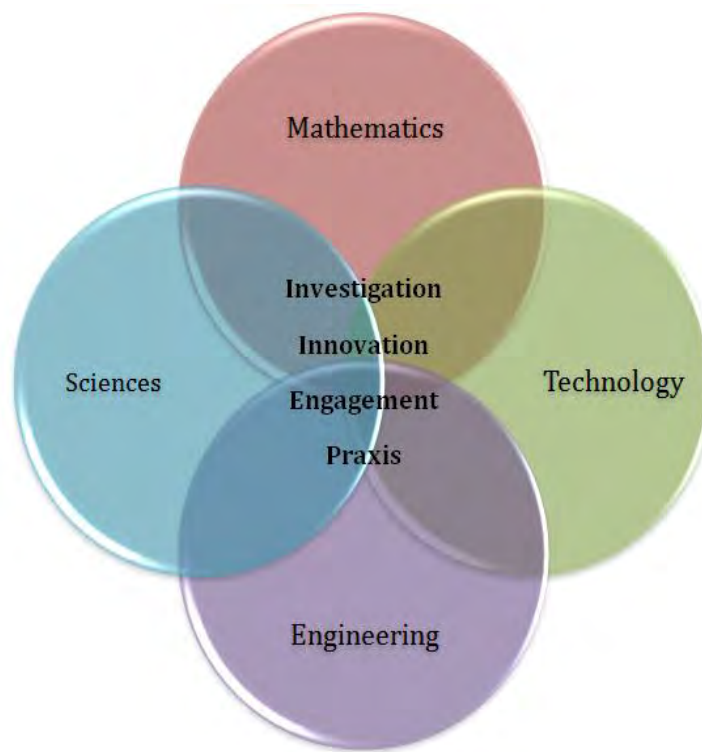


Figure 1: Transdisciplinary approach uniting UK STEM Education Department endeavors

How can we foster these much-needed interdisciplinary and transdisciplinary collaborations with respect to STEM education with the current academic and financial realities in mind? Some of our benchmark institutions are attempting to figure this out, such as The University of Wisconsin–Madison, Duke University, the University of Southern California, and the Pennsylvania State University, who all have an explicit goal to hire interdisciplinary faculty. Some do so as *cluster hires*, or groups of faculty with promise of informing an interdisciplinary topic but still with main affiliation within a department (Holley, 2009; Sa, 2008). While such practice has promise to work within the historical structure of the postsecondary institutions and the all-powerful department, an improvement to this tactic is undoubtedly the creation of a transdisciplinary department, with all the protections and affordances, to its students and faculty, that departments allow.

Our unique, timely, and focused department will be grounded in our college-wide framework of *Research and Reflection for Learning and Leading* and related to national accreditation standards through NCATE (National Council of Accreditation of Teacher

Education). Our department-specific framework is guided by standards and recommendations from the following:

- National Research Council,
- American Association for the Advancement of Science,
- National Academy of Engineering and the American Society for Engineering Education,
- International Society for Technology in Education, and
- National Council of Teachers of Mathematics.

All six organizations stress an understanding of central discipline specific concepts as well as those that unite the disciplines, such as, the tools of inquiry, the importance of professional values/ethics, skills in the use of technology, and a commitment to multicultural competence and awareness.

Science, Technology, Engineering, and Mathematics Education Department Long-Range Plans

There are three phases to our proposed STEM Education Department plan. Below is an overview of each of the three Phases with discussions of each following.

Phase 1 (Immediate upon establishment of Department)

- The establishment of a STEM Education Department within the College of Education.
- The movement of eight education faculty (see Table 1) from the Curriculum and Instruction Department to the new unit of STEM Education.
- **The transfer of the current undergraduate mathematics and science secondary education programs, the Advanced Master of Science in STEM Education program, and the Master of Arts in Education (with initial certification) in mathematics and science programs from the Department of Curriculum and Instruction to the STEM Education Department. (see Table 3)**

Phase 2 (February 2011 – February 2012)

- The development, approval, and implementation of a new undergraduate certification program (called “STEM PLUS”) where undergraduate students can major in STEM Education and a content area with secondary teaching certification in one or more state-certifiable STEM subjects in just 4 years. In addition, a stand-alone STEM Education major will be created to allow for greater flexibility and multiple pathways towards becoming a STEM teacher. These options currently do not exist for potential secondary mathematics, science, and/or computer science teachers.
- The establishment of no cost joint appointments between faculty from the Colleges of Arts & Sciences, Engineering, and Education.

Phase 3 (March 2012 – March 2013)

- The development, approval, and implementation of a new STEM Education doctoral program. (Prior to the development of this doctoral program, PhD students are enrolled in the Interdisciplinary Educational Science program housed at the College level.)

Phase One Discussion

Currently our STEM Education faculty consists of nine faculty lines. We have four faculty members in mathematics education, Xin Ma, Margaret Mohr-Schroeder, Molly Fisher, and Christa Jackson. Xin Ma is 50% in the Department of Curriculum and Instruction and 50% in the Department of Educational, School, and Counseling Psychology. Upon approval of the STEM Education Department, his appointment would change to 50% in the Department of STEM Education and 50% in the Department of Educational, School, and Counseling Psychology. Our four science education faculty members include, Jennifer Wilhelm, Rebecca McNall Krall, Jana Bouwma-Gearhart, and Christine Schmittka. In addition, we have one open senior mathematics education regular title faculty line.

Our STEM Education faculty is strong in both content and pedagogical content knowledge with five faculty members holding bachelors and master's degrees in the content areas of physics, engineering, mathematics, and biology and doctorates in mathematics, mathematics/science, and science education. Content and Research Expertise as well as area of teaching (currently and future) are listed in Table 1 below. All of the faculty vitas can be accessed online at: <http://education.uky.edu/EDC/content/faculty>. For specific current Curriculum and Instruction courses, the future of these courses, and how it will impact Curriculum and Instruction programs please see the Appendix A, page 21.

As Regular Title Tenure and Tenure-Track Faculty, all of our teaching loads are 2-2.

Table 1: *STEM Education Department Faculty Expertise*

STEM EDUCATION FACULTY	CONTENT EXPERTISE	RESEARCH EXPERTISE	CURRENT COURSES TAUGHT IN DEPT. OF C&I	COURSES TO BE TAUGHT IN DEPT. OF STEM ED
Jana Bouwma-Gearhart, Ph.D., Assistant Professor	Biology, Chemistry, Genetics, Bacteriology, Evolution	Motivation In Teaching and Learning, Educator Professional Development, Modeling-based Inquiry, Mixed Methods Methodology, Qualitative Methodology, Evaluation	Graduate STEM Education and Biology Content Classes, Secondary Science (MIC) Methods	Graduate STEM Education and Biology Content Classes, STEM PLUS courses, Secondary Science (MIC) Methods
Molly Fisher, Ph.D., Assistant Professor	Mathematics, Technology	Mathematics Teacher Retention, Teacher Stress and Burnout	Elementary Mathematics Methods, Graduate STEM Education Classes	Elementary Mathematics Methods (service course), Graduate STEM Education Classes
Christa Jackson, Ph.D., Assistant Professor	Mathematics, Chemistry	Equity in Mathematics Education, Issues of Social Justice, Qualitative Methods with Emphasis in Ethnography	Graduate STEM Education Courses, Elementary Mathematics Methods Class, Advanced Elementary Methods	Graduate STEM Education Courses, Assessment & Equity in STEM Education (STEM PLUS), Elementary Mathematics Methods (service course), Advanced Elementary Methods

STEM EDUCATION FACULTY	CONTENT EXPERTISE	RESEARCH EXPERTISE	CURRENT COURSES TAUGHT IN DEPT. OF C&I	COURSES TO BE TAUGHT IN DEPT. OF STEM ED
Rebecca McNall Krall, Ph.D., Associate Professor	Biology, Environmental Science	Preservice/ Inservice Teacher Education, Scientific Knowledge for Teaching, Distance Learning, Integration of Educational Technology in Science Instruction	Graduate STEM Education Classes, Elementary Science Methods, Advanced Elementary Science Methods	Graduate STEM Education Classes, Elementary Science Methods (service course), Advanced Elementary Science Methods
Xin Ma, Ph.D., Full Professor	Mathematics, Statistics	Attitude and Motivation In Mathematics, Comparative International Education Systems, Advanced Quantitative Methods	Graduate Mathematics Education Classes, Middle Level Mathematics Methods	Graduate Mathematics Education Classes, Middle Level Mathematics Methods (service course)
Margaret Mohr-Schroeder, Ph.D., Assistant Professor	Mathematics, Biology	Mathematics Knowledge for Teaching, Preservice Teacher Education, Quantitative, Mixed Methods Methodology, Assessment, Educational Technology	Graduate STEM Education Classes, Secondary Mathematics Methods (MIC), Survey of Secondary Mathematics Curriculum	Graduate STEM Education Classes, Secondary Mathematics Methods (MIC), STEM PLUS courses

STEM EDUCATION FACULTY	CONTENT EXPERTISE	RESEARCH EXPERTISE	CURRENT COURSES TAUGHT IN DEPT. OF C&I	COURSES TO BE TAUGHT IN DEPT. OF STEM ED
Christine Schnittka, Ph.D., Assistant Professor	Mechanical Engineering, Physics	Engineering Design-based Science Education, Educational Technology	Graduate STEM Education Courses, Elementary and Middle Level Science Methods	Graduate STEM Education Courses, Elementary Science Methods (service course), Middle Level Science Methods (service course)
Jennifer Wilhelm, Ph.D., Associate Professor	Physics, Mathematics	Project-based Instruction, Physics and Mathematics Education, STEM Integration	Graduate STEM Education Classes	Graduate STEM Education Classes, STEM PLUS courses

Four faculty members will be at the senior level (Jennifer Wilhelm, Xin Ma, Rebecca McNall Krall, and future senior level mathematics education hire) and have full time graduate faculty status, enabling them to chair doctoral committees, or act as committee co-chairs with other junior faculty members within the department. All of the junior faculty members have part-time graduate faculty status enabling them to serve on committees and/or co-chair committees with a senior faculty member. Several of the proposed department junior faculty members have already had many experiences co-chairing doctoral committees. Currently we have twenty active doctoral students chaired and/or co-chaired by STEM Education faculty (see Table 2 below).

Table 2. *Active STEM Education Doctoral Students and their Faculty Advisors*

Advisor Name	Student
Ron Atwood (Professor Emeritus)	Diane Johnson (Science Education)
Rebecca McNall Krall	Ashlie Beals (Science Education)
Xin Ma	Antoinette Davis (Mathematics Education)
	Anushka Karkelanova (Mathematics Education)
	Amber Sullivan (Mathematics Education)
	April Pilcher (Mathematics Education)
	Darlene Nelson (Mathematics Education)
	Karen Heavin (Mathematics Education)
	Lori Powell (Mathematics Education)
	Michael Osborne (Mathematics Education)
Margaret Mohr-Schroeder	Amy Green (Mathematics Education)
	David Little (STEM Education)
	Jamie-Marie Wilder (Mathematics Education)
	Robin Magruder (Mathematics Education)
	Ramona Birch (Mathematics Education)
	Robin McClaran (Mathematics Education)
	Tonja Hudson (Mathematics Education)
Jennifer Wilhelm	Jodi Mills (STEM Education)
Jennifer Wilhelm & Jana Bouwma-Gearhart	Jennifer Collins (Science Education)
Jennifer Wilhelm & Molly Fisher	Jennifer Ferguson (STEM Education)

Administrative Structure of the Science, Technology, Engineering, and Mathematics Education Department

Within the new department structure (see Figure 2 below), there will only be the need to add the administrative duties of a department chair and a director of graduate studies to faculty members' current loads. These two positions will be filled following typical College of Education and University procedures. Within the current administrative structure of the College of Education and its Teacher Education Unit (TEP), there exists Program Faculties, which govern each specific program within the TEP. Specifically for STEM Education, there exists Program Faculties for Science Education and Mathematics Education. Each Program Faculty is chaired by a faculty member within the program; Jana Bouwma-Gearhart is the current Program Faculty Chair for Secondary Science Education and Margaret Mohr-Schroeder is the current Program Faculty Chair for Secondary Mathematics Education. These positions and administrative duties operate in place of "Directors of Undergraduate Studies". (For more information about the Program Faculty Structure see: <http://education.uky.edu/ADeanASTC/>). Drs. Bouwma-Gearhart and Mohr-Schroeder have been Program Faculty Chairs of Science and Mathematics, respectively, since their arrivals

to UK, three- and five-years ago, respectively. Therefore, this would not represent any additional administrative load to them as junior faculty members. Molly Fisher and Christine Schnittka are co-directors of the STEM Education Lab within the *Kentucky P20 Innovation Lab* (<http://p20.education.uky.edu/>). They have been in this position for one year, therefore this would not represent any additional administrative load to them as junior faculty members. **None of the current eight faculty members hold specific administrative duties within the current Department of Curriculum and Instruction except for Jana Bouwma-Gearhart and Margaret Mohr-Schroeder. However, since their programs for which they are Program Faculty Chairs will be transferred to the new STEM Education Department, there will be no administrative effect on the current Department of Curriculum and Instruction.** (For details on the effect of resources and administrative duties within the remaining Department of Curriculum & Instruction please see Dean O’Hair’s responses in Appendix B, page 27).

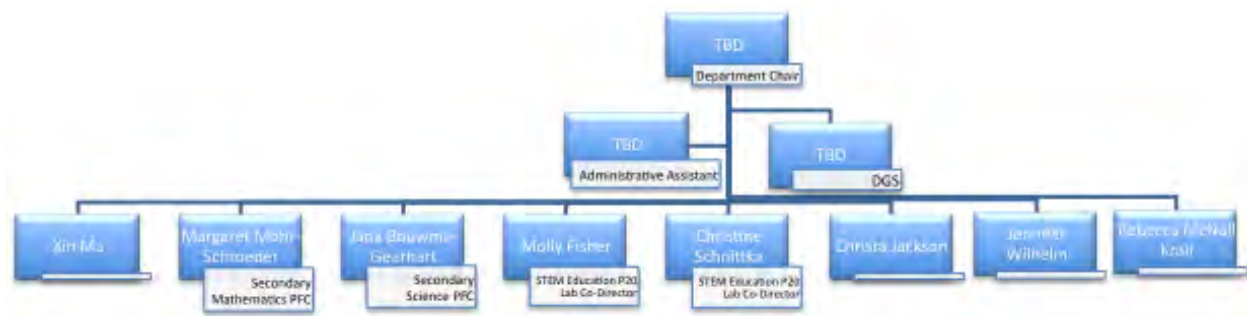


Figure 2. *Administrative Hierarchical Chart*

There are eleven committees within the College of Education in which the future Department of STEM Education would gain representation. Of these eleven committees, currently four of our eight faculty are members. There would be additional service requirements in terms of representation on these committees. The faculty DOE's would be adjusted to reflect this.

Program Structure within Science, Technology, Engineering, and Mathematics Department

Within the current structure of the Department of Curriculum and Instruction, there are 13 active degree programs at the undergraduate and graduate level. **With the formation of the new STEM Education Department, five of these existing programs would be transferred to the new department. Table 3 below summarizes the current programs and enrollment and which programs would be transferred.**

Table 3. *Current Programs and Enrollment*

Current Department of Curriculum and Instruction (2009-2010 enrollment)*	Future Department of STEM Education
Bachelor's in Elementary Education (495)	Elementary Education Mathematics and Science Methods as service courses
Master's In Elementary Education (13)	Advanced Elementary Mathematics and Science Methods as service courses
Undergraduate Secondary Education – English (101)	N/A
Ed.D. – Instruction and Administration (62)	N/A
Master's in Instructional System Design (9)	N/A
Undergraduate Secondary Education – Mathematics Education (66)	Will Transfer (66)
Bachelor's in Middle School Education (88)	Middle Grades Mathematics and Science Methods as service courses
Master's in Middle School Education (2)	N/A
Undergraduate Secondary Education – Science Education (22)	Will Transfer (22)
Master's Secondary Education (64) [includes Advanced Master's and MIC program]	Will Transfer MIC Mathematics (7), MIC Science (6), and Advanced Master's in STEM Education Programs (0)
Alternative Mathematics and Science Certification Program (0)	Will Transfer (0)
Undergraduate Secondary Education – Social Studies Education (157)	N/A
TOTAL Students (09-10): 1,079	TOTAL Students based on 09-10: 101 (9.4% of C&I)

*Most current available data

This chart does not include the twenty above-mentioned Ph.D. students. The program they are enrolled in is housed at the College level. They will continue in their current program of studies.

Phase Two Discussion

On February 1, 2011, the STEM Education Faculty will submit 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, 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 page 79 for Dean Lester's support, both theoretically and financially, of the

undergraduate certification options involving computer science and engineering students and courses). 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 proposed 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.

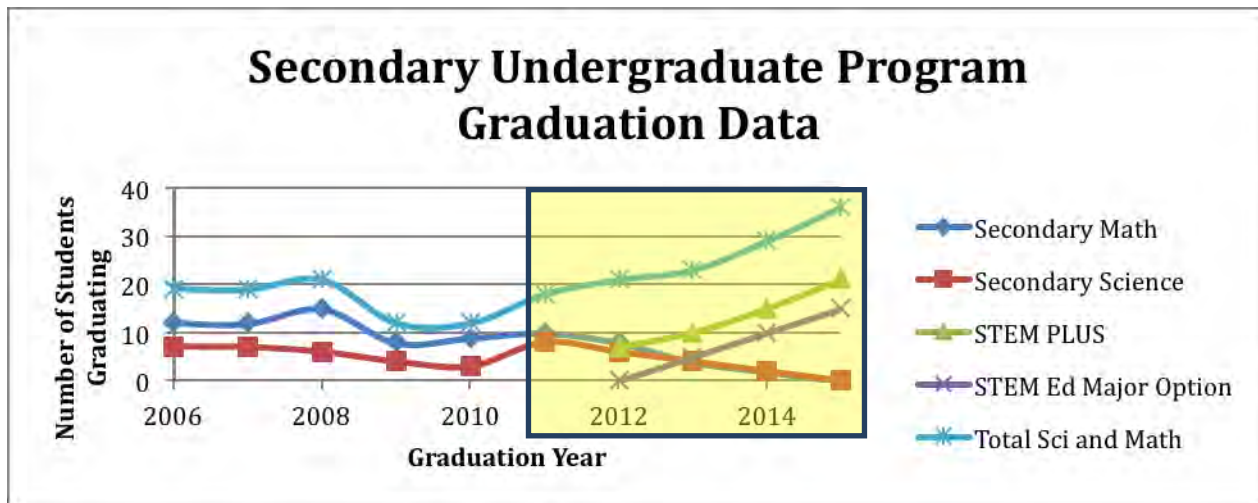


Figure 3. *Current and Projected Secondary Undergraduate Program Graduation Data*

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 (see media clippings in Appendix D, page 39). 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.

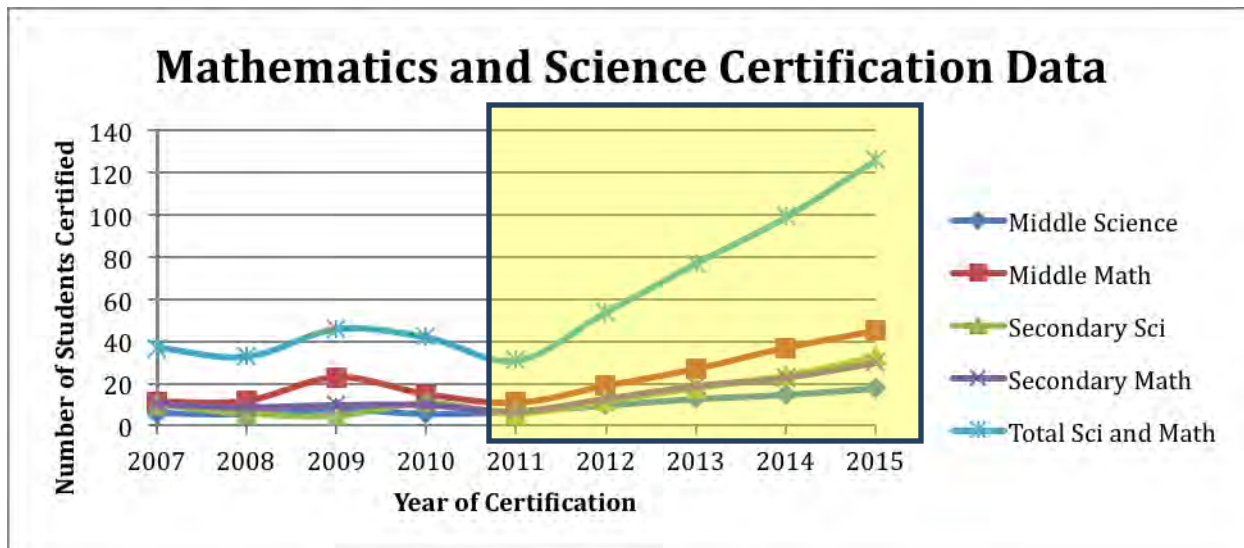
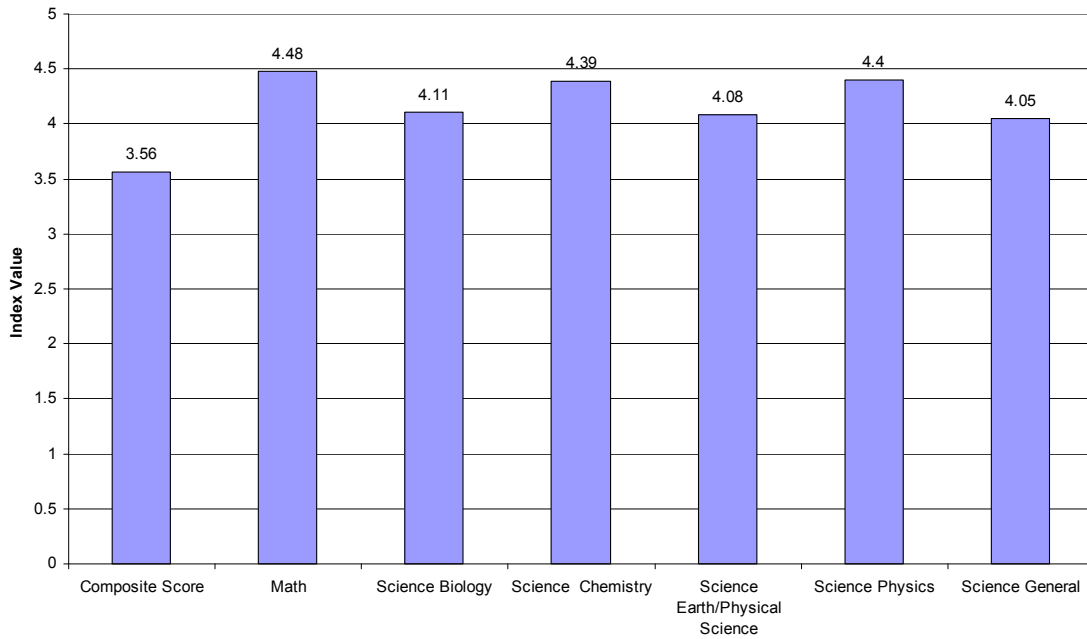


Figure 4. *Current and Projected Mathematics and Science Certification Data*

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).

AEE Estimates of Relative Demand for Teachers by Subject Area on a Five Point Scale in 2007 (1=Considerable Surplus, 5=Considerable Shortage)



Source: AEE (2007) *Educator Supply and Demand in the United States*
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, page 73)

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 wholeheartedly 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.

Joint Appointments

Capitalizing on the significant contributions of our historical partnerships with faculty from the Colleges of Engineering and Arts and Sciences at UK, we plan to take these collaborations to a new level towards meeting the needs of our students who should graduate with expertise in both STEM content and STEM pedagogy. To this end, we plan to have no cost joint appointments within our proposed STEM Education Department for select STEM faculty in the Colleges of Arts & Sciences and Engineering, such as PIMSER outreach professors. Likewise, the content departments plan to grant reciprocal no-cost joint appointments to the STEM Education Department. The expectations of these joint appointments might include but not be limited to activities such as joint teaching, program development, grant writing, committee service, and research. Voting rights will be conferred to jointly appointed individuals to address curricula and programmatic changes and faculty hires.

Phase Three Discussion

Beginning in March 2012, the STEM Education Department will build upon the current redesigned STEM Education master's program and doctoral offerings in mathematics and science education to create a unique doctoral program for graduate students to pursue a PhD in science education, technology education, engineering education, and/or mathematics education. Our enrollment of Ph.D. students specializing in mathematics, science, and/or STEM education is 20 (see Table 2). We plan to increase this number by a factor of 2 by 2015. By 2015, seven of the eight current STEM Education faculty will have gone through the promotion and tenure process. The potential addition of these faculty members at the senior level in addition to the no-cost joint appointments will provide the capacity to chair the projected doctoral student growth.

Final Thoughts

Presently, we are aware of only two institutions that have STEM Education Departments (Old Dominion and University of Massachusetts – Dartmouth). None of our benchmark institutions are forming STEM Education departments, precisely one of the reasons why UK should. STEM is no longer simply an acronym for Science, Technology, Engineering, and

Mathematics; it represents not only disciplinary focus, but also a unification of the disciplines. It is its own entity and is much greater than the sum of its parts. UK needs to position itself now as the leader for STEM Education in the Commonwealth. We are formally requesting our new STEM Education Department will have a proposed January 2011 start date. The time is right, the people are here, and we are ready to make an immediate impact on innovation, investigation, engagement, and praxis in STEM Education.

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APPENDIX A

Current Courses Taught by STEM Education Faculty in Curriculum and Instruction and Future Courses Taught in STEM Education

There are currently 96 courses on record within the Department of Curriculum and Instruction. Twenty (21%) of these courses are taught by STEM Education Faculty Members. The following courses would be transferred to the STEM Education Department under “SEM” (as approved by registrar’s office) and remain the responsibility of the STEM Education Faculty Members. Courses taught within set programs such as the MIC, Elementary, and Middle School Programs will continue to be coordinated with the Program Faculty Chair as usual. (see table 4). No existing Curriculum and Instruction courses will be cut or planned to be cut. Table 5 represents new courses to be created within the new STEM Education Department to meet the needs of STEM PLUS, current certification programs, and our graduate students. See “Forecasted STEM Education Course Offering” (table 6) for future course offerings.

Table 4: *Current Curriculum and Instruction Courses and the Future of the Course*

Course Number and Title	Responsible Faculty	Future of the Course
EDC 328: Teaching Science in the Elementary School	Christine Schnittka and/or Rebecca McNall Krall	SEM 328: Will continue to be taught as a service course to the Elementary Education Program
EDC 337: Teaching Mathematics in Elementary Schools	Molly Fisher and/or Christa Jackson	SEM 337: Will continue to be taught as a service course to the Elementary Education Program
EDC 345: Teaching Mathematics in the Middle School	Xin Ma	SEM 345: Will continue to be taught as a service course to the Middle School Program
EDC 348: Teaching Science in the Middle School	Christine Schnittka or Jana Bouwma-Gearhart	SEM 348: Will continue to be taught as a service course to the Middle School Program
EDC 421: Survey of Secondary Mathematics Curriculum	Margaret Mohr-Schroeder	SEM 421: This course will go through a major course change and become the first methods course in the STEM PLUS Program. It will be taught by Margaret Mohr-Schroeder, Jennifer Wilhelm, and/or Jana Bouwma-Gearhart.

Course Number and Title	Responsible Faculty	Future of the Course
EDC 603: Curriculum and Instruction in STEM Education	All STEM Education Faculty	SEM 603: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program
EDC 604: History of STEM Education	All STEM Education Faculty	SEM 604: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program
EDC 613: Effective Use of Technology for Modeling-Based Inquiry in STEM Education	All STEM Education Faculty	SEM 613: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program
EDC 631: Mathematics Pedagogy in the Secondary School	Margaret Mohr-Schroeder	The methods course for the MIC Program; will continue as SEM 631
EDC 634: Science Pedagogy in the Secondary School	Jana Bouwma-Gearhart	The methods course for the MIC Program; will continue as SEM 634
EDC 670: Advanced Study in the Teaching of Elementary School Mathematics	Molly Fisher or Christa Jackson	SEM 670: Course is taken by graduate students in elementary, middle, STEM Education, and doctoral programs
EDC 674 Advanced Studies in Teaching Elementary School Science	Rebecca McNall Krall	SEM 674: This course was created by the STEM Education Faculty in Spring 2010 for use in the Elementary, Middle, Advanced Master's STEM Education Program and the doctoral program

Course Number and Title	Responsible Faculty	Future of the Course
EDC 701: History of Mathematics Education	Molly Fisher or Xin Ma	SEM 701: Course is taken by graduate students in Advanced Master's STEM Education Program and doctoral program
EDC 702: Theoretical Foundations of Mathematics Education	Xin Ma or Margaret Mohr-Schroeder	SEM 702: Course is taken by graduate students in Advanced Master's in STEM Education Program and doctoral program
EDC 703: Advanced Research in Mathematics Education	Xin Ma	SEM 703: Course is taken by graduate students in Advanced Master's in STEM Education Program and doctoral program
EDC 704: Designing Project-Based Environments in STEM Education	Jennifer Wilhelm	SEM 704: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program
EDC 706: Research in STEM Education	All STEM Education Faculty	SEM 706: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program
EDC 708: Engineering in STEM Education	Christine Schnittka	SEM 708: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program

Course Number and Title	Responsible Faculty	Future of the Course
EDC 746: Subject Area Instruction in the Secondary School	Margaret Mohr-Schroeder and Jana Bouwma-Gearhart	EDC/SEM 746: This course is the student teaching credit for students in the MIC Program. In addition, there is a seminar built within the course. This course will not be transferred, but rather the course will be cross-listed as EDC/SEM 746.
EDC 770: Special Topics in STEM Education	All STEM Education Faculty	SEM 770: This course was created by the STEM Education Faculty in Spring 2010 for use in the Advanced Master's STEM Education Program and the doctoral program

Table 5: *Courses to be created in the STEM Education Department*

Courses to be Created	Responsible Faculty	Reason
SEM 110: Introduction to STEM Education (2 hrs)	All STEM Education Faculty	This will be the introductory course to STEM Education and will be used as a recruiting tool for increasing our potential pool of STEM teachers. It will be a required course within STEM PLUS and will contain a field experience component.
SEM 422: STEM Methods II (3 hrs)	Jennifer Wilhelm, Margaret Mohr-Schroeder, and/or Jana Bouwma-Gearhart	The second in a sequence of two methods courses for the STEM PLUS program. Specific sections will be created based on the current student population.
SEM 423: Assessment and Equity in STEM Education (2 hrs)	Christa Jackson, Margaret Mohr-Schroeder, Jennifer Wilhelm, or Jana Bouwma-Gearhart	A required course within the STEM PLUS Program. Taken concurrently with SEM 435.

Courses to be Created	Responsible Faculty	Reason
SEM 435: STEM Student Teaching in the Secondary School (10 hrs)	Jennifer Wilhelm, Margaret Mohr-Schroeder, and/or Jana Bouwma-Gearhart	Student credit for student teaching experience. Will include 4 observations, midterm and final assessment reviews, and final project review.
SEM 501: Teaching Internship (1-12 hours)		This course is a supervised practice teaching course under competent leadership. It is part of the Alternative Certification Program in Mathematics and Science and also serves as a general practicum course for students in special circumstances. It can be taken by undergraduate and graduate students.
SEM 767: Dissertation Residency Requirement	DGS/Advisor	Residency credit of dissertation research after the qualifying exam. Students may register for this course in the semester of the qualifying examination. A minimum of two semesters are required as well as continuous enrollment (Fall and Spring) until the dissertation is completed and defended.
SEM 781: Independent Study in STEM Education	All STEM Education Faculty/Consent of DGS	An independent study course for graduate students.

Table 6: Projected STEM Education Department Courses Schedule

	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Spring 2013	Fall 2013	Spring 2014	Fall 2014	Spring 2015	Fall 2015	Spring 2016	
EDC 328: Teaching Science in the Elementary School	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & PTI or GA	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & GA	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & Chris Schnittka	2 sections - Chris Schnittka & GA	2 sections - Becky Krall & Chris Schnittka	2 sections - Becky Krall & GA	2 sections - Becky Krall & Chris Schnittka	
EDC 337: Teaching Mathematics in the Elementary School	2 sections - Christa Jackson & Bev Dean	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & GA	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & GA	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	2 sections - Christa Jackson & Molly Fisher	
EDC 345: Teaching Mathematics in the Middle School	Xin Ma		Christa Jackson		Xin Ma		Christa Jackson		Xin Ma		Christa Jackson		
EDC 348: Teaching Science in the Middle School	Christine Schnittka		Christine Schnittka		Christine Schnittka		Christine Schnittka		Christine Schnittka		Christine Schnittka		
EDC 421: Survey of Secondary Mathematics Curriculum	Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		
EDC 603: Curriculum and Instruction in STEM Education	Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher		
EDC 604: History of STEM Education		Jennifer Wilhelm				Jennifer Wilhelm				Jennifer Wilhelm			
EDC 613: Effective Use of Technology for Modeling-Based Inquiry in STEM Education			Becky Krall			Becky Krall			Becky Krall			Becky Krall	
EDC 631: Mathematics Pedagogy in the Secondary School	Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		
EDC 634: Science Pedagogy in the Secondary School	Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		
EDC 670: Advanced Study in the Teaching of Elementary School Mathematics		Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher		Molly Fisher	
EDC 674: Advanced Studies in Elementary Science	Becky Krall		Chris Schnittka		Becky Krall		Becky Krall		Becky Krall		Becky Krall		
EDC 701: History of Mathematics Education	Molly Fisher				Molly Fisher				Molly Fisher				
EDC 702: Theoretical Foundations of Mathematics Education		Xin Ma				Xin Ma				Xin Ma			
EDC 703: Advanced Research in Mathematics Education			Xin Ma				Xin Ma				Xin Ma		
EDC 704: Designing Project-Enhanced Environments in STEM Education				Jennifer Wilhelm				Jennifer Wilhelm				Jennifer Wilhelm	
EDC 706: Research in STEM Education			Jana Bouwma-Gearhart			Jana Bouwma-Gearhart			Jana Bouwma-Gearhart			Jana Bouwma-Gearhart	
EDC 708: Engineering in STEM Education		Chris Schnittka			Chris Schnittka			Chris Schnittka			Chris Schnittka		
EDC 746: Subject Area Instruction in the Secondary School (Mathematics)		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder		Margaret Mohr-Schroeder	
EDC 746: Subject Area Instruction in the Secondary School (Science)		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart		Jana Bouwma-Gearhart	
EDC 770: Special Topics in STEM Education: <i>Insert Topic</i>	Jana Bouwma-Gearhart												
					Need Additional Courses:								
THIS DOES NOT INCLUDE 1 ADDITIONAL LINE THAT WAS HELD THIS YEAR DUE TO BUDGET. 1 IN MATHEMATICS.		Becky K		Becky K	Christa J	Chris S	Christa J	Becky K	Christa J	Becky K	Christa J	Chris S	
				Chris S	Jana B-G	Christa J	Jana B-G	Xin M		Chris S	Jana B-G	Christa J	
				Xin M		Margaret M-S		Christa J		Christa J		Margaret M-S	
				Christa J				Jana B-G		Jana B-G			
				Jana B-G				Margaret M-S		Margaret M-S			

These questions, posed by the remaining C&I Faculty, were answered by Dean Mary John O'Hair in Spring 2010.

The following are questions generated by faculty who will be remaining in Curriculum and Instruction:

1. How will the budget be impacted? How will the allocation of funding change? *The C&I budget will not be impacted. New dollars will be allocated to the STEM department to fund department chair stipend, an administrative assistant, TAs, and operating expenses.*

2. How much money comes to the department through STEM faculty? If that money is moved to STEM education, how will this impact staffing, TA allocation, etc.?
 - *No funds would be moved from C&I to the STEM department.*
 - *The current operating expenses would remain in C&I; new operating expenses for the STEM department would be provided by the Provost's Office.*
 - *Grants and contracts awarded to STEM faculty would go to the new STEM department. We anticipate that establishment of the STEM department will lead to additional grants and contracts in the STEM disciplines. Incentive funds generated by faculty members are associated with the faculty members earning the funds.*
 - *I encourage C&I faculty members to be actively engaged in securing grants and contracts. Incentive funds from these grants and contracts would remain in C&I.*
 - *As in previous years, the travel budget would be based on \$1,400 per faculty member, which comes from the college budget. In the past, C&I faculty members have received \$350 from departmental funds to supplement the college's \$1,400 allocation. This additional amount will remain for faculty in C&I. The STEM department would establish its own policy related to any additional travel money to supplement the college allocation.*

3. Generally, does the change impact space, TAs, and staff assistants?
 - *An attempt will be made to locate all STEM faculty in a central location. Since most are already in TEB, the plan is to relocate faculty in DH to TEB. C&I could benefit from the move since faculty office space would open up when STEM faculty are relocated.*
 - *The C&I department would not lose TA lines. Commitments from the President's Office and development funds will be used to create new TA lines in the STEM department.*
 - *No change will occur to the number of staff assistants in C&I. The Provost's Office has committed to funding a staff assistant in the new STEM department.*

4. Will faculty be teaching the science and mathematics courses embedded in EDC programs? *Yes.*

5. Who will take on supervision duties? *Supervision responsibilities will continue as they currently are. Mathematics education and science education faculty who teach in the elementary and middle school methods blocks will continue to supervise practicum students during their field placements.*

6. Who will be program chair for mathematics education and science education? *The Mathematics and Science Education Program Faculty has been divided into two program faculties: the Mathematics Education Program Faculty and the Science Education Program Faculty. Margaret Mohr-Schroeder will chair the Mathematics Education Program Faculty and Jana Bouwma-Gearhart will chair the Science Education Program Faculty.*
7. Who will serve as advisors, and how will that be allocated? *If an advising proposal that is under review by the Provost's Office is not fully funded, advising for students who have been admitted to TEP or upper division status will be advised as in the past. The faculty in Mathematics Education would advise students in mathematics education; faculty in Science Education would advise students in science education.*
8. Who will serve on committees (this is more about representatives from the STEM Education department)? *The STEM department would have representation on college-level committees and be treated as other departments in the college in this regard. Faculty from the content disciplines in Arts and Sciences who would have joint appointments in STEM could serve on doctoral committees. Given recent hires in mathematics education and science education, there will be sufficient faculty in the STEM department to serve on program faculties, including the Elementary Education and Middle School Program Faculties.*
9. Will we keep all 8.5 TA lines currently allocated to C&I? *Yes.*
10. What is the future of lecturer lines in C&I? *Currently we have one as the MIC coordinator and one as the middle school coordinator. Ms. Vicki Vance has coordinated the elementary student teaching for a number of years, but is retiring in June. Will we be able to hire someone into Ms. Vance's position? Lecturer lines are established as needs arise throughout the college. The lines do not "belong" to a specific department. Salaries to fund the lecturer lines come from vacant faculty lines. The lecturer line for the MIC program will continue into the 2010-2011 academic year because the college was not able to search for the MIC position; however, a successful search was conducted for the middle school position and that lecturer line will not be available to C&I for the coming year. The department will be able to hire an individual to replace Ms. Vance for the upcoming year.*

Science and Mathematics Teacher Imperative

January 6, 2010

President Barack Obama
The White House
1600 Pennsylvania Avenue
Washington, D.C. 20500

Dear Mr. President:

We write to salute your leadership and determination to revolutionize science, technology, engineering, and mathematics (STEM) education and to convey our commitment to contributing significantly to this noble goal.

As you have so eloquently stated, if we as a nation do not prepare one of the world's most educated, and scientifically and mathematically literate workforces, then we have no chance of continuing to be one of the world's most secure and competitive economies.

To educate our students to compete effectively in the global economy, we need to prepare the world's best science and mathematics teachers. As the institutions with, by far, the largest cohorts of the most capable undergraduate science, mathematics and engineering students, public research universities have a critical role to play in preparing the number and quality of teachers the nation requires. Over the past several decades, our large public research institutions have all too often stood aside and not participated as we can—and must—to the critical need for highly qualified science and mathematics teachers.

Discovery from research stimulates excitement and enthusiastic attention from young people. Learning by doing research at major research universities teaches science in the way that mere rote learning cannot. One of the needs now is to teach science in a different and more meaningful way—by prompting students to learn how to find the answers—and, perhaps more important, how to ask the questions. Even at the most basic level, teachers prepared at research universities have the opportunity to understand the world through their own explorations and thus become significantly more effective in their teaching craft. Decades of research on how people learn, studies of environments that support student learning, and successful models of teacher professional development, advocate for such approaches.

Many of our institutions have demonstrated that a whole university (colleges of science and education working together) can cast science and mathematics teaching as the critical and noble profession that it is for young people to consider.

As presidents of major public universities, we are newly resolved to address this national challenge. We offer as a new major contribution to your Administration's efforts, our commitment to the **Science and Mathematics Teacher Imperative (SMTI)**.

We deliberately define this effort as an **Imperative**. We do not take this lightly, simply issuing a statement or report, expecting others to implement. For this sustained effort, our pledge is to substantially increase the number and diversity of high-quality science and mathematics teachers we prepare, and build better partnerships among universities, community colleges, school systems, state governments, business, and other stakeholders.

Preparing more than 7,500 mathematics and science teachers annually, we are presently 121 public research universities across 41 states—including 11 university systems. We launched this new and powerful effort about a year ago, making it the nation's largest such initiative.

While each of our efforts reflects the needs in our particular states for science and mathematics teachers, and acknowledges intense fiscal challenges, 39 institutions and several systems are today committing to at least doubling the number of teachers they prepare. (A chart of our individual commitments is included below.) Together, our institutions committing to SMTI will strive to increase the number of new science and mathematics teachers we prepare to more than 10,000 annually by 2015, for an accumulated 7,500 new teachers over the five years from what we would have prepared.

We and our colleagues on science, mathematics and education faculties participating in SMTI are inspired and driven by a "can-do" attitude:

- Faced with a plethora of "one-off" innovative, exemplary and dedicated programs across the country over the past decade by universities in Texas, California, North Carolina, Georgia and Colorado with no common driving force or learning community, we created SMTI to serve as a convener and coordinating vehicle.
- Finding the nation lacks a comprehensive source of information about effective programs and practices to prepare science and mathematics teachers—we are developing one. Our "Analytic Framework," funded by grants from the Carnegie Corporation of New York and the National Science Foundation (NSF) will enable institutional benchmarking and the identification of exemplar practices, supported by evidence.
- Reaching the preparation of 10,000 new teachers annually by 2015 will require more effective institutional sharing and taking to scale exemplar practices. Such scaling has not been accomplished in the past due to a lack of effective dissemination of information, collaborative leadership and coordination, the absence of a coherent model of change, and an academic desire not to repeat anyone else's ideas. SMTI will document leading practices and, working in partnership with participating public research universities; other universities; school systems; state, local and federal governments; as well as the business community, we will greatly extend the impact of locally proven practices to major regions, underserved populations and demographically similar locations.
- Recognizing that enhancing the priority of teacher preparation at individual universities is key, we have teamed with the American Physical Society in an NSF funded Math and Science Partnership to study conditions that promote change in a test group of 26 universities.

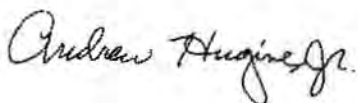
- Realizing the strength in learning across universities, SMTI encompasses many approaches. Our coalition of institutions has lead participants in major science and mathematics teacher preparation reform programs. For example:
 - APLU institutions have awarded more than half the NSF Noyce Scholarships to their students since the program began.
 - Eleven of the fifteen UTeach sites, including the originator, the University of Texas, Austin, are SMTI participants.
 - Nine of the twelve NSF funded Physics Teacher Education Coalition (PhysTEC) sites participate in SMTI.

In sum, we are committed to addressing this critical national need for more and better science and mathematics teachers. Through the Science and Mathematics Teacher Imperative we have come together to learn from leading innovative programs, define and assess the quality of our efforts, understand how to better partner with school systems, and challenge ourselves to improve relentlessly our activities.

Mr. President, we ask that you and your Administration continue to provide dedicated leadership to the nation to address these critical concerns in new ways, forming new collaborations. We seek enhanced opportunities to work with your Executive Office on an overall approach, as well as federal agencies. We note for example that your Secretary of Education would like to make his Department a science and mathematics “powerhouse” and we would like an opportunity to help make that happen. The National Science Foundation has been seeking new ways to better integrate research and education, and assisting universities in developing a robust scholarship of science education. The Department of Energy is recognizing the urgent need to support science education, if our citizenry is to understand why and how we might seek more sustainable economy.

And finally, Mr. President, we seek your sustained challenge to us to be more creative, more innovative, and more dedicated in addressing these national challenges. We hope that each time you turn back to us with further encouragement over the course of the next several years; we are working more closely with leaders of your Administration to define how we might better meet our mutual national objectives to retain our high U.S. quality of life and global leadership.

Respectfully,



Andrew Hugine, Jr.
President
Alabama A&M University



George J. Gogue
President
Auburn University



Lois B. DeFleur
President
Binghamton University, SUNY



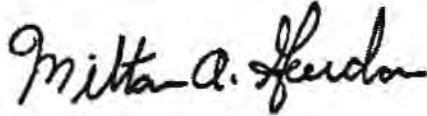
Robert W. Kustra
President
Boise State University



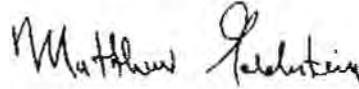
Carol A. Cartwright
President
Bowling Green State
University




John D. Welty
President
California State University,
Fresno



Milton A. Gordon
President
California State University,
Fullerton



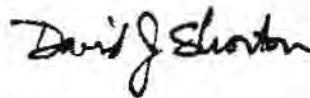
Matthew Goldstein
Chancellor
City University of New York
System, The



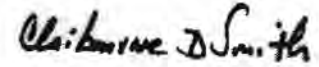
James F. Barker
President
Clemson University



Anthony A. Frank
President
Colorado State University



David J. Skorton
President
Cornell University



Claibourne D. Smith
Acting President
Delaware State University



Mark B. Rosenberg
President
Florida International University



Thomas K. Wetherell
President
Florida State University



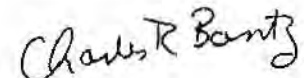
Alan G. Merten
President
George Mason University



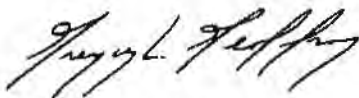
Mark P. Becker
President
Georgia State University



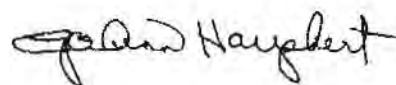
C. Alvin Bowman
President
Illinois State University




Charles R. Bantz
Chancellor
Indiana University-Purdue
University



Gregory L. Geoffroy
President
Iowa State University



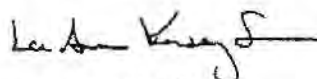
JoAnn W. Haysbert
President
Langston University



Carolyn R. Mahoney
President
Lincoln University



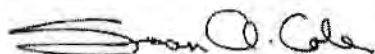
Michael V. Martin
Chancellor
Louisiana State University



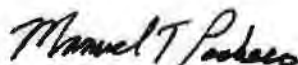
Lou Anna K. Simon
President
Michigan State University



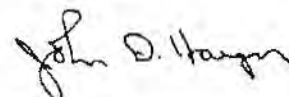
Glenn D. Mroz
President
Michigan Technological
University



Susan A. Cole
President
Montclair State University



Manuel T. Pacheco
Interim President
New Mexico State University



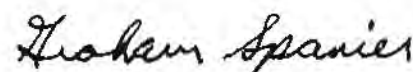
John D. Haeger
President
Northern Arizona University



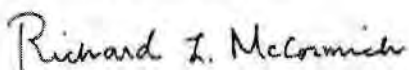
E. Gordon Gee
President
Ohio State University, The



George Pernsteiner
President
Oregon University System



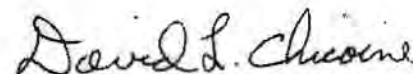
Graham B. Spanier
President
Pennsylvania State University, The



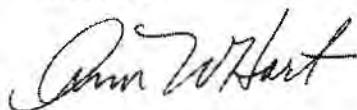
Richard L. McCormick
President
Rutgers, The State University of
New Jersey



Nancy D. Limpher
Chancellor
State University of New York



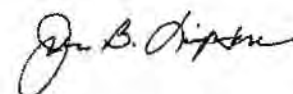
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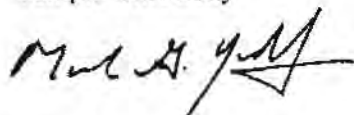
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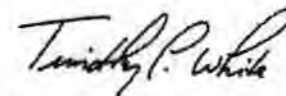
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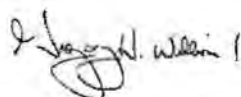
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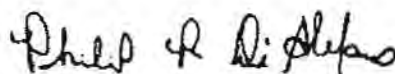
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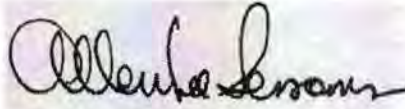
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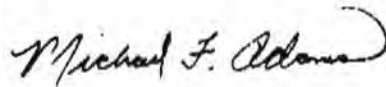
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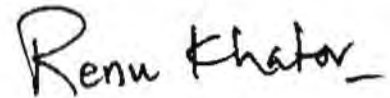
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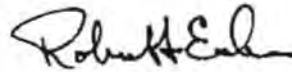
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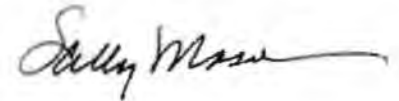
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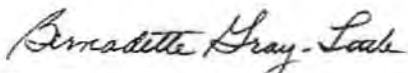
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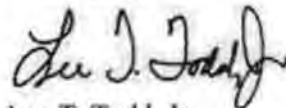
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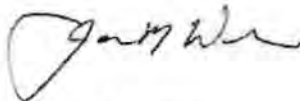
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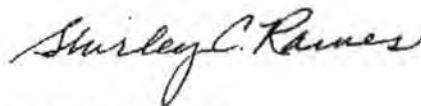
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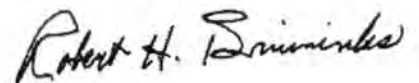
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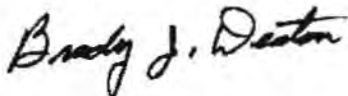
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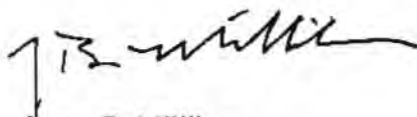
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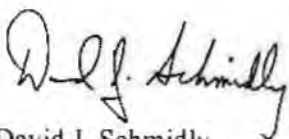
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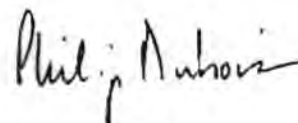
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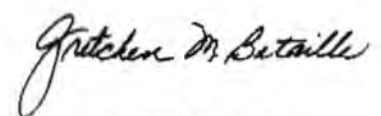
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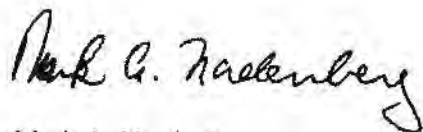
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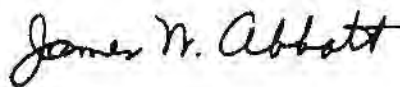
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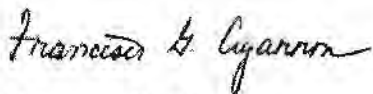
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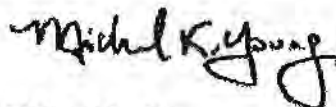
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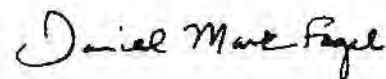
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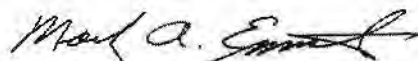
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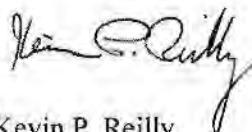
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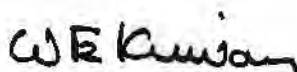
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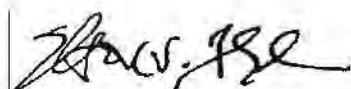
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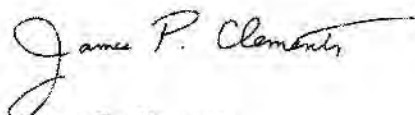
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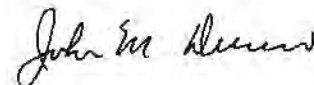
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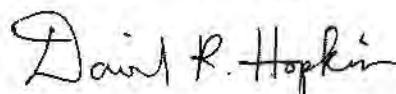
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Attachment – Universities Intending to Double Science and Mathematics Teachers Prepared
(chart)



The Association of Public and Land-grant Universities (A·P·L·U) launched the Science and Mathematics Teacher Imperative in November 2008 to increase the number and diversity of high-quality middle and high school science and mathematics teachers in the United States. To meet this goal, SMTI works to galvanize university leadership to action, strategically improve teacher preparation, develop a teacher personnel needs assessment tool, and expand the number of teachers prepared annually at public research universities.



Universities Intending to Double Science and Mathematics Teachers Prepared

Systems

	Number of teachers produced*	Number of teachers to be produced*
California State University System**	768	1536
University of California System**+	188	376
University System of Maryland	106	374

Institutions

University of Georgia	91	206
Arizona State University	70	162
California State University, Fullerton**	54	154
Georgia State University	46	150
University of North Carolina at Charlotte	70	148
University of Houston	43	140
San Francisco State University**	62	134
University of Maryland College Park	31	130
Colorado State University	33	117
California State University, Fresno*	38	103
University of South Carolina - Columbia	24	82
California Polytechnic State University, San Luis Obispo**	13	80
Northern Arizona University	33	80
University of Texas at Arlington	38	76
University of South Florida	31	75
University of North Texas	30	70
Virginia Tech	20	63
The University of Memphis	27	60
University of Cincinnati	29	60
University of Kansas	16	60
Florida State University	28	58
University of Wyoming	23	55
Ball State University	26	53
Florida International University	6	52
South Dakota State University	16	51
Boise State University	15	50
University of Colorado Denver	21	50
University of New Mexico	25	50
University of Colorado at Boulder	20	45
University of Illinois at Chicago	20	43
University of Tennessee, Knoxville	20	40
Wichita State University	16	40
University of Utah	14	36
University of Missouri - Kansas City	13	35
University of Idaho	13	34
University of Kentucky	13	32
The University of Montana	10	31
New Mexico State University	15	30
University of the District of Columbia	1	30
Cornell University	14	28
Indiana University-Purdue University Indianapolis	10	20
North Dakota State University	8	16
Alabama A&M University	5	15

Charts were updated on March 12, 2010 to include the following universities with the intent to double the number of science and mathematics teachers they prepare: Arizona State University, South Dakota State University, North Dakota State University, and the University of the District of Columbia.

+The University of California System's number of teachers credentialed was corrected. [Note: In 2003, the University of California produced 366 (or 38%) of the science & mathematics majors who went on to obtain a teacher credential by an institution that year in California. Through their CalTeach program, the UC System goal is to reach 1,000 teachers by 2011.]

*For "Number of Teachers Produced", institutions chose the year, usually 2006-2009, in which to report the number of science and mathematics teachers they produced. For "Number of Teachers to be Produced", institutions chose the year, usually 2011-2015, in which to report the number of science and mathematics teachers that they intend to produce.

**Institutions which reported the "Number of Teachers Produced" for 2003.

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UK president Todd to meet with Obama

Herald-Leader Staff Report

University of Kentucky President Lee T. Todd Jr. will be part of a delegation of university leaders who will meet with President Barack Obama on Wednesday and pledge to help reduce the nation's deficit of math and science teachers.

Todd and three others are scheduled to deliver to Obama a letter signed by 79 university leaders in which they pledge to "substantially increase the number and diversity of high-quality science and mathematics teachers we prepare," as well as to work closely with other universities, colleges, school systems, state governments and businesses to develop those teachers.

Specifically, 39 institutions and three university systems — including UK — say they plan to at least double the number of math and science teachers who graduate by 2015, according to the Association of Public and Land-grant Universities.

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The other three university leaders joining Todd in delivering the letter to Obama will be Kansas University's chancellor Bernadette Gray-Little, University System of Maryland's chancellor William "Brit" Kirwan, and University of Colorado chancellor Philip P. DiStefano.

The meeting will take place as part of the White House's "Educate to Innovate" campaign, in which Obama will honor science and math teachers from across the country.

Obama also is expected to announce that companies, foundations and science and engineering societies will be involved in the efforts to bolster math and science education, according to a news release from the White House.

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News briefs: Jan. 6

UK president Todd to meet with Obama

Lexington: University of Kentucky President Lee T. Todd Jr. will be part of a delegation of university leaders who will meet with President Barack Obama on Wednesday and pledge to help reduce the nation's deficit of math and science teachers.

Todd and three others are scheduled to deliver to Obama a letter signed by 79 university leaders in which they pledge to "substantially increase the number and diversity of high-quality science and mathematics teachers we prepare," and work with other schools, state governments and businesses to develop those teachers.

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Specifically, 39 institutions and three university systems — including UK — say they plan to at least double the number of math and science teachers who graduate by 2015, according to the Association of Public and Land-grant Universities.

Ruling on tobacco restrictions

Bowling Green: A federal judge overturned two of the marketing restrictions in a new tobacco law, including a ban on color and graphics in most tobacco advertising. Several tobacco makers sued in August to

block the restrictions, and U.S. District Judge Joseph McKinley in Bowling Green agreed that two violated tobacco companies' free speech rights.

Congress could have exempted certain types of colors and images instead of banning all color and graphics in advertising that children might see, McKinley ruled. He also said the U.S. Food and Drug Administration can't bar anyone from saying the agency's regulation of tobacco makes it safe.

But he upheld most of the new marketing restrictions, including a ban on tobacco companies sponsoring athletic, social and cultural events or offering free samples or branded merchandise. McKinley's ruling, recorded Tuesday, also upholds a requirement that warning labels cover half the packaging on each tobacco product.

The Family Smoking Prevention and Tobacco Control Act, signed into law in June, lets the FDA limit but not ban nicotine. It also lets the agency ban candy flavorings and marketing claims such "low tar" and "light," require warnings be emblazoned over carton images, regulate what goes into tobacco products and publicize those ingredients.

Paper seeks Nunn records

Attorneys for the Courier-Journal have filed a motion to vacate an agreed protective order in the murder case against former state Rep. Steve Nunn.

According to a motion filed Tuesday, the newspaper wants to intervene "solely for the purpose of asserting its and the public's constitutional and common law rights of access to court records and its constitutional right to gather news." The Herald-Leader will join the Courier-Journal's filing.

The agreed protective order, filed Dec. 21, is in reference to items in the commonwealth's inventory and four items of evidence from Lexington police. The order does not provide details



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UK is part of national push for more math and science teachers

By Ryan Alessi - ralessi@herald-leader.com

Amid a growing national awareness of the need for more math and science teachers, the University of Kentucky promised to triple the number of educators it produces in those fields over the next five years.

UK President Lee T. Todd Jr. delivered the pledge Wednesday to President Barack Obama as Obama announced new efforts in science, math and technology education.

"We must admit, we are now being outpaced by our competitors," Obama said, adding that the United States ranks 21st in science education and 25th in math globally. "That's not acceptable."

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Todd said he spoke briefly with Obama when delivering a letter in which leaders of 121 public universities pledged to increase the number of new math and science teachers to 10,000 from 7,500 by 2015.

At UK, 11 science and 12 math teachers are expected to graduate in May from its one-year program for a master's degree in secondary education with initial teaching certification.

UK leaders hope to increase those numbers to 33 and 36, respectively, by 2015 by encouraging primary and high school students to choose math and science education and by creating more spots in the master's program, said Mary John O'Hair, the dean of UK's college of education. UK also is focusing on professional development for current math and science teachers, she said.

O'Hair recently hired a new professor to bring the math and science education faculty to eight.

The pledge to cultivate more teachers is only part of the equation.

Todd and three other university leaders urged U.S. Department of Education Secretary Arne Duncan and other administration officials to focus more federal funds to continue programs that work rather than jumping from one pilot teaching program to another.

"It's all hands on deck — that's how Arne Duncan put it to us," Todd said. "One thing we told Duncan was that we really need you all to be pushing these careers from the top. We have parents who are telling their students that the (math and science) jobs are all going out of the country, so why should you go into those fields?"

And Todd said he told executives from technology companies such as Intel and Texas Instruments that they should use marketing to encourage more young people to go into math and science fields; he cited the ExxonMobil TV commercials featuring golfer Phil Mickelson, whose teaching academy focuses on math and science.

In addition, Todd has a key role with a national initiative called the Science and Mathematics Teacher Imperative.

That organization is compiling a catalog of teaching techniques, programs and approaches used to reach out to students.

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Also Wednesday, Obama honored more than 100 math and science educators with teaching awards, including two from Kentucky.

They are Kristen Jarboe, who teaches mathematics intervention for primary through third grade at Elkhorn Elementary School in Franklin County, and Keri Dowdy, a fourth grade science teacher at Sedalia Elementary School in Graves County.

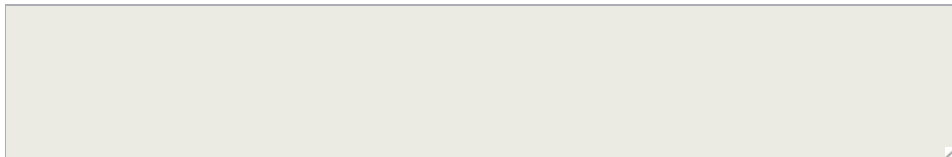
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Win_with_Willard wrote on 01/07/2010 11:37:59 AM:

We need to be teachun mor of that intulechule desine, not math and siense.

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hman56 wrote on 01/07/2010 07:07:11 AM:

If I ever run for anything, remind me to tout education, public safety, new sidewalks, and free everything for everybody.

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hman56 wrote on 01/07/2010 07:04:40 AM:

Stinkykitty, I don't think it was the ring he kissed.

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frommars859 wrote on 01/06/2010 09:29:05 PM:

don't know what happened to the comments on the first article that was postbut my question is...exactly what is being proposed by Dr Todd??? Sounds like PR and BS to me.

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hman56 wrote on 01/06/2010 08:01:59 PM:

products back into this country, we will continue to lose jobs.

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UK pledges to not be left behind in school: Will increase number of math, science teachers

January 19, 2010 by [News Staff](#) · [Leave a Comment](#)



By [Genevieve Adams](#)

UK is stepping up to a national challenge to multiply the number of math and science teachers.

Earlier this month, UK President Lee Todd traveled to Washington D.C. to deliver a letter to President Barack Obama addressing the shortage of secondary education math and science teachers. Todd pledged for Kentucky to be a role model for the rest of the nation to further the Science, Technology, Engineering, and Mathematics Education Coalition.

Secondary mathematics education chairwoman Margaret Schroeder said UK is taking the initiative to increase funding for education programs. She hopes this pledge will improve the quality and quantity of math and science teachers.

“This year, we had an increase of 10 percent enrollment in mathematics and 400 percent enrollment in science,” Schroeder said. “The numbers for next year look even more promising, with possible increases in mathematics of 60 percent or more and science improving by as much as 50 percent.”

Schroeder isn’t the only one who has high hopes for change in UK’s program. Education major David Little said he believed UK’s education program is in need of change.

“What has always been the case is that education changes every year because the needs and strengths of our youth change every year,” Little said. “This state of change in the real-world arena of teaching will undoubtedly always be reflected in the modification of current educational theory.”

However, curriculum changes and increased funding won’t solve this issue if the number of students wanting to teach math and science is scarce, Little said. Economically, teaching isn’t the most appealing future for most college students.

“The best and the brightest individuals from STEM fields tend to look for employment outside of education for economic reasons, as well as fewer demands and responsibilities tied to other jobs,” Little said. “While it is nationally recognized that teaching and education are extremely important in this country, very little is being done to entice highly qualified individuals into the field.”

Kentucky’s plan of action began with an undergraduate program that was recently introduced to allow students to get their teaching certificate in one year. This would increase the number of students going straight into teaching and also allow those who can’t afford further schooling to become qualified teachers, Schroeder said.

“It is an excellent program, particularly for career changers and those graduating with non-education content BA’s, because the program is designed to take only one calendar year,” Schroeder said. “For the past five years, we have had 99.9 percent job placement rate in the Master’s programs for our graduates and that’s a testament to our quality all by itself.”

Little said the goal of the pledge is easy to recognize, but not so easy to attain.

“The solution to this is simple in theory but hard in practice; we must work towards making education as attractive an employment option as everything else that’s within the reach of STEM majors,” Little said.

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November 19, 2010

Dr. Hollie Swanson
Chair, Senate Council
University of Kentucky

Dr. Kumble Subbaswamy
Provost
University of Kentucky

Dear Dr. Swanson and Dr. Subbaswamy:

On behalf of the College of Education, I fully support the faculty's proposal to create a new STEM Education Department in the College of Education. I share the STEM faculty concern as well as the general public that the United States ranks 21st in science education and 25th in mathematics globally. Nationally, almost 30 percent of students in their first year of college are forced to take remedial science and/or mathematics classes because they are not prepared to take college-level courses. At UK, 11.6 percent of the first-year students in the 2008-2009 cohort (latest data available) scored below the readiness standard in mathematics. Ensuring an adequate supply of well-prepared and highly effective STEM teachers is critically important to our nation's economic prosperity and well-being.

My decision to support the new department is based on strong support from the College of Education faculty who voted unanimously at its May 2010 meeting to support the establishment of a new STEM Education Department. In addition, faculty support is strong across UK as represented by support letters from Physics and Astronomy, Mathematics, Chemistry, Biology, and Engineering. Our students, as well as the Commonwealth of Kentucky, are in need of pioneering interdisciplinary STEM education efforts such as the faculty have proposed. These efforts represent a fundamental shift from research-driven, discipline-bound knowledge production to research that is problem-driven, highly interdisciplinary, and applied.

STEM Education currently resides in the Department of Curriculum and Instruction. The department has a very broad portfolio, offering undergraduate degrees in Elementary, Middle School, and Secondary Education and graduate programs in Elementary, Middle School, and Secondary Education, Reading, and Instructional Systems Design. The faculty of the College and I have concluded that the centrality of STEM Education in the development of an educated workforce in the 21st Century dictates that the College adopt a more targeted focus on STEM Education, beyond that which is possible in a highly variegated department. In a word, STEM Education needs its own curricular and administrative infrastructure.

Administrative costs of the new STEM Education Department represent less than two percent of UK's total investment in STEM Education educational efforts (i.e., senior and junior mathematics, science, and engineering education professors, outreach professors, etc.). As a

see
blue.

result of the university-level commitment to STEM Education, the Provost committed to a recurring expense of \$24,626 for the new department chair's stipend and benefits. In January 2010, Dr. Todd delivered a letter to President Obama at the White House in which 79 public research universities pledged to increase the number of mathematics and science teachers from 7,500 to 10,000 by 2015. Within the state of Kentucky, during the 2009-2010 school year, the Education Professional Standards Board issued 123 emergency certificates in the areas of biology, chemistry, physics, earth/space science (grades 8-12), mathematics (grades 8-12), middle school science (grades 5-9), and middle school mathematics (grades 5-9) (please see enclosed letter from Dr. Phillip Rogers, Executive Director of the Education Professional Standards Board). At UK last year, 11 science and 10 mathematics teachers graduated from our one-year, master's degree program in secondary education with initial teaching certification. Currently, this is the only secondary education program in science and mathematics at UK that leads to teacher certification. The new STEM Education Department pledges to significantly increase the number of teachers and provides additional proposed pathways to create options for potential secondary mathematics and science teachers at the undergraduate level as highlighted in the proposal under Phase 2.

The new STEM Education Department would serve as the focal point to significantly increase the recruitment, preparation, and retention of highly qualified STEM teachers. In addition, the new department would improve significantly student success in P-12 mathematics and science by (1) providing ongoing, internationally-recognized best practices in professional development to practicing teachers and school leaders; (2) conducting extensive educational research on learning; and (3) translating research findings into innovative practices that emphasize higher order thinking and other 21st Century Skills.

To succeed in this new information-based and highly technological society, all students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past. I commend and support the faculty's vision to increase substantially the number and diversity of highly qualified science and mathematics teachers and believe a new STEM Education Department will unite our efforts as a university to help us achieve this important goal.

Sincerely,



Mary John O'Hair
Dean and Professor



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

August 11, 2010

Dr. Hollie Swanson, Chair
Faculty Senate
University of Kentucky

Dear Chair of the Faculty Senate:

I strongly support the establishment of the new STEM education department in the College of Education. Faculty in physics and astronomy, chemistry, mathematics, and biology also support the new department's formation, as evidenced by the enclosed departmental letters of support. Faculty members in these departments have a rich history of collaboration with mathematics and science education faculty through their participation in Teacher Education Program Faculties in the College of Education and through funded research projects, such as the Appalachian Math and Science Partnership, Noyce grants, and a Toyota Foundation award.

Faculty view the new department as an opportunity for undergraduates to work seamlessly between their A&S departments and the new STEM education department. This department will ensure that our students graduate with strong content and teaching certificates, and are ready to meet state and national demands for highly qualified science and math teachers. This new department is designed to meet the demands through a student-centered, personalized learning system.

In addition to better prepared pre-service teachers, the new STEM education department will serve as a focal point for UK to (1) deepen the content knowledge and inquiry-based teaching skills of practicing science and math teachers; (2) strengthen collaborative STEM research across A&S, Education, and Engineering and translate research findings into responsive practices; and (3) develop meaningful learning experiences for school leaders, policy-makers, parents and community members.

I support the creation of the STEM education department and look forward to future collaborations.

Yours,

Mark Lawrence Kornbluh
Dean
College of Arts and Sciences



August 11, 2010

Dr. Mary J. O'Hair, Dean
College of Education
University of Kentucky
103 Dickey Hall
CAMPUS 0017

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.cenr.uky.edu

Dear Dean O'Hair:

It gives me a great deal of pleasure to support the proposal by the College of Education to create a new Department of STEM Education. I cannot think of a more important initiative for the University to undertake than to expand the cadre of science, math, and engineering teachers in the high schools throughout Kentucky.

In our discussions over the past year, I have emphasized how important this initiative is for the future of the state. Kentucky remains mired near the bottom nationally in the per capita production of STEM graduates. In engineering, Kentucky graduates only half the number of bachelor's degrees per capita as the nation, and it remains far below the productivity of the seven contiguous states. Kentucky's engineering degree productivity is but two-thirds that of West Virginia!

Kentucky's educational system has made enormous strides in many areas since the passage of the landmark Kentucky Educational Reform Act in 1990. Unfortunately, STEM education is not one of the areas in which the state has made progress. If the next twenty years are to see marked improvement in the ability of Kentucky high school graduates to pursue undergraduate and graduate work in science, math, or engineering, a new cadre of teaching professionals must be prepared. The University of Kentucky is the only institution statewide that can marshal the resources across a broad array of academic programs to make an impact throughout the state. The Department of STEM Education will be the foundation for this effort.

I commend you and your faculty for undertaking this administrative restructuring and pledge my support in making this initiative successful.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas W. Lester".

Thomas W. Lester
Dean



Dream · Challenge · Succeed

May 13, 2010

Dear Dean O'Hair,

I am writing to recommend the formation of a Science, Technology, Engineering, and Mathematics [STEM] Education Department. Our proposed Department will expand and enhance STEM Education at the University of Kentucky and for the Commonwealth in significant ways. Along with strengthening teacher preparation programs already in place in continued collaboration with the Department of Curriculum & Instruction, the STEM Education Department will build new bachelor's, master's, and doctoral programs in science, technology, engineering, and/or mathematics education. In addition, the new department will lead the Commonwealth in STEM Education research by attracting graduate students, future STEM faculty researchers pursuing progressive research, and funding to support research in these disciplines. Our plan is to become the top program, notably still in a college of Education, for preparing future STEM Education faculty members, researchers, undergraduate and graduate students. Over the long term, the creation of a PhD within the STEM Education Department would be nationally groundbreaking and place UK on the cutting-edge among benchmarks. Given the national shortage of PhD graduates to fill vacant faculty positions in STEM education disciplines, UK has the strong potential to fill an important market niche.

When I arrived at University of Kentucky a year ago, I came to find out that we had only one doctoral student in Science Education and a few more doctoral students in Mathematics Education. I, along with my colleagues, wished to create more innovative, STEM focused options for our current graduate students and future graduate students. We developed a master's-level degree program for the College of Education's redesigned Master of Science degree. This program was purposefully crafted as a STEM master's degree with new courses developed by the STEM Education faculty. I designed and developed two; they are *Designing Project-enhanced Environments in STEM Education* and *History of STEM Education*. As a result of this new graduate focus, we have already seen the number of our graduate students pursuing doctorates in science and mathematics education increase. Once a STEM Education Department is in place, we will proceed to create a doctoral program in STEM Education.

My personal research focus and interest have always involved the design and implementation of project-enhanced, interdisciplinary learning environments. In my case, 'interdisciplinary' is primarily concerned with the productive integration of a) mathematics and science; b) mathematics, science, and technology; or c) mathematics, science, and engineering. This research interest has been instrumental in how I teach both undergraduate and graduate classes. With this focus, I have written many research papers that report investigations concerning how people understand science and mathematics concepts as they participate in project work that demands the integration of multiple content areas. Some example projects, which are inherently interdisciplinary and fruitful for contextualized student learning, include studies of motion and rate of change; sound waves and trigonometry; and the moon's motion, the moon's phases and spatial geometry. It should be noted that I include and mentor doctoral students extensively in my research. I am a strong believer in giving doctoral students the

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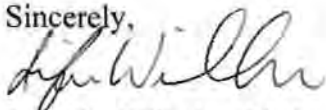
opportunity and the experience of STEM education research, which includes assisting in research design, data collection, manuscript writing, and paper presenting. I have published and presented on numerous occasions with my doctoral students while a professor at Texas Tech University (TTU). I want to continue this tradition and focus at the University of Kentucky and this can only happen if we build and bring STEM Education to the forefront.

When I arrived at my previous institution (TTU), there was not a focused mathematics and science graduate program of study and there were only a total of three doctoral students pursuing research in the areas of mathematics or science education. I wished to build a Science and Mathematics Education Program and that was exactly what my colleagues and I did. I served as the Science and Mathematics Education (SMED) Program Chair (2007 – 2009) and helped to grow our numbers to nearly thirty by the time I left Texas Tech. I expect similar and possibly even better results can happen at UK with the establishment of a STEM Education Department.

When I was a faculty member at Texas Tech University, I focused my grant writing efforts on STEM Education funding and was able to land nearly \$6 million dollars of external funding. I received a \$3 million grant from the Greater Texas Foundation entitled "*Middle School Math and Science (MS)²: Understanding by Design*"; a National Science Foundation GK-12 (\$2,723,642) Award (2008-2013) entitled "*Building Bridges: Integrating Mathematics, Science, Engineering Education on the South Plains*"; a NASA- IDEAS (\$44,001) Award (2006-2008) entitled "*Cratering Analysis for REAL: Investigating Craters in the Solar System*," and an American Education Research Association (\$25,000) Award (2003-2005) with support from the U. S. Department of Education's Institute of Education Sciences (AERA/IES) entitled "*Moon Journals: Students Forging New Mathematical and Literacy Identities*". All of these externally funded grants involved designing and implementing project-enhanced learning in STEM environments. In doing so, I have worked with colleagues across campus from the Colleges of Engineering and Art & Sciences, as well as colleagues within my own College of Education. While at UK, I have worked with the Colleges of Arts & Sciences, Agriculture, and Engineering in pursuit of external funding. I believe that by becoming a STEM Education Department, this process will be more targeted and streamlined. Funding agencies will take notice of our forward thinking ideas and our targeted initiatives.

In closing, the University of Kentucky has recently committed to President Obama to "substantially increase the number and diversity of high-quality science and mathematics teachers we prepare, and to build better partnerships among universities." Committing to such ambitious and warranted goals demands strong, organized, and aggressive actions, and can only be done with a shared vision. We, the STEM Education faculty at UK, have such a vision; we can create the right opportunities and experiences through focused STEM Education undergraduate and graduate programs and targeted STEM funding in a timely, synergistic manner.

Sincerely,



Jennifer Wilhelm, PhD
Associate Professor of Science/Math Education
Partnership Institute of Mathematics and Science Education
Reform (PIMSER) Outreach Professor
College of Education

November 17, 2010

To: UK University Senate

I am writing you to confirm general support from the Department of Curriculum and Instruction for the movement of STEM to organize into a new academic department within the College of Education and the University of Kentucky. In an effort to be as transparent as possible in providing the requested details related to this proposed departmental reorganization, I hope to respond to queries made regarding this proposal from the University Senate. As a disclaimer, I must indicate that I arrived at the University of Kentucky in July as the newly appointed department chair in the Department of Curriculum and Instruction. I was superficially aware of the discussions underway related to the STEM proposal while I participated in the interview process last spring but was not familiar with any details associated with this proposal. With that limitation acknowledged in connection to my first letter of support, in this letter I will attempt to provide more detail related to questions about this proposal.

It appears from C&I faculty meeting minutes from last year that the initial discussion of the STEM department possible realignment was at the December, 2009 meeting. Minutes from this meeting indicate a review of the history of the STEM discussions that occurred in COE and across the UK campus. General concerns and advantages for this departmental realignment are listed in the minutes. For example, the concerns noted were, "The impact to Curriculum and Instruction, Teaching loads, Legal and ethical questions about advertising for positions in Curriculum and Instruction, then moving the newly hired faculty to the STEM department, The number of tenured faculty in the STEM department." The advantages listed in the minutes included, "A separate STEM department will bring in more money, The science and math education graduate programs will expand, benefitting the entire college, Students will be better prepared for a changing job market." As you can see, little in the way of detail related to these issues is apparent in the recorded minutes. An additional meeting was held in the spring to provide C&I faculty with an opportunity to vote on a silent ballot related to the STEM department proposal. This vote was conducted by Dr. Mary Shake who was serving as the interim chair of C&I at the time. This resulted in a 20-5 vote in favor of the change. I am not able to address why the COE vote was unanimous as that vote was conducted by the Dean, although that vote was conducted some time following the departmental vote.

In order to capture what C&I faculty were thinking related to their vote last spring, I invited them to write me anonymous letters describing their rationale. This invitation was extended in the November 12th C&I faculty meeting. I extended this invitation since I had no record, given the silent ballot used last year, on who voted either for the proposed STEM department or against it. As a result of this invitation, I received one anonymous letter and five signed letters. I will present summary information from these six letters to attempt to capture faculty reflections on this process. Five of the faculty indicated in their letters that they voted for the creation of the STEM department. One indicated that they had voted against the proposal. There was apparent variation present in the rationale that faculty applied to arrive at their particular votes. Some indicated that the STEM faculty clearly demonstrated the benefits of this new department and that there is evidence that this is a strong national trend to develop such departments. Additionally, organizing

such a focused department should increase the number of students in these programs and facilitate a greater success rate in funding by external sources. There was also a perception that the creation of a STEM department would generally benefit the University of Kentucky. There also seemed to be a perception that the process was a bit rushed last year and that they would have preferred more time to discuss this change. However, connected to that concern was a nearly unanimous view that both C&I and STEM would benefit by moving forward with this proposal. One concern raised in a faculty letter was a question of the rationale for having a separate STEM department that would still have programs in the ELED, Middle Level, and Secondary teacher education programs. This raises a potential challenge for C&I in how to staff these programs. However, initial conversations between myself and Dr. Wilhelm have established a process to ensure that an equitable resolution for this and other transition challenges will be resolved. Even though we have anticipated this challenge, in our conversations, it seemed premature to make final plans for articulation until we have received official approval to proceed. Once approval is provided, we will establish a subcommittee of faculty from both C&I and STEM to look at how to facilitate the details of the change to ensure program continuity with and effort to ensure no negative programmatic side effects on our combined students. It was also noted that for new programs established in STEM, the CPE and KPSB would need to provide approval. STEM faculty are committed to working through this approval process in a timely fashion. There was also a concern expressed in several of the meetings last year about how this change might impact the resource base for C&I. I have attached correspondence received from the Dean to C&I faculty responding to this and other questions. The Dean's office would need to address the specifics related to funding for C&I and STEM.

While the summary comments listed above represent letters from the six faculty choosing to provide me with information, it seems to be quite consistent with what I have heard informally from faculty since my arrival at UK. The general view expressed in all of the letters is that both STEM and C&I faculty are anxious to move forward with this proposal and allow each unit to maximize the opportunities to refine their programs and focus their research within the revised contexts.

Sincerely,



Parker C. Fawson, Ed.D.
Professor of Literacy
Editor, Literacy Research and Instruction
Chair, Curriculum and Instruction
College of Education
University of Kentucky
337 Dickey Hall
Lexington, Kentucky 40506-0017
(859) 257-0767
fax (859) 257-1602

The following are questions generated by faculty who will be remaining in Curriculum and Instruction:

1. How will the budget be impacted? How will the allocation of funding change? *The C&I budget will not be impacted. New dollars will be allocated to the STEM department to fund department chair stipend, an administrative assistant, TAs, and operating expenses.*
2. How much money comes to the department through STEM faculty? If that money is moved to STEM education, how will this impact staffing, TA allocation, etc.?
 - *No funds would be moved from C&I to the STEM department.*
 - *The current operating expenses would remain in C&I; new operating expenses for the STEM department would be provided by the Provost's Office.*
 - *Grants and contracts awarded to STEM faculty would go to the new STEM department. We anticipate that establishment of the STEM department will lead to additional grants and contracts in the STEM disciplines. Incentive funds generated by faculty members are associated with the faculty members earning the funds.*
 - *I encourage C&I faculty members to be actively engaged in securing grants and contracts. Incentive funds from these grants and contracts would remain in C&I.*
 - *As in previous years, the travel budget would be based on \$1,400 per faculty member, which comes from the college budget. In the past, C&I faculty members have received \$350 from departmental funds to supplement the college's \$1,400 allocation. This additional amount will remain for faculty in C&I. The STEM department would establish its own policy related to any additional travel money to supplement the college allocation.*
3. Generally, does the change impact space, TAs, and staff assistants?
 - *An attempt will be made to locate all STEM faculty in a central location. Since most are already in TEB, the plan is to relocate faculty in DH to TEB. C&I could benefit from the move since faculty office space would open up when STEM faculty are relocated.*
 - *The C&I department would not lose TA lines. Commitments from the President's Office and development funds will be used to create new TA lines in the STEM department.*
 - *No change will occur to the number of staff assistants in C&I. The Provost's Office has committed to funding a staff assistant in the new STEM department.*
4. Will faculty be teaching the science and mathematics courses embedded in EDC programs? *Yes.*
5. Who will take on supervision duties? *Supervision responsibilities will continue as they currently are. Mathematics education and science education faculty who teach in the elementary and middle school methods blocks will continue to supervise practicum students during their field placements.*

6. Who will be program chair for mathematics education and science education? *The Mathematics and Science Education Program Faculty has been divided into two program faculties: the Mathematics Education Program Faculty and the Science Education Program Faculty. Margaret Mohr-Schroeder will chair the Mathematics Education Program Faculty and Jana Bouwma-Gearhart will chair the Science Education Program Faculty.*
7. Who will serve as advisors, and how will that be allocated? *If an advising proposal that is under review by the Provost's Office is not fully funded, advising for students who have been admitted to TEP or upper division status will be advised as in the past. The faculty in Mathematics Education would advise students in mathematics education; faculty in Science Education would advise students in science education.*
8. Who will serve on committees (this is more about representatives from the STEM Education department)? *The STEM department would have representation on college-level committees and be treated as other departments in the college in this regard. Faculty from the content disciplines in Arts and Sciences who would have joint appointments in STEM could serve on doctoral committees. Given recent hires in mathematics education and science education, there will be sufficient faculty in the STEM department to serve on program faculties, including the Elementary Education and Middle School Program Faculties.*
9. Will we keep all 8.5 TA lines currently allocated to C&I? *Yes.*
10. What is the future of lecturer lines in C&I? *Currently we have one as the MIC coordinator and one as the middle school coordinator. Ms. Vicki Vance has coordinated the elementary student teaching for a number of years, but is retiring in June. Will we be able to hire someone into Ms. Vance's position? Lecturer lines are established as needs arise throughout the college. The lines do not "belong" to a specific department. Salaries to fund the lecturer lines come from vacant faculty lines. The lecturer line for the MIC program will continue into the 2010-2011 academic year because the college was not able to search for the MIC position; however, a successful search was conducted for the middle school position and that lecturer line will not be available to C&I for the coming year. The department will be able to hire an individual to replace Ms. Vance for the upcoming year.*



Curriculum & Instruction
317 Dickey Hall
Lexington, KY 40506-0017

859 257-7399
fax 859 257-1602
www.uky.edu

November 19, 2010

To Whom It May Concern:

I am writing this letter in support of the establishment of a new STEM Department in the College of Education. This is an important opportunity that would situate our College and the University as a national leader focused on a timely and critical educational issue. In fact, to my knowledge, there are only two such STEM Departments in existence nationally. As the University seeks to attain a position as a “Top 20” university, it seems that a new STEM Department would only help leverage our status toward this goal.

Based on President Todd’s recent remarks regarding the need for increased numbers of highly qualified K-12 STEM educators in Kentucky, I feel that the College would be remiss to not move forward with creating a separate department, which would provide the opportunity for an increased emphasis on STEM education in conjunction with pre-service and in-service teacher preparedness in these areas.

I do not feel that the separation of our STEM faculty from the Department of Curriculum and Instruction would impose any hardships on our department or current programming. I will continue to pursue opportunities to collaborate with and engage in integrated projects with our STEM faculty in which we can work together to improve our current programs while planning additional, innovative approaches to teacher preparation. For example, Dr. Wilhelm and I are planning the submission of an NSF grant that would integrate science and literacy curriculum from a problem-based learning approach. Additionally, we are exploring new program ideas designed to attract military veterans from engineering battalions at Fort Knox and Fort Campbell to enter the teaching field at the middle and/or high school level as part of the P20 College & Career Readiness Lab HOMEFRONT: Honoring Our Military through Education: Flexible Recruitment of New Teachers Initiative.

I strongly believe that the development of a new STEM Department fits well within the goals of the Strategic Plans for our College and Department. Through greater, national visibility as one of only a small number of Colleges with a dedicated department for STEM education, our College will be positioned as a national leader in this area. This

increased visibility and recognition is certain to result in opportunities for the recruitment of doctoral students and access to external funding that would augment the capacity of the College “to increase the numbers of teachers it prepares to help address critical shortages in the high-need fields of science and mathematics” (Department of Curriculum and Instruction Strategic Plan, 2006-09).

Sincerely,

A handwritten signature in cursive script that reads "Laurie A. Henry". The signature is written in black ink and is positioned above the typed name.

Laurie A. Henry, Ph.D.
Co-Director, P20 College & Career Readiness Lab
Assistant Professor of Early Adolescent Literacy



Dr. Jennifer Wilhelm
Department of Curriculum & Instruction
College of Education
101 B Taylor Education Building
CAMPUS 0001

College of Education
Field Experiences & School Collaboration
104 Taylor Education Building
Lexington, KY 40506-0001
859.257-1857 or
859.257-7974
fax 859.257-2734
fieldx@uky.edu
www.uky.edu/Education/ofcover.html

Dear Jennifer,

I am writing to support the proposal for you and other colleagues who specialize in areas related to Mathematics and Science Education to form a STEM department which is separate from Curriculum & Instruction (C & I) where you currently reside. As a faculty member in the C & I department and director of the field experience program for Teacher Education, I am acutely aware of the importance of highlighting the STEM areas at this juncture. Clearly, this is a time of radical transformation for our P-12 schools with the mandate to better prepare students to succeed in this highly technological, interconnected world. I believe it is vitally important for the College of Education to lead efforts to improve mathematics and science instruction, which is a key component in that transformation. Helping teachers implement strategies that emphasize real-world, problem-based learning will take considerable resources. My understanding is that having a STEM department in the College will enhance the possibility of securing funds and mobilizing the resources needed to do the job.

I hope my comments prove helpful as the proposal moves through the approval process.

With best wishes,

A handwritten signature in blue ink that reads "Sharon".

Sharon Brennan Ed.D
Associate Professor and Director

August 9, 2010

Mary John O'Hair, PhD, Professor, and Dean
College of Education
University of Kentucky

Dear Dr. O'Hair:

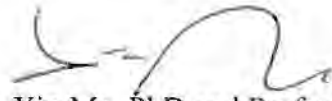
I am writing this letter to offer my support for the establishment of the STEM education department in the College of Education. Although for various reasons the new department will not be my primary department, I have been a supporter of this innovation since the time when Dr. Richard Millman was the interim chair of the Department of Curriculum and Instruction. I believe this is an indication of educational leadership of UK for the state of Kentucky and beyond.

I am sure good arguments have been made in plenty on the importance of the new department. Here I offer my personal experience. Part of my graduate studies at the University of British Columbia was carried out in a department called Mathematics and Science Education, a good initial effort of the now STEM education. My experience in that department was beneficial as the whole department operated its research and teaching around common and unique issues in the two school subjects more closely related than any others. Realizing and thinking about the common and unique issues in mathematics and science education brought doctoral students to a special position to understand both mathematics education in relation to science education and science education in relation to mathematics education. Unfortunately, to my disappointment, such an emphasis (even connection) was very much lost later when the Department of Mathematics and Science Education was combined with another department to form the Department of Curriculum Studies.

It is my hope that the new STEM department operates in a similar philosophy realizing that these two school subjects are both closely connected with each other and substantively unique from each other. Such a direction will, I believe from my own first-hand experience, benefit research and teaching in the new department.

Please feel free to contact me for more discussion.

Sincerely,

A handwritten signature in black ink, appearing to be 'Xin Ma', with a stylized flourish at the end.

Xin Ma, PhD and Professor
Spencer Fellow of the (U.S.) National Academy of Education
(Former) Canada Research Chair



Dr. Mary John O'Hair
Dean, College of Education
103 Dickey Hall
University of Kentucky
Lexington, KY 40506-0017

May 18, 2010

Dear Dean O'Hair,

I am writing in support of the proposed Science, Technology, Engineering, and Mathematics (STEM) Education Department in the College of Education. I believe this department has the potential for giving national prominence to the University of Kentucky in the area of K-12 teacher education in the STEM fields, as well as highlight the university's focus on professional development in STEM Education and research on strategies for improving the teaching and learning in STEM education.

During my tenure at the university, I have been a faculty member within the Department of Curriculum and Instruction. Although this arrangement has worked well in terms of elementary and middle level teacher education programs, little focus has been given to mathematics or science education, two areas of great need in schools today. Further, indirect funding from external funding agencies (e.g., National Science Foundation, US Department of Education) has been distributed across the department, leaving few funds to purchase materials and resources for the science and mathematics teacher education programs. This was a bit frustrating when considering the amount of resources brought into the department through external funding sources by mathematics and science education faculty.

The formation of the STEM Education Department offers many opportunities for collaboration among STEM Education faculty as well as faculty from STEM disciplines. The history of STEM Education faculty collaborations with faculty within the College of Arts and Sciences is rich with local, state, and regional professional develop programs in science and mathematics for K-12 teachers, graduate programs in mathematics, and partnerships with state education representatives to develop standards-based instructional materials. The organization of the STEM Education Department will provide a more focused group within the College of Education to continue these collaborations. Additional programs also will focus on modeling pedagogies for teaching science, technology, mathematics and engineering concepts, offering authentic learning experiences for K-12 teachers within these fields to foster understanding of how STEM concepts apply to real world/authentic practices in the field, and develop programs to improve the teaching of STEM concepts in institutions of higher education.

Curriculum and Instruction
335 Dickey Hall - Lexington, Kentucky 40506-0017
(859) 257-4661 - fax (859) 257-1602
www.uky.edu

The newly approved STEM Education graduate program is the first program developed under the auspices of the new department. The program offers teachers and other individuals with expertise in one or more STEM fields opportunities to extend their learning in their domain, or to develop a broad background in STEM education while earning a master's of science degree. In addition, I am beginning preliminary work developing a master's level program in math and science education for elementary and middle level teachers. Such a program will target teachers in grades 4-7, grades levels that correspond to state accountability tests, and thus of great interest for school districts within the region. In addition, I am in the preliminary stages of developing a collaborative project for teachers in grades four through eight in collaboration with a scientist at Eastern Kentucky University. The project will begin as a professional development program focusing on a comparison of ecological issues in Kentucky and Madagascar culminating in a possible study trip to Madagascar.

Although such programs could be part of a larger STEM education program, the new department provides faculty more focus on developing such programs, and supports a community of researchers in STEM Education. As the faculty meet to discuss department issues, other topics of interest also are discussed, such as writing projects, grant opportunities, and collaboration opportunities. In addition, faculty within the STEM Education Department also have formed a writing group that meets monthly during the school year to critique manuscripts members are preparing for publication. The writing group provides another opportunity for faculty members to collaborate, assist each other in developing scholarly writing, and develop ideas for new research and writing projects.

In summary, I am delighted with the development of the STEM Education Department and look forward to its beginning in the 2010-2011 school year.

Sincerely,



Rebecca McNall Krall, Ph.D.
Phone: 257-2176
Email: rebecca.krall@uky.edu



College of Education
Curriculum and Instruction
355 Dickey Hall
Lexington, KY 40506
859 257-4661

May 13, 2010

Dear Dean O'Hair:

I am writing to express my interest in joining the potential new Department of Science, Technology, Engineering, and Mathematics [STEM] Education. As Mathematics Program Faculty Chair in the present Department of Curriculum and Instruction, I believe the formation of this new department is timely and of the utmost importance. It will help create a specialized focus on STEM Education at the University of Kentucky, allowing for more innovative approaches to teacher education and research in its associated fields. The investment in research on teaching and learning the new department would offer will inform the development and enhancement of STEM curricula and pedagogical approaches—a prominent need based on nationally recognized issues. In turn, investment in the new department's research and programming could lead to increased numbers of science, technology, engineering, and mathematics teachers as well as STEM teacher educators, both of which will fulfill needs in Kentucky.

I believe my mathematics content expertise and current externally funded projects in investigating mathematics knowledge for teaching, geometry knowledge for teaching, and formative assessments for secondary mathematics teachers will contribute to making UK and the College of Education a national leader in STEM Education. My P20 engagement - including Family Math Nights, Big Blue Council of Teachers of Mathematics, and partnerships with Fayette County Mathematics - and my representation of UK on numerous state committees will contribute to the ever-expanding partnership base at the University of Kentucky.

The goals of the STEM Education department represent the kind of P20 engagement our college currently states as its mission, and meshes perfectly with my research and goals for working at UK. Together, I believe we can bring our content expertise and national-level projects to bear on Kentucky reform and make a difference as a STEM Education department.

Sincerely-

A handwritten signature in cursive script that reads "Margaret J. Mohr-Schroeder, Ph.D.".

Margaret J. Mohr-Schroeder, Ph.D.



May 16, 2010

To Whom It May Concern,

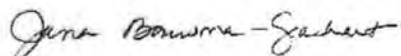
This letter conveys my intention to become a member of the newly forming department of science, technology, engineering, and mathematics (STEM) education at the University of Kentucky. I intend to begin working in this department as soon as possible.

The new department will allow for numerous opportunities for me, professionally, as well as for my new department colleagues. Most notable will be the concentrated efforts that will allow us to help meet our ambitious goals to significantly increase our numbers of highly-qualified, highly-effective certified K-12 science and mathematics teachers. As a new department we intend to strengthen current teacher certification programs as well as to create new ones with a focus on research-confirmed best teaching and learning practices that unify the STEM disciplines.

This focus will carry over into our graduate programs, including a new PhD program in STEM education, one of only a few of its kind. The cumulative expertise of the proposed STEM education department faculty group promises to foster doctoral graduates of exceptional quality. We aim to help alleviate the shortage of postsecondary STEM education faculty currently needed to effectively train the practicing and potential K-20 educators of tomorrow. The potential of the formation of a new STEM education department, alone, has already been an effective recruiting tool for strong PhD candidates; I am already working with two new students (to being, officially, in fall 2010) in planning joint research regarding STEM teaching and learning at the postsecondary level. I am confident that our newly formed department will help our faculty to better secure external funding monies to help support our graduate students, as well as attract and support postdoctoral researchers, and to become one of the top producers of STEM education research in the country.

I wholeheartedly endorse the proposed STEM education and will do my best work to see its success as a leader in STEM education for the Commonwealth, the nation, and internationally. I humbly request the support of the various entities here to assist and subsidize its immediate creation.

Sincerely,



Dr. Jana Bouwma-Gearhart
Assistant Professor of Curriculum and Instruction
Secondary Science Education

May 15 2010

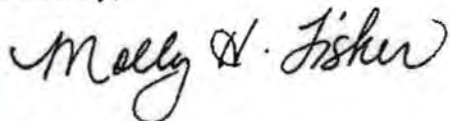
Dear Dean O'Hair,

When my appointment at the University of Kentucky began last summer, I did not realize I would quickly become an inaugural member of one of the first STEM Education departments in the United States. When I began, I knew I was drawn to my colleagues in mathematics and science education, but I assumed it was because of our similar content interests. I quickly realized that they were as driven and passionate as I am about improving awareness of STEM related fields and training teachers to become successful STEM educators. This common passion has driven us closer throughout this past year.

In my first year at the University of Kentucky, I have collaborated to write an NSF grant, assisted in creating a master's degree program in STEM Education, designed a graduate level course in STEM Education curriculum, written a proposal to become the co-director of a P20 STEM Innovation Lab, and offered feedback in the STEM Plus undergraduate degree program for future teachers in STEM fields. All of this was in collaboration with my STEM Education colleagues. Additionally, our relationships with the STEM related departments in the College of Arts and Sciences and College of Engineering has helped increase my personal contacts in other colleges and I look forward to working closely with our colleagues in those colleges.

I am excited about the increased collaboration and productivity our STEM Education department will produce and I fully devote my support to this endeavor. Since moving to Kentucky, I have gained friendships, but more importantly in higher education, I have made colleagues for life. As a team within the Curriculum and Instruction department, we are dynamic and driven; as our own department, we will be unstoppable.

Sincerely,



Molly H. Fisher, PhD



Dr. Mary John O'Hair
Dean, College of Education
University of Kentucky
Lexington, KY 40506

College of Education
Curriculum and Instruction
335 Dickey Hall
Lexington, Kentucky 40506-0017
859 257-4661
fax 859 257-1602
www.uky.edu

Dear Dean O'Hair,

May 16, 2010

I came to the University of Kentucky because it seemed to be a place that would value my work integrating engineering design and digital technology tools into science teaching and learning. Thankfully, my first year here has demonstrated that UK is such a place. For the past 30 years, STEM education has been at the core of who I am, and to find an academic home for my pursuits with like-minded people has been very fulfilling.

It was often an isolating thing to be one of those "science math geeks" growing up- delighting in owning the first personal computer on the street back in the late 1970s, rebuilding my car engine as a teenager, leaving high school early to take calculus at the university in town, being the only female in my graduating class of mechanical engineering majors. When I eventually became a science teacher at a girls' middle school, my mission was to encourage all my students to collaborate and find their own inner engineer- to tinker, invent, take-apart, build, re-build, and apply their newfound math and science skills to solving everyday problems with the other students in their class.

Working with my new science and math education colleagues at UK has helped me experience the sense of collaboration I hoped to instill in my students. With them I find a special place where I am not a "science math geek" in isolation, but the member of a team that includes teachers in the community, members of PIMSER, and engineering faculty across the street. The STEM fields are unique, with a special language and culture of their own. While I value the contributions of faculty in other disciplines, there is a special underlying understanding amongst those involved in STEM education initiatives. To work together in our own department, I think, would only strengthen the mission we collaboratively share.

I fully support the creation of the Department of Science, Technology, Engineering and Math Education at the University of Kentucky- but not just because it's good for bringing in grant money, not just because it's good for reaching out to colleagues in other colleges on campus, not just because it's part of the larger STEM initiative to increase the number of science and math teachers who are technologically literate, and not just because it seems likely to help UK reach Top 20 status. I support the creation of the STEM Education department because it will help me be more productive and focused as I work with a team of amazing scholars who speak my language and share my goals.

Sincerely,

A handwritten signature in black ink that reads "Christine Schnittka". The signature is written in a cursive style.

Christine Schnittka, Ph.D.
Assistant Professor, Science Education



July 1, 2010

Dear Dean O'Hair,

When I was interviewed for the Assistant Professor of Elementary/Middle School Mathematics Education position at the University of Kentucky, I was informed of the plans of creating a new STEM Education Department. Soon after my interview, I researched universities that promoted a STEM emphasis in their Colleges of Education. Needless to say, the number of universities with this focus was limited, and no university had a STEM Education Department. I am excited to be a faculty member of an innovative and cutting-edge department.

After I accepted the position at the University of Kentucky, my new STEM Education colleagues in mathematics and science education have been very supportive. I know during this short period of time, I have gained important friendships with individuals whom I will collaborate with to develop a strong department that will be recognized worldwide. I am thrilled to be part of this team in the College of Education.

Sincerely,



Christa D. Jackson, PhD



Department of Physics & Astronomy
177 Chemistry-Physics Building
Lexington, KY 40506-0055

859 257-6722
fax 859 323-2846

www.pa.uky.edu

May 10, 2010

Professor Jennifer Wilhelm
Department of Curriculum and Instruction
College of Education
University of Kentucky
Lexington, KY 40506-0017

Dear Professor Wilhelm,

On behalf of the faculty of the UK Department of Physics & Astronomy, I am writing to strongly endorse your proposal to establish a STEM Department in the UK College of Education.

The dearth of qualified physics teachers at all K-12 levels, and especially in secondary schools, is a well-known national problem that has risen to the level of a crisis in Kentucky. Our Department has long recognized this problem, but has never had the resources to address it, or even to contribute to its solution. The problem has an obvious, tangible impact on both our undergraduate and graduate programs in physics and astronomy, as well as on the ability of the state to improve the technical sophistication of its workforce, and to attract and grow high tech industries.

For the proposed STEM Department to address this problem, it will need not only strong administrative support, but also support from faculty in the STEM departments of A&S. Our Department is eager to pursue joint and adjunct appointments of faculty and new departmental curricula as required to ensure that future KY physics teachers have the core content knowledge required to be effective in the classroom. We would also like to pursue a dual major option, in which students in our recently proposed revised BA program would simultaneously seek an education degree and initial certification through the proposed STEM Department.

In summary, we fully support your proposal for a new STEM Department in the College of Education, and look forward to working with College of Education faculty to advance physics and astronomy education at UK and throughout the Commonwealth.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Cavagnero". The signature is fluid and cursive.

Michael Cavagnero, Chair
UK Department of Physics & Astronomy



April 6, 2010

Dr. Jennifer Wilhelm
Department of Curriculum & Instruction
335 Dickey Hall
University of Kentucky
Lexington, KY 40506-0017

Dear Dr. Wilhelm:

I am writing to indicate the support from the Department of Mathematics for the formation of the new Department of Science, Technology, Engineering and Mathematics Education in the UK College of Education.

The department sees this as a very positive step in the enhancement of programs to prepare teachers of secondary mathematics for the state of Kentucky. There has been a long-time partnership between the Department of Mathematics and the College of Education in this program to prepare teachers of mathematics.

We see this as an opportunity for faculty from both departments to work together to help plan and implement new and better plans for the preparation of secondary mathematics teachers. Faculty from the Mathematics department have been helping in many ways with programs in Curriculum and Instruction as have faculty from C & I helped with planning and preparation of the courses that our future teachers need to be highly-qualified as they complete this program.

The department is very interested in the possibility of a new program for preparing more mathematics teachers through a 4-year program. We strongly support such a move. We hope that when such a program is implemented we will be able to work with the STEM Education department to make it possible that those students who are majoring in mathematics will be able to do so while still getting their certification to teach mathematics in the secondary schools.

Likewise, while we foresee the opportunity for these undergraduate students to work seamlessly between our two departments, it is a very good idea to have the opportunity for our interested faculty to be able to work seamlessly with both departments. In this direction we are very interested in the plan to have joint appointments (5%) between the STEM Education Department and the Mathematics Department. We hope that the STEM Education department would take under advisement for certain mathematics faculty members, such as Paul Eakin, Carl Lee, and David Royster, to hold a 5% appointment within the STEM Education Department. At the same time the Mathematics department

is willing to entertain the proposal that certain mathematics education faculty, such as Margaret Mohr-Schroeder, Molly Fisher, and Christa Jackson might hold a similar appointment within the Mathematics Department. Having these joint appointments would more forcibly indicate to internal and external units the commitment and help to ensure successful and productive collaborations. Collaborations might include but not be limited to activities such as joint teaching, program development, grant writing, committee service, and research.

Again, we support the creation of this STEM Education department and look forward to working with you and this department in the future.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Zhongwei Shen', with a stylized flourish at the end.

Zhongwei Shen
Professor and Chair

September 1, 2010

Jennifer Wilhelm
College of Education
University of Kentucky

Dear Dr. Wilhelm:

I write as Chair of the Department of Chemistry to indicate our Department's support for the establishment of a STEM Education Department within the College of Education.

The Department of Chemistry is concerned about the nationwide shortage in qualified teachers who could teach chemistry at the high school level. As a result many students are not exposed to quality chemistry instruction in high school and may shy away from pursuing degrees in STEM disciplines at the College level. It has been our experience that several of these students are often under-prepared when taking our introductory chemistry courses.

The proposed STEM Education Department would help educate more and better prepared STEM teachers. Moreover, it would provide a collaborative environment for research in STEM education. A number of faculty members from our department are interested in participating in the research mission of the newly formed department. Consequently, the Department of Chemistry supports the establishment of a STEM Education Department.

Sincerely,



Mark S. Meier
Professor and Chair
Department of Chemistry



8 September 2010

Dr. Jennifer Wilhelm
Dr. Rebecca McNall Krall
University of Kentucky
College of Education
Dept. Education Curriculum and Instruction
114 Taylor Education Bldg.
Campus 0001

Dear Dr. Wilhelm and Dr. Krall,

We write to express our enthusiastic support of the initiative to establish a Department of Science, Technology, Engineering, and Mathematics (STEM) Education within the College of Education at UK. We fully appreciate the need for secondary STEM educators who have themselves been educated and trained as scientists in STEM fields. In the Earth Sciences, which are among the core content subjects for assessment in Kentucky, we see a particular need for earth scientists to teach that content, as opposed to someone broadly trained in another field or another science as is often the case at many high schools. We also foresee the potential for instructional and research collaborations between EES and the STEM Department, and even joint faculty appointments.

We look forward to the seeing the new STEM Department on campus. Please let us know if we can be of further assistance.

Sincerely,

**Dhananjay
Ravat**

Dhananjay Ravat, Chair

Digitally signed by Dhananjay Ravat
DN: cn=Dhananjay Ravat, o=University
of Kentucky, ou=DEES,
email=dhananjay.ravat@uky.edu, c=US
Date: 2010.09.08 16:48:06 -04'00'

A handwritten signature in black ink, appearing to read 'Dave Moecher'.

Dave Moecher, DUS

Earth & Environmental Sciences
101 Stone Building, Lexington, KY 40506-0053
+1 859 257 3758 • fax +1 859 323 1938
www.uky.edu/AS/Geology/



Chairman of Biology
Department of Biology
101 Thomas Hunt Morgan Building
Lexington, KY 40506-0225
859 257-6766
fax 859 257-1717
www.as.uky.edu/biology

May 14, 2010

Jennifer Wilhelm
College of Education
University of Kentucky

Dear Dr. Wilhelm,

I am writing to provide my support for the creation of a Department of Science, Technology, Engineering and Mathematics (STEM) Education. It is clear that there is a grave shortage of competent science and mathematics teachers in the Commonwealth of Kentucky as well as the nation at large. Further, the level of ignorance of scientific principles is alarmingly high throughout this country, and training of enthusiastic, competent science teachers is a necessary first step in alleviating this deplorable situation. I appreciate your willingness to work with STEM departments that will provide the scientific content for these future STEM teachers. I also appreciate your recognition that multiple paths to teacher certification for science teachers should be encouraged. As we move forward, I look forward to working with your faculty collaboratively on science education research and will authorize courtesy appointments in my department to facilitate such proposals.

Good luck with your proposal, and, should you need further information or help, do not hesitate to contact me.

Yours Sincerely,

A handwritten signature in blue ink, appearing to read 'Vincent M. Cassone'.

Vincent M. Cassone, Ph.D.

Professor and Chair



EDUCATION PROFESSIONAL STANDARDS BOARD

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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



May 17, 2010

Dr. Jennifer Wilhelm
101B Taylor Education Building
University of Kentucky
Lexington, KY 40506-0001

Dear Dr. Wilhelm,

I am pleased to offer, on behalf of the Partnership Institute for Mathematics and Science Education Reform (PIMSER), strong and unequivocal endorsement of the proposal to the University Senate to establish a STEM Education department in the College of Education.

The PIMSER has worked closely over the past three years with the deans of the College of Education and the university administration as an advocate for increasing the number of STEM education faculty and the creation of a department of this nature.

The proposed department will address the compelling evidence for the critical need for the enhancement of the quality and quantity of STEM education teachers in the Commonwealth and the nation. As our state and nation continue to fall behind other nations in technological and economic development, and the quality of life they bring, this department will build new bachelor's and master's degree programs in science, technology, engineering and mathematics education. The University of Kentucky is a very active member of the Science and Mathematics Teacher Imperative (SMTI) of the Association of Public and Land Grant Universities (APLU), chaired by President Lee Todd. This national program has provided the evidence and the rationale for degree programs of the type proposed.

A specific niche in the overall need for STEM education enhancement is that of research based programs that can attract graduate students, STEM faculty researchers pursuing cutting-edge research, and graduate education and research. The University of Kentucky, as the Commonwealth's Research I flagship institution can, and should occupy that niche.

Finally, the PIMSER is the University of Kentucky's institute that provides support to STEM-related departments in their initiatives to promote pre-and in-service teacher education through engagement partnerships with K-12 teachers and administrators. It has built a network of K-12 schools and state and national stakeholders that enables this support. The Institute will be a particularly strong partner with the proposed new STEM education department.

Sincerely,

A handwritten signature in black ink that reads "John H. Yopp". The signature is written in a cursive style.

John H. Yopp
Director, PIMSER and SMTI Team Leader



April 6, 2010

a continuum of learning ...

www.appalmsp.org

Dear Dr. Wilhelm,

I am writing in support of the formation of a STEM Education Department in the College of Education and congratulate you and your colleagues for spearheading the efforts. The University's focus on science, technology, engineering and mathematics at the K-12, undergraduate and graduate levels is very timely. One can quote study after study, and commission after commission reports (national and state) indicating the lag in the nation, and particularly in this state, in K-12 student performance in mathematics and science.

The University of Kentucky has increased markedly its efforts to improve STEM education in the state over the past eight or so years. This began with the rewarding of a large grant from the National Science Foundation (NSF) to improve student and teacher performance in mathematics and science in the central Appalachian region. The program involved faculty from the Colleges of Arts and Science and Education. In addition, the University's administration is very supportive in that the President has taken lead positions at both state and national levels. He served as chair of a statewide taskforce on STEM education, serves as chair of an NSF Advisory committee in education and serves as chair of a recently formed Association of Public and Land-Grant Universities commission entitled the Science and Mathematics Teachers Imperative (SMTI) as well as serving on several forums, such as the Business-Education Forum. Further, the Provost has supported the Partnership Institute for Mathematics and Science Education Reform that evolved from the large NSF award and was approved by the University Senate [Board of Trustees]. He has lent support to the mathematics and science education efforts in the Colleges of the Arts and Science, Education and Engineering including outreach professors in mathematics, science, and science education to increase and improve the University's influence in K-12 STEM Education.

I mention the above to indicate the University is interested in taking a leadership role in STEM education and as mentioned before, it is timely that a unit be formed to assume this role, interiorly. There are other reasons for a STEM education department. The University has excellent STEM courses and STEM education courses. A unit that would assist in connecting these courses, i.e., the content and the pedagogy, would greatly enhance the quality of mathematics and science teachers produced by the University. Also, the number of teachers the University graduates needs to be increased. As it stands, a number of universities in the state graduate more teachers.

One further issue is that there are federal, and some state funds directed to the improvement of STEM education. Again, a focal point on STEM education will increase the University's potential to obtain funds for pre-service and in-service teachers as well as for research on best practices.

Finally, I mention briefly that for the past 15 years I have been involved with K-12 mathematics and science programs which have brought into the central Appalachian states over \$40 million. I have found there is a great need for a four year teacher education program. Five year programs do not supply many teachers in high needs areas. Secondly, programs with high quality content and pedagogy are absolutely essential to make the impact necessary to improve student performance.

It appears to me that your new department and its program in STEM education are being proposed at the appropriate time. I wholeheartedly support them.

Sincerely,

Wimberly C. Royster,
Co-PI, Appalachian Mathematics and Science Partnership
Emeritus Professor of Mathematics



Dr. Jennifer Wilhelm
Department of Curriculum & Instruction
335 Dickey Hall
University of Kentucky
Lexington, KY 40506-0017

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>

Dear Dr. Wilhelm,

I am writing to extend my support as the Outreach Professor of Mathematics for the formation of the new Department of Science, Technology, Engineering and Mathematics Education in the UK College of Education.

One of the purposes of the position of Outreach Professor of Mathematics is to enhance the teacher preparation program with which the Department of Mathematics has assisted the College of Education in the past. The formation of the STEM Department is a very positive step in advancing the preparation programs for teachers of secondary mathematics in the state of Kentucky. I come to the University of Kentucky from a university where there was a very close working relationship between the Department of Mathematics and the College of Education. I am pleased to see that it is only grower stronger here at UK. This is an opportunity for me to work together with the faculty from your department and for all of us to plan and implement new and better programs for the preparation of secondary mathematics teachers.

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. In my past university position, I served as a faculty member in the Department of Mathematics with an Adjunct appointment in the Department of Middle, Secondary, and K-12 Education. In this capacity I was available to serve on department committees and direct dissertations for the department. I look forward to having similar opportunities here, if they present themselves. Having joint appointments serves only to indicate more forcefully to internal and external units the commitment of the departments and to ensure successful and productive collaborations.

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

A handwritten signature in blue ink, appearing to read 'droyster', with a long horizontal flourish extending to the right.

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



Dr. Jennifer Wilhelm
Associate Professor
University of Kentucky, College of Education
Department of Curriculum and Instruction
101 B Taylor Education Building
Lexington, KY 40506-0017

Dear Dr. Wilhelm:

I am writing this letter in support of the University of Kentucky (UK), College of Education's plan to develop a Department of STEM education. This is an important initiative for the University and the Commonwealth because it will help develop a statewide STEM pipeline and improve the STEM literacy of Kentucky's workforce.

The dominant industries of the future will be driven by advances in technology that require a workforce with strong background in information technology (IT) and a solid foundation in STEM. The next wave of the IT revolution not only will transform states, it will lead to significant new economic opportunities as IT companies find new business opportunities and create new digital environments. Unfortunately, Kentucky is facing an immediate, critical shortage in STEM-oriented labor. A 2010 Milken Institute assessment of the technical and scientific workforce of each state ranked Kentucky 47th overall, indicating that the state has limited science and technology assets. Based on the 2008 State New Economy Index, Kentucky ranks in the lowest percentile for IT professionals, high-tech jobs, science and engineering, and workforce education. The 2010 National Science Foundation's Science and Engineering Indicators show that this trend will continue as less than 1/4 of high school graduates participate in advanced placement programs. Kentucky is in the lowest quartile for number of students receiving degrees in a science and engineering field with fewer than 10% of these students pursuing graduate degrees. Currently, Kentucky is 37th in the NAEP's standing in mathematics and under performs US students on international tests in math and science and ACT scores. The key for Kentucky and the rest of the nation is to build an educational system that keeps pace with emerging industry needs.

The proposed STEM department in the College of Education will expand and enhance STEM Education at UK and in the Commonwealth in significant ways. Along with strengthening teacher preparation programs already in place (e.g., Elementary, Middle School, and Master's with Initial Certification), the STEM Education Department will build new bachelor's, master's, and doctoral programs in science, technology, engineering, and/or mathematics education. Through these curriculum and instruction goals, the new STEM department will increase and retain Kentucky students in the STEM pipeline, from pre-K through productive adulthood in the workforce.

To achieve these ambitious and urgent goals requires the concerted efforts of those with a common vision who share focused, relevant expertise in STEM education. The new efforts in the College have already been a catalyst for bringing diverse groups of academics and professionals from across campus to talk about STEM issues. In the years to come, this new department can serve as a model for other Kentucky universities in developing STEM initiatives. As an active practitioner and researcher in STEM education, I strongly recommend the development of this department and advocate for its implementation. I will support this endeavor in any all ways possible.

Respectfully,

A handwritten signature in cursive script, appearing to read "Carol D. Hanley".

Carol D. Hanley, Ed. D.
Associate Director
Tracy Farmer Institute for Sustainability and the Environment
College of Agriculture, Environment and Natural Resources Initiative



December 6, 2010

University Senate
University of Kentucky
Lexington, KY 40506

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

Dear Colleagues:

I am writing to provide my enthusiastic endorsement of the creation of a Department of STEM Education in the College of Education at the University of Kentucky. As dean of the College of Engineering for over twenty years, I have become acutely aware of the substantial shortfall in certified math and science teachers that encumbers all other efforts to enhance Kentucky's competitiveness in high-tech areas. In my opinion, UK is the only university in the state that has the size and breadth in its STEM programs and the strength and leadership in its College of Education to properly address the needs in this area.

A sampling of data from recent years will underscore the severity of Kentucky's problems in STEM education. In the fall of 2008, the college-enrollment in Kentucky reached 249,000 students, and engineering enrollment reached an all time high of 4,696. Accordingly, 1.9% of all college students were enrolled in engineering courses of study in Kentucky. Nationally, 3.3% of all college students were enrolled in engineering. Among the surrounding states, the comparable figures were 2.4% in Illinois, 2.6% in Missouri, 3.2% in Tennessee, 3.5% in West Virginia, 3.5% in Virginia, 3.8% in Ohio, and 4.0% in Indiana. To move Kentucky to the national average would require an increase of nearly 3,400 students beyond the current engineering enrollment!

The College of Engineering has been a partner with the College of Education for a number of years in developing STEM-related initiatives. UK is the affiliate university for Project Lead the Way, the largest and most successful nationwide endeavor to increase the number of high school students who develop interest in, and persist to a degree in the STEM area. That initiative shows signs of being highly successful, but even its viability and long term prospects in Kentucky are severely limited by the shortage of qualified STEM faculty in the public schools.

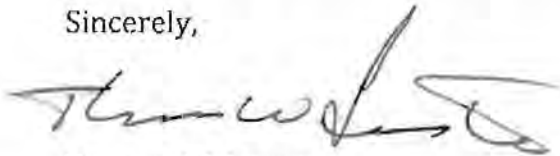
A number of faculty in the College of Engineering have strong ties historically to the College of Education. In fact, the colleges have jointly appointed an assistant professor who has a PhD in Education and a BS in Mechanical Engineering. Another College of Education faculty member has been hired recently due to her similar



educational background. The College is looking forward to providing necessary coursework in engineering to assist the long-term development of the Department of STEM education and its programs. As the opportunity presents, I will work with the Dean of Education to identify and to hire additional faculty in joint positions to bolster the institution's ability to offer appropriate STEM educational degrees and to conduct educational research in the field.

I view the creation of a Department of STEM Education as the single most important initiative that the University of Kentucky can undertake to assure a higher quality education in math and science for Kentucky public school students. I commend this proposal to you as one worthy of your full support.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas W. Lester". The signature is fluid and cursive, with a prominent initial "T" and a long, sweeping underline.

Thomas W. Lester
Dean

On November 9, 2017 the Curriculum and Instruction faculty eligible to vote on such matters took a vote on the following motion:

The EDC faculty are willing to release the responsibility for the masters in secondary education for math and science to STEM and support their new masters degree.

The vote was:

For: 3 Against: 12

The Curriculum and Instruction Department (EDC) and the STEM Education Department (SEM) negotiated a number of items in this process, but when EDC endeavored to negotiate an MOU stating that SEM would not expand into middle level education, elementary education, or other programs already in place in EDC, which the 13.1206 CIP code would allow, we were not successful. Given that SEM would not agree to enter such an agreement, we regret that we cannot support use of the 13.1206 CIP code to identify the STEM MAT program.

Respectfully Submitted,



Jared R. Stallones, Ph.D.
Professor and Chair

**COLLEGE OF EDUCATION
COURSES AND CURRICULA COMMITTEE MEETINGS**

Nov. 27, 2017, 11:30-1:00, 151F Conference Room, Taylor Education Building

Committee Members

- EDC, Margaret Rintamaa
- EDL, Tricia Browne-Ferrigno
- EdSRC, Jackie Rogers
- EDP, Lisa Ruble
- EPE, Jane Jensen (Chair)
- KHP, Stephanie Bennett
- STEM, Brett Criswell
- Ex Officio, Rosetta Sandidge
- Staff, Martha Geoghegan
- Staff, Gary Schroeder

Approval of the Minutes for the Oct. 27, 2017 meeting:

Motion: Tricia Browne-Ferrigno

Second: Stephanie Bennett

Action: Approved

Committee Issues for Discussion: none

From Educational, School, and Counseling Psychology

New Course Proposal – [EDP 622 Supervision in School Psychology](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Margaret Rintamaa
2. Discussion
 - a. This is a one credit course offered fall and spring
 - b. The course has been a general seminar, but, because of accreditation, it is helpful to clearly identify the course with supervision in the title.
 - c. The syllabus doesn't have a grading scale; however, the syllabus does include a statement of grading practices, which is adequate.
 - d. Margaret R. asked the general question of whether the electronic signature from the chair is sufficient or if there should be documentation of when the department actually reviewed the procedure?
 - i. Jane indicated that this documentation is helpful to demonstrate department support of a course proposal and can be attached.
 - ii. Martha indicated that Curriculum does require a signature, but not necessarily an actual documentation

- iii. Joan Mazur indicated that at the Senate Council, the issue of documentation of review often comes up.
 - iv. It was agreed that department review of a course proposal does not need to be documented in the proposal as the signature of the chair implies review and departmental approval, but that faculty review is important and documentation doesn't hurt.
- 3. Amendments:
 - a. none
 - 4. Action: Approved

From Early Childhood, Special Education, and Rehabilitation Counseling

Minor Course Change Proposal – [RC 510 Orientation to Rehabilitation Resources](#)

- 1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
- 2. Discussion
 - a. Jackie indicated that there is a change to the number now being 410G
- 3. Amendments: none
- 4. Action: Approved

New course Proposal – [EDS 501 Universal Design for Learning \(UDL\)](#)

- 1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
- 2. Discussion
 - a. The syllabus needs a graduate grading scale and should be updated to the proposed course number.
 - b. Joan Mazur had a question related to duplication with EDC 544 which includes universal design
 - i. She also wondered whether SPED 514 still includes components of universal design
 - ii. EDSRC and EDC have a joint graduate certificate
 - 1. Joan did meet with people from special education to discuss the management of the certificate, given that there are insufficient faculty in special education to teach all of the courses that have been taught in the past
 - c. Joan Mazur asked if there is a staffing problem in special education, should that be something to be discussed in Courses and Curricula?
 - 1. Tricia indicated that if the department offers the course it means that it has the resources to teach it.
 - d. Joan indicated that this is actually not a special education course; it is a UDL course
 - e. Joan reiterated that we should be thinking about not duplicating content across departments or courses and that more discussion of this course is needed.

- i. There has been some discussions between EDC and EDSRC, but perhaps these discussions have not be concluded.
 - ii. Margaret indicated that she also feels that there should be more discussion between the departments.
 - iii. Joan indicated that perhaps the course ought not be a special education course, but perhaps go back to the graduate school as a GS course.
- 3. Amendments: none
- 4. Action: Not Approved The committee would welcome the course being resubmitted, but in a more well-developed form. Particularly, there should be more discussion with EDC and any other affected departments including the Graduate School.

From Kinesiology and Health Promotion

Justin Nichols explained that the Department of Kinesiology and Health Promotion is looking at enrollment in its various programs and has recognized a need for more electives at the 300 level. In addition, a proposal for an undergraduate Sports Management program will probably be developed in the next few years if student interest in this area continues to grow. The courses submitted for approval at this meeting are designed as electives; however, the syllabi include elements directly related to accreditation, in anticipation of a potential undergraduate Sports Management program.

New Course Proposal – [KHP 321 Sales, Sponsorship, and Fundraising in Sport](#)

- 1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Stephanie Bennett
- 2. Discussion: none
- 5. Amendments: none
- 3. Action: Approved

New Course Proposal – [KHP 322 Sport Facility and Event Management](#)

- 1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Stephanie Bennett
- 2. Discussion
 - a. The syllabus doesn't have an identified professor. Is that OK?
 - i. Yes. Identifying the faculty is mostly required in a new program, not necessarily a new course.
 - b. Jane did note that the syllabi for this and the other elective courses all seem to be based on the same template without significant detail, which might be questioned by future curriculum committees
 - i. Tricia noted that the syllabi do all fall under a general curriculum concept for a sports management program.
 - ii. Justin discussed while the syllabi do seem to look alike. He indicated that even though the format is similar, the content isn't.
- 3. Amendments: none

4. Action: Approved

New Course Proposal – [KHP 474 Global Sport](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
2. Discussion: none
 - a. Justin indicated that this course will be available for student athletes in study abroad. There was also some review of the history at UK related to offering courses for athletes, particularly for study abroad.
3. Amendments: none
4. Action: Approved

New Course Proposal – [KHP 475 Sport Leadership and Ethics](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Lisa Ruble
2. Discussion
 - a. Justin Nichols asked whether perhaps the title of the course should be sport management rather than sport leadership, which seems like it might be related to the department of administration.
 - b. The members of the committee, including Dr. Browne-Ferrigno from the Department of Ed Leadership, did not have a problem with the current title.
3. Amendments: none
4. Action: Approved

New Course Proposal – [KHP 476 Research in Sport Management](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Brett Criswell
2. Discussion
 - a. Jane asked, “Do we not have an undergraduate research course in the College of Education? Does this course need to be only sport related? Couldn’t it be used college wide by students in different programs? If this course is offered as an elective in KHP, would there be room for students from different areas?”
 - i. No other undergraduate research courses of the same type were identified
 - ii. Justin feels that this would be a course what could be used by students in other programs.
3. Amendments: none
4. Action: Approved

New Course Proposal – [KHP 576 LGBTQ* Health Promotion](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Lisa Ruble

2. Discussion
 - a. This is a summer abroad course. This course is now presented to be useable both abroad, for distance learning, or face to face
 - b. Margaret wondered about whether there might be different expectations for graduate students as undergraduate students. Shouldn't there be different expectations?
 - i. A 500 level class has to be developed to be used as both an UG and GRAD course.
 - ii. There is consensus that these different expectations need to be identified.
 - iii. The syllabus does need to be amended to address these issues
3. Amendments:
 - a. The course should be approved pending changes in the syllabus as indicated in the discussion of the syllabus showing the difference in expectations for UG and Graduate students.
4. Action: Approved as amended

From Education Leadership Studies

Program Change Proposal – [CIP Code for Undergraduate Certificate in Educational Leadership](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Brett Criswell
2. Discussion
 - a. This change has been promoted by the Council for Postsecondary Education and the office of Institutional Effectiveness at UK.
 - b. The UK Senate has already approved the general changes in CIP codes from 10 to 8 characters, but each department must submit its own proposed changes
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [EDL 634 Leadership for Human Resources Development in Schools](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Margaret Rintamaa
2. Discussion: It was noted that the proposal indicated a change in pre-requisites that needed to be addressed.
3. Amendments:
 - a. There are now no pre-requisites. The proposal needs to indicate “none”
4. Action: Approved with edit to the pre-requisite question to indicate “none”.

Minor Course Change Proposal – [EDL 638 The Supervisor](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Margaret Rintamaa

2. Discussion: none
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [EDL 662 Digital Age Learning & School Technology Leadership](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Jane Jensen
2. Discussion: none
3. Amendments: none
4. Action: Approved

Major Course Change Proposal – [EDL 664 School Technology Leadership for School Improvement](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
2. Discussion
 - a. This course is performance assessment focused, rather than teaching and learning focused.
 - b. No concern about the course dealing with assessment was raised in terms of duplication in other departments
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [ELS 604 Leadership in Professional Learning Communities](#)

1. Motion to Approve
 - a. Motion: Jane Jensen
 - b. Second: Margaret Rintamaa
2. Discussion: none
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [ELS 620 Leading Action Research in School Renewal I](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
2. Discussion: none
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [ELS 621 Leading Action Research in School Renewal II](#)

1. Motion to Approve

- a. Motion: Tricia Browne-Ferrigno
- b. Second: Brett Criswell
2. Discussion: none
3. Amendments: none
4. Action: Approved

Minor Course Change Proposal – [ELS 624 Leadership Practicum: Monitoring Learning, Assessment, and Accountability](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Margaret Rintamaa
2. Discussion: none
3. Amendments: none
4. Action: Approved

Change Certificate Proposal – [School Technology Leadership](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Margaret Rintamaa
2. Discussion
 - a. This proposal has to do with reducing the number of courses in the certificate from five to three
 - b. It was explained that candidates would like to do the certificate as part of their doctoral programs, but they have had a hard time fitting in the five courses.
 - c. Jane confirmed that the minimum number of credits for a Graduate Certificate is nine and therefore the certificate still complies.
3. Amendments: none
4. Action: Approved

New Certificate Proposal – [Leadership for Deeper Learning](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
2. Discussion
 - a. These will be included in the masters and specialist programs
 - b. This will be part of a packaging of three courses
 - c. This is included in the Next Generation Learning programs that are being taught across Kentucky.
3. Amendments: none
4. Action: Approved

New Certificate Proposal – [Instructional Coaching](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Brett Criswell

2. Discussion
 - a. This has been requested because of demand from both Kentucky and abroad.
 - b. This is also a nine hour certificate with an option for non-Kentucky students to pursue Leadership for Creative Problem Solving instead of a Practicum.
 - c. The demand is for a certificate that is titled in such a way as to identify candidates as instructional coaches
 - d. Joan Mazur raised the question of duplication of courses
 - i. EDC has a course which specifically trains teachers to be instructional coaches
 - ii. Justin Bathon indicated that the included in this certificate (previously titled “The Supervisor”) is for school administrators to learn how to be instructional coaches.
 - iii. Joan noted that the title changes had happened quickly due to the large volume of proposals
 - iv. Tricia Browne-Ferrigno indicated that all the courses in the certificate are already being taught.
3. Amendments: none
4. Action: Approved

From Curriculum and Instruction

Program Change Proposal – [CIP code for Doctor of Education \(EdD\)](#)

1. Motion to Approve
 - a. Motion: Tricia Browne-Ferrigno
 - b. Second: Brett Criswell
2. Discussion
 - a. This change has already been discussed and approved by the Department of Curriculum and Instruction
3. Amendments: none
4. Action: Approved

New Course Proposal – [EDC 603 Teaching Reading to Low-Achieving Primary Students](#)

1. Motion to Approve
 - a. Motion: Margaret Rintamaa
 - b. Second: Lisa Ruble
2. Discussion
 - a. This proposal has already been through the committee twice.
 - b. Margaret says that all of the requested changes are now in the proposal
 - c. NOTE.... Be sure that there is just ONE EDC603 in the Curriculog system
3. Amendments: none
4. Action: Approved

From STEM Education

New Program Proposal – [STEM Education Master of Arts in Teaching](#)

1. Motion to Approve

- a. Motion: Tricia Browne-Ferrigno
- b. Second: Stephanie Bennett

2. Discussion

- a. Jane reviewed the information shared at the last C&C meeting regarding the creation of the STEM department. The proposal for the new STEM department included a transition of STEM-related courses and programs from EDC to STEM. The transfer of any program or course, however, must be approved by faculty curriculum committees. All of the STEM degrees previously in EDC were subsequently transferred with C&C approvals.
- b. However, the Master's program did not transfer because the Masters of Arts in Teaching with teacher certification program (MIC) technically did not include specializations. Thus there were no "strands" or "tracks" or "specialities" to transfer.
- c. As was noted at the last C&C committee meeting, there is the perception of duplication of between the MAT STEM proposal and the MIC in STEM. The C&C committee had requested that documentation of approval of the release of responsibility for MIC Math and Science be acquired and included in this new proposal.
- d. The MAT STEM proposal provides an extensive history of the establishment of the STEM department and subsequent correspondence regarding the appropriate CIP code and inter-departmental correspondence.
- e. The proposed CIP code for the new program was identified as the main remaining point of controversy.
 - i. The CIP code proposed for the program (13.1206) is one first proposed by CPE for the WKU SKY Teach program.
 - ii. CIP code 13.1206 is multilevel although the proposal is for a MAT in secondary education
 - iii. Dr. Mazur related the way the WKU program is a multilevel SKY program and the CIP code associated with the program is noted as being WKU only.
 - iv. Margaret Mohr-Schroeder claimed that two departments cannot share the same CIP code and thus a different code from the MIC is necessary.
 - v. Joan Mazur and Margaret Rintamaa expressed concern that approving a program with a multi-level CIP code would open the door for STEM offering a multi-level program in the future.
- f. Brett Criswell read the letter from STEM in the proposal that indicates that STEM does not intend to extend their programs to the Elementary and Middle School levels.
- g. Margaret Rintamaa raised the question of the MOUs requested by EDC that are not in the proposal.
 - i. Dr. Wilhelm indicated that there are two MOUs that exist.
 - ii. Dr. Rintamaa asked that the discussion of the MOUs be reflected in the proposal.

- iii. Dr. Rintamaa indicated that EDC would like to have a more definite statement related to the fact that STEM will not develop initial preparation programs at the elementary and middle levels.
- h. Tricia indicated she does not understand what the objections are to this proposal that has already been approved by the UK Board of Trustees.
 - i. Jane reminded the committee that curricular changes must be approved by curriculum committee as had already occurred with the other STEM degrees and that the establishment of the STEM department was an administrative approval.
 - i. Jane explained that since the MAT STEM proposal was submitted to C&C, EDC faculty had voted on a recommendation to support the transfer of responsibility for math and science secondary education training from the EDC MIC program to the STEM MAT program. The EDC faculty voted to reject the recommendation.
 - j. Jane shared a memo submitted by Jared Stallones documenting this vote.
- 3. Amendments: Amended with documentation of the EDC vote attached to proposal for review by the college.
- 4. Action: for 4 against 2 Approved

ADJOURNED: 1:16 p.m.

Dr. Jane Jensen, Chair
Courses and Curricula Committee
College of Education

November 28, 2017

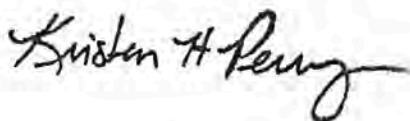
Dear Dr. Jensen,

This letter is to express the Department of Curriculum and Instruction's extreme disappointment at the Committee's vote yesterday to send forward the STEM MAT proposal. EDC voted overwhelmingly against supporting the proposal because we believe that it is duplicative of the Master's Degree with Rank II Initial Certification already in existence. Any curriculum changes the Department of STEM Education desires can be effected within the existing degree, and the current structure is more compatible with the strong emphasis CAEP and other entities place on cross-disciplinary collaboration. We also object to the use of a CIP code for the proposed STEM MAT that allows development of middle level and elementary programs that would further encroach on existing EDC programs. STEM Ed has acknowledged that such actions are in their long-range plans. We further believe that such significant changes as new degree programs should be undertaken with strategic, data-based deliberation by the college as a whole. Accordingly, we respectfully request a discussion and vote on this matter at the next possible College of Education meeting.

Sincerely,



Jared R. Stallones, Ph.D.
Department Chair



Kristen H. Perry, Ph.D.
Director of Graduate Studies

see blue.



Educational Policy Studies & Evaluation
131 Taylor Education Building
Lexington, KY 40506
(859) 257-1929

TO: Kelly Bradley, Chair, Faculty Council

FROM: Jane Jensen Chair, Courses & Curricula Committee

RE: MAT in Secondary STEM

DATE: December 11, 2017

The Courses and Curricula Committee met Monday, November 27, 2017. During that meeting, we approved a new Masters in Teaching in Secondary STEM Education with a 4-2 vote. The Chair of EDC, Jared Stallones, submitted an objection to that degree program after an email exchange with the proposal author from STEM, Brett Criswell (attached). Minutes of our November 27th meeting have not yet been approved by the committee, therefore I submit the following notes to summarize the C&C's discussion leading to a recommendation of approval:

- a. The proposal submitted for the MAT in Secondary STEM was revised following our October meeting and the revisions to the proposal contents were generally considered acceptable. There were continuing concerns, however, regarding the perception of duplication with the MIC program in EDC and the CIP code for the new program.
- b. As was noted at the October C&C committee meeting, there is the perception of duplication of between the MAT Secondary STEM proposal and the MIC in STEM despite the fact that the Masters of Arts in Teaching with teacher certification program (MIC) technically does not include concentrations or "tracks". Because of this perceived duplication, the C&C committee requested documentation be acquired from EDC of approval of the release of responsibility for MIC Math and Science and included in the MAT Secondary STEM proposal. The EDC department voted overwhelmingly not to support the proposal based on continuing concerns around the CIP code.
- c. The revised MAT Secondary STEM proposal provides correspondence regarding the recommended CIP code: 13.1206. Unfortunately, there is no specific CIP code for STEM education. There is a CIP code for secondary education (13.1205), for math or science at "various levels" (13.1311 & 13.1316 respectively), and for multi-level education (13.1206). The Kentucky Council for Post-Secondary Education (CPE) has given permission to Western Kentucky University (WKU) to use 13.1206 for its multi-level STEM education program. In discussion with CPE, UK's Office for Institutional Effectiveness recommended use of 13.1206 for UK's MAT in Secondary STEM education. Use of the same code for two programs within the same institution is strongly discouraged; therefore, use of 12.1205 for both the MIC and the new program was not recommended.

- d. The 13.1206 CIP code is supposed to allow graduates of the new degree to be “counted” as STEM graduates by the state (and perhaps other organizations—this differs from organization to organization), despite not being a STEM specific code. Offering a college-wide MAT under 13.1205 with concentrations in separate departments similar to our PhD would not allow this designation. Offering two separate secondary level MAT degrees in math and science respectively was not proposed.
- e. The EDC and STEM departments tried to find resolution to the objection. EDC suggested an MOU between the two departments stating that the STEM department would not extend their programming into Elementary or Middle level education, but the two departments could not agree on wording for the MOU.
- f. Testimony from the EDC representative and guests at the C&C meeting indicated that they did not have an objection to the contents of the degree program, only to the CIP code. They reiterated concerns that a multi-level code would open the door to further development of elementary and middle STEM education in the future.
- g. The STEM department representative (and author of the proposal) and guests reiterated what was stated in the proposal—that they have no intention of offering elementary and middle level degrees at this time.

The C&C Committee voted to approve the MAT in Secondary STEM, acknowledging that the CIP code does not clearly reflect the proposed program of study, but recognizing that there does not seem to be another option available at this time. The committee approved a secondary education degree only, not a multi-level degree program as indicated by the CIP code.

Following our committee vote, further objections and a request for discussion and a vote on this proposal at our next CoE faculty meeting were made by EDC Chair, Jared Stallones. These objections are attached.

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Faculty Meeting Minutes
December 12, 2017

Taylor Auditorium

1:00 – 2:00 p.m.

Call to Order and Welcome

At 1:05 p.m., Dean O’Hair called to order the College of Education faculty meeting with 79 faculty members and 12 staff members in attendance. She announced we have a quorum today. Tricia Browne-Ferrigno moved to accept the meeting minutes and Joan Mazur seconded the motion. The motion carried to accept the minutes without changes. Please use this link to access today’s PowerPoint presentation and handouts: https://luky-my.sharepoint.com/personal/gfwind00_uky_edu/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Fgfwind00%5Fuky%5Fedu%2FDocuments%2FCollege%2Dwide%20Meetings%2F2017%2D2018%2FDecember%202017

Welcome

Dean O’Hair welcomed everyone. We don’t know yet who our provost will be. We have two candidates, Dean Donna Arnett of the College of Public Health and Dean David Blackwell of the Gatton College of Business and Economics. Both candidates did a great job in their presentations.

The December dean’s report was distributed on December 1st. Regarding grant funding mentioned in the report, Margaret Mohr-Schroeder asked Dean O’Hair if the \$9 million included the \$5 million grant from the National Center on Innovation in Education. She also believes we rank sixth on campus instead of seventh. She asked if we are where the dean expected us to be. Dean O’Hair said we have steadily moved up in terms of grant dollars. Margaret Bausch said the college has made significant gains. The \$9 million does not include the National Center’s grant which had not been awarded when the data for the VPR’s report was collected. Margaret will send everyone information on what comprises the \$9 million. Dean O’Hair reminded everyone that the dean’s report is a collective effort.

Heather Erwin asked who will be on the search committee for the CoE dean search. Dean O’Hair answered that we do not have permission to search, but the new provost will appoint the search committee members.

Josh Boldt announced he has employed Kara Hill as a web programmer to update the college/department websites and security. Kara will also program the touch screen monitors. Kara worked in the College of Dentistry and she has extensive experience with java script.

Margaret Bausch introduced Patricia Murray, her new administrative assistant. Patricia’s office is in 124 Taylor Education Building. Patricia comes from OSPA and brings skills with block funding. She is busy reconciling accounts now. Margaret thanked everyone who is helping her.

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Dean O’Hair asked everyone to come celebrate with our graduates at the commencement reception on December 14th from 6:00 – 8:00 in the front hallway of Taylor Education Building.

Faculty Council Update

Kelly Bradley said the Faculty Council did not have a business meeting this month. Instead the dean hosted a holiday reception for the Council of Chairs, Faculty Council, Staff Council, and Council of Student Leaders. It was nice to network and talk with students. In January, she will meet with the Council of Student Leaders to see if they can work on joint projects.

Kelly asked the members of the Faculty Council to stand and thanked them for their work. During the spring semester, they will work on the faculty handbook, FMLA and modified duties. The departments are working on their rules documents now.

University Senate Update

Margaret Mohr-Schroeder is presenting since Katherine McCormick is attending Senate Council. She reported that Kelly Bradley had asked about the open dean’s position, but will not know the status of filling Dean O’Hair’s position until we have a provost in place. We currently have six, soon to be seven, open deans’ positions. Last week, the University Senate interviewed the two candidates for provost. Both candidates feel strongly about filling all open positions. The Senate Council drafted a letter of support for Dean Blackwell. The president will announce his decision no later than Monday, December 18. The new provost will begin January 1, 2018. Regarding the Blue Ribbon Committee on Graduate Education, both candidates said reports needs to cease and we need to take action.

The Senate Council elected a new chair, Jennifer Bird-Pollan, from the College of Law. She will serve from June 1, 2018, through May 31, 2019. Margaret Mohr-Schroeder will serve as vice-chair during the same time frame.

Yesterday, the University Senate approved a syllabus bank that will live within myUK. Course descriptions will pop up along with a link to an unofficial syllabus. Faculty instructors are responsible for uploading syllabi into myUK. The College of Education has already done this. Within myUK, we can only have one syllabus at a time, so we cannot have historical syllabi. Joan Mazur will send Josh Boldt the contact information for Roger Brown in the College of Agriculture.

Courses and Curricula Committee

Jane Jensen said Courses and Curricula (C&C) had a really long list of course and program proposals to consider at its last meeting. They got through a huge amount of work in a short period of time. She asked the members of the committee to stand. She

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thanked the committee members and Martha Geoghegan for getting the huge amount of work done. C&C has recently started using SharePoint for their minutes.

C&C meets and then posts the results of their votes. Faculty members have ten (10) days to ask questions after the results are posted. Nothing precludes faculty members from questioning anything on the list within the 10-day window. This process precludes the need for each item to go before the faculty-wide meeting.

Jane indicated the item to discuss today is a proposed MAT degree in STEM Education, Curriculum and Instruction (C&I) submitted a letter of concern regarding the proposal, which they consider duplicative to the MIC degree that we already have. The current MIC is a degree of the whole; it does not have options or specializations. Students are grouped by discipline and enroll in discipline-specific methods courses, thus, the perception is that options and specializations do exist. Technically, we have only one MIC degree for all programs. Another complication is the lack of a CIP code for a STEM master's degree. MIC uses 13.1205, a generic CIP code. There is no CIP code for STEM. The UK Office of Institutional Effectiveness determines the CIP code to be used. CPE suggested 13.1206, Teacher Education, Multiple Levels, for the STEM proposal. Western Kentucky University's STEM program also uses this CIP code.

Jane reported the C&C Committee asked STEM to go back and clear things up to have clearer information going forward. On November 27, the committee voted 4 to 2 to approve the program as a secondary education degree using the 13.1206 CIP.

Joan Mazur moved to extend voting privileges to faculty members in the Clinical and Lecturer Title Series per college rules only for this item on the agenda. Kelly Bradley amended the motion to include faculty in the Research Title Series. She asked faculty to vote by raising their hands. The motion passed.

Jared Stallones reported C&I faculty consider the proposed MAT program as duplicative to the MIC, not in terms of curriculum content, but it does have the same effect resulting in a teaching degree at the Rank II level. The CIP code would allow multiple level programs. He has had discussions with STEM leadership about a move into middle level education in the future. Jennifer Wilhelm stated that was untrue. Tricia Browne-Ferrigno said she does not recall any discussion of any degree in Faculty Council meetings.

Brett Criswell, the author of the MAT proposal with a STEM focus, said it will include a full assessment course, a summer course, and an embedded methods course. This degree would reside in STEM. They have no intention of moving into elementary or middle level education.

Jared Stallones consulted with STEM faculty about creating a memorandum of agreement, but they could not reach an agreement. C&I first requested an MOA that said STEM would 'never' use the program's CIP code to move into elementary or middle

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level education and STEM refused. C&I then offered the term 'would not' in place of 'would never' and STEM still refused.

Joan Mazur stated the Board of Trustees approved the new department, but the faculty approves programs. STEM said they would continue to teach in all programs. Kathy Swan asked for a point of clarification and reported the current MIC has a lot of flexibility with faculty input across content areas and the capacity to do an assessment class and an embedded methods course. Kathy reported that, at previous MIC meetings, the faculty unanimously supported the current program stretching across two years, and from the C&I perspective, MIC faculty members have been very accommodating.

Candace Crowell Hargons asked if the proposal is approved and if STEM wants to expand into middle level education at some future time, would we go through this same process again. Jane responded that C&C would have to vote again and then if there is concern, the proposal would be placed on the COE faculty meeting agenda for a vote.

Beth Goldstein said she can appreciate both sides and she would love to see this resolved in house. She does not know what it would take to make that happen since the motion does not have the support of Curriculum and Instruction.

Jeff Reese asked, from a student's perspective, how would the options be different if we approve the motion. Margaret Mohr-Schroeder said we currently have two routes to receive certification: An undergraduate student can declare a degree within the College of Education, Engineering or Arts and Sciences through undergraduate STEM Plus. As a graduate student, a student could apply for entry into the MIC program.

Tricia Browne-Ferrigno asked for a point of clarification. If the STEM Education proposal does not pass, would they have no graduate program of their own? STEM Education currently has an MS and a PhD degree.

As chair of the Courses and Curricula Committee, Jane Jensen read the motion/recommendation from the committee. The motion carried with 31 yes votes and 28 no votes with 18 abstaining.

Graduate Recruitment, Retention, and Student Success

Molly Fisher reported the Dean had tasked the committee with reaching a decision regarding block funding. Members of the committee voted 5-2 to go with Option 1. Each department would have slightly under \$30K; the funding will reside in departments going forward. Margaret Mohr-Schroeder complimented the committee for its transparency. Margaret Bausch reminded everyone that block funding is to be spent on students only, and the amount has to be spent this year directly from departmental accounts.

There was no new business.

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Dean O'Hair wished everyone a wonderful holiday break and asked them to celebrate with our graduates at the commencement reception on December 14.

Joan Mazur moved to adjourn the meeting. Kristen Maxwell seconded the motion.

The meeting adjourned at 2:05 p.m.



University of Kentucky
College of Education
Office of the Dean

103 Dickey Hall
Lexington, KY 40506-0017
P: 859-257-6076
F: 859-323-1046
education.uky.edu

December 20, 2017

Dr. Katherine McCormick
Chair, Senate Council
University of Kentucky
203E Main Building
Lexington, KY 40506-0032

Dear Dr. McCormick:

I am writing concerning the feasibility of establishing a Master of Arts in Teaching (MAT) degree in STEM Education in the College of Education.

The College is proposing this new degree program because of a shortage of P-12 teachers in the STEM disciplines. In October 2016, *EdWeek* published an article titled *Is STEM Education in Permanent Crisis?* (<http://www.edweek.org/ew/articles/2016/10/26/is-stem-education-in-permanent-crisis.html>). The article indicates the U.S. has faced a severe shortage of STEM teachers over the years and continues to experience this shortage. The situation is only getting worse as teacher preparation programs across the country are experiencing reduced enrollments, including those programs that prepare STEM teachers. A 2017 article in *The Messenger* (http://www.the-messenger.com/news/local/article_1e3cd656-28f8-11e7-8c6d-f770318c2d10.html) indicates this situation applies equally to Kentucky. One way to address this problem is to provide multiple programs offering different pathways into STEM teaching.

Several years ago, the Department of STEM Education implemented a new STEM PLUS undergraduate program to allow individuals to get a degree in a STEM major, along with an education degree and teaching certificate. This program provides one pathway into STEM teaching. The Department of Curriculum and Instruction has the Master's with Initial Certification (MIC) program, which has included the preparation of mathematics and science teachers at the secondary level. When the STEM Education Department formed, the expectation was that MIC secondary mathematics and science teacher preparation would come under the auspices of the new department. The proposed MAT in Secondary STEM Education is the outcome of that.

The proposal for this program in secondary STEM education has been carefully planned and will not require any additional resources. It is anticipated the program will enroll approximately 20-30 students each year, i.e., 10-15 in mathematics education and 10-15 in science education. At this time, the College has sufficient faculty; recurring and non-recurring sources of funds; and laboratory, office, and teaching space to offer this degree program.

As the STEM Education Department has acknowledged, it is not the intention of the department to expand the MAT in STEM Education into elementary and middle levels. I concur that the College and Department do not have resources to expand into these levels.

see blue.

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In summary, regarding the proposed MAT program in Secondary STEM Education, the College and STEM Education Department have sufficient resources to ensure faculty and student success in this program. I am certifying this program as administratively feasible.

Sincerely,



Mary John O'Hair, Ed.D.
Professor and Dean

CC: Tim Tracy, Provost



**University of Kentucky
Office of the Provost**

105 Main Building
Lexington, KY 40506-0032
P: 859-257-2911
F: 859-257-1333
www.uky.edu

January 25, 2018

Dr. Katherine McCormick
Chair, Senate Council
University of Kentucky
203E Main Building
Lexington, KY 40506-0032

Dear Dr. McCormick:

I am writing in reference to the program proposal for a Master of Arts in Teaching (MAT) degree in Secondary STEM Education in the College of Education. The proposal has my endorsement.

The Department of STEM Education is interested in establishing a new degree program for several reasons. First, there is a national and statewide shortage of secondary STEM teachers. This program, through offering an additional, high-quality pathway, will help address the shortage.

Second, the proposed degree program expands the Department of STEM Education's unique STEM degree offerings with specialized coursework and clinical field experiences in secondary STEM education. Through a partnership with the Fayette County Public School System, the methods coursework will take place in real high school classrooms, allowing for rich, high-quality field experiences that will better prepare our future STEM teachers.

Third, the proposed program does not require any new or additional resources. The projected enrollment in the proposed program is approximately 20-30 students per year. Per assurances from the Dean and department, the Provost Office does not foresee problems attendant to funding these additional students. Any additional costs will be absorbed by already allocated sources of funds, faculty, and space.

It is for all these reasons (national and statewide need for STEM teachers, a unique pathway that expands the Department of STEM Education's program portfolio, and sufficient level of resources), I offer my endorsement of the proposed program.

Regards,

David W. Blackwell
Provost

DWB/jkt/ab

seeblue.

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