

COURSE CHANGE FORM

Complete 1a – 1f & 2a – 2c. Fill out the remainder of the form as applicable for items being changed.

1. General Information.						
a. Submitted by the College of: <u>Education</u>		Today's Date: <u>February 22, 2011</u>				
b. Department/Division: <u>STEM Education</u>						
c. Is there a change in "ownership" of the course?					YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If YES, what college/department will offer the course instead? _____						
d. What type of change is being proposed? <input checked="" type="checkbox"/> Major <input type="checkbox"/> Minor ¹ (place cursor here for minor change definition)						
e. Contact Person Name: <u>Margaret Mohr-Schroeder</u>		Email: <u>m.mohr@uky.edu</u>		Phone: <u>257.3073</u>		
f. Requested Effective Date: <input checked="" type="checkbox"/> Semester Following Approval OR <input type="checkbox"/> Specific Term ² : _____						
2. Designation and Description of Proposed Course.						
a. Current Prefix and Number: <u>SEM 421</u>		Proposed Prefix & Number: _____				
b. Full Title: <u>Survey of Secondary Mathematics Curriculum</u>		Proposed Title: <u>STEM Education Methods I</u>				
c. Current Transcript Title (if full title is more than 40 characters): _____						
Proposed Transcript Title (if full title is more than 40 characters): <u>STEM Ed Methods I</u>						
d. Current Cross-listing: <input checked="" type="checkbox"/> N/A OR Currently ³ Cross-listed with (Prefix & Number): _____						
Proposed – <input type="checkbox"/> ADD ³ Cross-listing (Prefix & Number): _____						
Proposed – <input type="checkbox"/> REMOVE ^{3,4} Cross-listing (Prefix & Number): _____						
e. Courses must be described by <u>at least one</u> of the meeting patterns below. Include number of actual contact hours ⁵ for each meeting pattern type.						
Current:	<u>3</u> Lecture	_____ Laboratory ⁵	_____ Recitation	_____ Discussion	_____ Indep. Study	
	_____ Clinical	_____ Colloquium	_____ Practicum	_____ Research	_____ Residency	
	_____ Seminar	_____ Studio	_____ Other – Please explain: _____			
Proposed:	<u>2</u> Lecture	_____ Laboratory	_____ Recitation	_____ Discussion	_____ Indep. Study	
	_____ Clinical	_____ Colloquium	<u>10</u> Practicum	_____ Research	_____ Residency	
	_____ Seminar	_____ Studio	_____ Other – Please explain: _____			
f. Current Grading System: <input checked="" type="checkbox"/> Letter (A, B, C, etc.) <input type="checkbox"/> Pass/Fail						
Proposed Grading System: <input checked="" type="checkbox"/> Letter (A, B, C, etc.) <input type="checkbox"/> Pass/Fail						
g. Current number of credit hours: <u>3</u> Proposed number of credit hours: <u>3</u>						

Comment [OSC1]: Excerpt from SR 3.3.0.G.2 Definition. A request may be considered a minor change if it meets one of the following criteria:
a. change in number within the same hundred series*;
b. editorial change in the course title or description which does not imply change in content or emphasis;
c. a change in prerequisite(s) which does not imply change in content or emphasis, or which is made necessary by the elimination or significant alteration of the prerequisite(s); d. a cross-listing of a course under conditions set forth in SR 3.3.0.E;
e. correction of typographical errors.

*...for the specific purposes of the minor exception rule, the 600-799 courses are the same "hundred series," as long as the other minor change requirements are complied with. [RC 1/15/09]

¹ See comment description regarding minor course change. *Minor changes are sent directly from dean's office to Senate Council Chair.* If Chair deems the change as "not minor," the form will be sent to appropriate academic Council for normal processing and contact person is informed.
² Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.
³ Signature of the chair of the cross-listing department is required on the Signature Routing Log.
⁴ Removing a cross-listing does not drop the other course – it merely unlinks the two courses.
⁵ Generally, undergrad courses are developed such that one semester hr of credit represents 1 hr of classroom meeting per wk for a semester, exclusive of any lab meeting. Lab meeting generally represents at least two hrs per wk for a semester for 1 credit hour. (See SR 5.2.1.)

COURSE CHANGE FORM

h. Currently, is this course repeatable for additional credit?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
<i>Proposed to be repeatable for additional credit?</i>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
<i>If YES: Maximum number of credit hours: _____</i>		
<i>If YES: Will this course allow multiple registrations during the same semester?</i>	YES <input type="checkbox"/>	NO <input type="checkbox"/>
i. Current Course Description for Bulletin:	<u>This course will examine the content of the mathematics curriculum of the secondary school and issues related to that curriculum. Students are expected to demonstrate competency in this conten</u>	
<i>Proposed Course Description for Bulletin:</i>	<u><i>This course is intended to help future STEM Education teachers build a theoretical background and develop the practical skills needed to begin to develop themselves as effective teachers in the secondary classroom. Students will be introduced to, and gain hands-on experience with a variety of instructional materials appropriate for teaching STEM Education at the secondary level. Students are encouraged to be creative and reflective in developing, implementing, and evaluating practices associated with teaching STEM concepts and skills. A strong emphasis is placed upon helping students to develop an understanding of the processes of inquiry teaching, the processes of science and mathematics, as well as a deep conceptual understanding of their respective content area(s). This is part I of a two course sequence. This course requires a minimum of 100 hours of observation.</i></u>	
j. Current Prerequisites, if any:	<u>None</u>	
<i>Proposed Prerequisites, if any:</i>	<u>EDP 202, SEM 110, Admission into STEM PLUS Program</u>	
k. Current Distance Learning(DL) Status:	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Already approved for DL* <input type="checkbox"/> Please Add ⁶ <input type="checkbox"/> Please Drop	
*If already approved for DL, the Distance Learning Form must also be submitted <u>unless</u> the department affirms (by checking this box <input type="checkbox"/>) that the proposed changes do not affect DL delivery.		
l. Current Supplementary Teaching Component, if any:	<input type="checkbox"/> Community-Based Experience <input type="checkbox"/> Service Learning <input type="checkbox"/> Both	
<i>Proposed Supplementary Teaching Component:</i>	<input type="checkbox"/> Community-Based Experience <input type="checkbox"/> Service Learning <input type="checkbox"/> Both	
3. Currently, is this course taught off campus?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
<i>Proposed to be taught off campus?</i>	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
4. Are significant changes in content/teaching objectives of the course being proposed?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
If YES, explain and offer brief rationale:		
<u><i>This course is changing to a education methods course in order to coincide with the proposed changes to the undergraduate mathematics education program. The current content of the course is dated and no longer appropriate for today's preservice teachers. This change updates the course content and learning targets to better align with today's expectations.</i></u>		
5. Course Relationship to Program(s).		
a. Are there other depts and/or pgms that could be affected by the proposed change?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
If YES, identify the depts. and/or pgms: _____		

⁶ You must *also* submit the Distance Learning Form in order for the course to be considered for DL delivery.

COURSE CHANGE FORM

b.	Will modifying this course result in a new requirement ⁷ for ANY program?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES ⁷ , list the program(s) here: _____		
6. Information to be Placed on Syllabus.			
a.	<input type="checkbox"/>	Check box if <u>changed to</u> 400G or 500.	If <u>changed to</u> 400G- or 500-level course you must send in a syllabus and <i>you must include the differentiation</i> between undergraduate and graduate students by: (i) requiring additional assignments by the graduate students; and/or (ii) establishing different grading criteria in the course for graduate students. (See <i>SR 3.1.4.</i>)

⁷ In order to change a program, a program change form must also be submitted.

COURSE CHANGE FORM

Signature Routing Log

General Information:

Course Prefix and Number: SEM 421

Proposal Contact Person Name: Margaret Mohr-Schroeder Phone: 257.3073 Email: m.mohr@uky.edu

INSTRUCTIONS:

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

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
STEM Education	February 22, 2011	Jennifer Wilhelm / 257.1291 / jennifer.wilhelm@uky.edu	<i>J. Wilhelm</i>
<i>GC Comm.</i>	<i>3/28/11</i>	<i>Doug Smith / 71824 / dcsmit1@uky.edu</i>	<i>Doug Smith</i>
<i>College of Ed</i>	<i>4/19/11</i>	<i>Steve Parker / 75443 / sparko2@uky.edu</i>	<i>Steve Parker</i>
		/ /	
		/ /	

External-to-College Approvals:

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

Comments:

The Board of Trustees approved the Department of Science, Technology, Engineering, and Mathematics (STEM) Education on February 22, 2011. The department will fiscally begin on July 1, 2011.

⁸ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

**SEM 421: STEM Education Methods I
Syllabus**

“Research and Reflection for Learning and Leading”

Instructor:	Dr. Margaret Mohr-Schroeder or Dr. Jana Bouwma-Gearhart
Office Location	105C TEB
Phone Number	257.3073
Email	m.mohr@uky.edu
Virtual Office Hours	Arranged individually through email; Telesupervision and Skype access also available
Technological Requirements	Computer with internet access or access to UK computer facilities. Access to digital video recording devices (digital camera, digital video recorder, laptop webcams)
For Technological assistance	Contact TASC at http://www.uky.edu/TASC or call 859.257.8272 Contact Information Technology Customer Service Center http://www.uky.edu/UKIT or 859.257.1300
Technical Complaints	Contact the College of Education Instructional Technology Center at 859.257.7967 or contact Information Technology Customer Service Center http://www.uky.edu/UKIT or 859.257.1300
Preferred method for contacting instructor	Email or Blackboard
Anticipated Response Time	2 days
Information on Distance Learning Library Service	http://www.uky.edu/Libraries/DLLS
DL Librarian	Carla Cantagallo, DL Librarian; local 859.257.0500 ext 2171 Long distance: 800.828.0439, option 6 dllservice@email.uky.edu
DL Interlibrary Loan Service	http://www.uky.edu/Libraries/libpage.php?lweb_ide=253&llib_id16
Course Website:	

Course Description

This course is intended to help future STEM Education teachers build a theoretical background and develop the practical skills needed to begin to develop themselves as effective teachers in the secondary classroom. Students will be introduced to, and gain hands-on experience with a variety of instructional materials appropriate for teaching STEM Education at the secondary level. Students are encouraged to be creative and reflective in developing, implementing, and evaluating practices associated with teaching STEM concepts and skills. A strong emphasis is placed upon helping students to develop an understanding of the processes of inquiry teaching,

the processes of science and mathematics, as well as a deep conceptual understanding of their respective content area(s). This is part I of a two course sequence. This course requires a minimum of 100 hours of observation.

Prerequisite:

EDP 202, SEM 110 and admission into the STEM PLUS Program

UK College of Education Professional Themes

This course will address the four themes of the conceptual framework for the UK professional education unit: **research, reflection, learning, and leading**. Students will be given the opportunity to review, analyze, discuss, and apply **research** from diverse perspectives in education, including professional scholarship and practitioner inquiry, in order to reflect on their own practices as they study, observe, and practice in P-12 school and university classrooms. **Reflection** will also be integrated into students’ learning opportunities through the production of written essays and analyses of observation and teaching experiences to help students take advantage of the analytical and problem-solving skills that comprise critical professional reflection on one’s own teaching. This course emphasizes the commitment of the professional education unit to ensure that its graduates move into their professional lives equipped for life-long **learning** as educators who will be active in **leading** colleagues in their schools, districts, and professional organizations. The ultimate goal in addressing these four themes is to produce teacher leaders who work together to improve student learning among diverse populations and improve education in Kentucky and beyond.

Course Learning Targets, Outcomes, and Assessments

This course has been designed to provide students with opportunities to acquire skills, knowledge, conceptual understanding, classroom experience, and practice teaching in their preferred content area(s). By the end of this course, students will have gained the following:

Learning Target/Outcome	Assessment
<ul style="list-style-type: none"> Communicates concepts, processes, and knowledge 	Mini-Unit (Summative)
<p>Self-assess dispositions and standards related to effective teaching and develop personal goals for growth</p> <ul style="list-style-type: none"> Characteristics of Highly Effective Mathematics Teaching (http://www.education.ky.gov/KDE/Instructional+Resources/Highly+Effective+Teaching+and+Learning/Characteristics+of+Highly+Effective+Mathematics+Teaching+and+Learning.htm) Kentucky Teacher (Initial) Standards (http://www.kyepsb.net/documents) 	Self-assessment (Formative)

<p>/EduPrep/Kentuckyteacherstandards.doc)</p> <ul style="list-style-type: none"> • Appropriate content area standards 	
Participate in, observe, and reflect upon a variety of education settings.	100 hours of field experience (Formative) Reflections (Formative)
Demonstrates instructional strategies appropriate for content and contribute to student learning	Mini Unit (Summative)
Identifies and address students' misconceptions of content.	Reflections (Formative)
Develops learning targets aligned with standards	Mini Unit (Summative)
Plans instructional strategies and activities that address learning targets for all students	Mini Unit (Summative) Reflections (Formative)
Plans instructional strategies and activities that facilitate multiple levels of learning	Mini Unit (Summative)
Values and supports student diversity and addresses individual needs	Reflections (Formative) Field Experience Players vs. Haters (Formative)
Fosters mutual respect between teacher and students and among students	Reflections (Formative) Field Experience
Provides a safe environment for learning	Reflections (Formative) Field Experience
Uses a variety of instructional strategies that align with learning targets and actively engage students	Reflections (Formative) Mini-Unit (Summative) Field Experience
Develops knowledge of a balanced assessment system (formative, summative, interim, self-assessment, etc.)	Reflections (Formative) Field Experience Mini-Unit (Summative)
Uses available technology to design and plan instruction	Digital Technology Exploration (Formative) Mini-Unit (Summative) Field Experience
Integrates student use of technology into instruction	Mini-Unit (Summative) Field Experience
Uses data to reflect on and identify areas for professional growth	Field Experience Reflections (Formative) Self-Assessment (Summative)
Uses data to reflect on and evaluate instructional practice	Field Experience Reflections (Formative) Self-Assessment (Summative)
Plans instruction around standards and curricula with colleagues	Mini-Unit (Summative) Field Experience

Identifies leadership opportunities that enhance student learning and/or professional environment of the school	Field Experience Professional Development Requirements
--	---

Course Delivery

This proposed course is designed as a **face-to-face course with a minimum of 100 hours of observation**. During this time, students will participate in class discussions and present projects. Where an online discussion is utilized, discussions will take place using a Learning Management System such as Blackboard or NING (www.ning.com).

Senate Bill 1 Initiatives

This course will provide students an opportunity to advance their knowledge and mastery of the “tools” associated with Kentucky education reform, including the Kentucky Core Academic Standards (as they become available), assessment literacy – assessment *for* learning, and the new accountability system as it becomes available. As students carry out projects and complete assignments that involve instructional activities for P-12 students in Kentucky schools, they will address one or more components of the Senate Bill 1 initiatives.

Required Texts

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM. Or you may use your NCTM membership to access the standards online for free.

National Science Education Standards – National Research Council
Framework for Science Education Standards (as they become available).

Articles Assigned (Available online)

Recommended Texts

Donovan, M. S., & Bransford, J. D. (eds.). (2005). *How students learn: Mathematics*. Washington, DC: The National Academies Press.

Donovan, M. S., & Bransford, J. D. (eds.). (2005). *How students learn: Science*. Washington, DC: The National Academies Press.

Marzano, R., Marzano, J. S., & Pickering, D. J. (2003). *Classroom management that works: Research-based strategies for every teacher*. Merrill Education/ASCD College Textbook Series.

Wong, H. K., & Wong, R. T. (2001). *The first days of school: How to be an effective teacher*. Harry K. Wong Publications.

Grades

Grades will be assigned as follows:

90%-100% A; 80%-89% B; 70%-79% C; 60-69% D; <60% E

Completeness and Promptness

Only assignments submitted complete and on time will be considered for full credit. **All assignments must be typed unless otherwise instructed.**

Assignment Format

All assignments will be submitted via **SharePoint/coursewebsite** unless otherwise indicated or stated. It is highly recommended you save all your work electronically and also a hardcopy for your records before turning it in. The following format is required for every assignment submitted. Deviating from the format may result in reduced points, returned paper, or rejection of the assignment completely. All submissions must be typed, in 12-point Times New Roman or Garamond or similar font, with 1" margins all the way around. A **cover page** specifying the assignment, due date, instructor's name, and student's name must be included. Please name your files as follows: **lastname.assignment name** (example: schroeder.article2). Assignments are **due by 11pm the day they are due** unless otherwise noted by the instructor.

Late Assignments

Only assignments submitted complete and on time will be considered for full credit. Any assignments turned more than one week late will receive zero points.

Attendance

Attendance of individuals in the class is required, and university rules regarding absences will be followed. Exchange of ideas is essential for the learning that occurs in this class. In most class meetings, students work in pairs and/or in groups. The absence of one individual affects the performance of all persons working in the group. If you are absent, it is each student's responsibility to make up the work and provide evidence that the absence was excused. Without this evidence, the absence will be considered unexcused. Two tardies, whether arriving late or leaving early, equals one unexcused absence. I reserve the right to lower your final grade one letter grade your grade for each unexcused absence.

Excused Absences: S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences:

- 1) serious illness;
- 2) illness or death of family member;
- 3) University-related trips;
- 4) major religious holidays;
- 5) other circumstances you find to be "reasonable cause for nonattendance."

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day for adding a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (257-2754).

In the case of an excused absence, it is the student's responsibility to inform the instructor of the absence, preferably in advance, but no later than one week after it. Opportunities for make-up will be discussed then.

Participation and Professionalism

The STEM PLUS program is a teacher preparation program, and as such expects you to work and to transition into the teaching profession. This entails both mature personal behavior and professional conduct based on the College of Education's Functional Skills and Dispositions (see Student Handbook at <http://education.uky.edu/AcadServ/content/student-handbook-education-programs>). These include 1) communicating appropriately and effectively, 2) demonstrating constructive attitudes, 3) demonstrating the ability to conceptualize key content, 4) interacting appropriately with diverse groups in educational settings (including colleagues and students), and 5) demonstrating a commitment to professional ethics and behavior.

You are expected to be on-time, present at classes and at all school observations related to this course and in the program overall. If you must be absent for a legitimate reason it is **your responsibility** to contact instructors/supervisors and make up any missing class work. Since class work is often in groups or pairs, the absence of one individual affects the total class experience. You must provide evidence that your absence is excused. Two tardies equals one unexcused absence. S.R. 5.2.4.2. defines acceptable reasons for excused absences as "serious illness, illness or death of a family member, university related trips, major religious holidays or other circumstances you find to be reasonable cause for nonattendance." Decisions on the acceptance of late work are at the discretion of the instructor.

You are expected to be an active participant in this class, and to demonstrate participation in a variety of ways in accordance with a student seeking to become a professional teacher. Participation may include: Contributing in discussions, asking constructive questions or responding to peers or instructor, demonstrating active listening (taking notes, paying attention, etc.), and communicating with the instructor via office meetings and/or email. Attendance, participation, and professionalism will be assessed holistically based on the above criteria, and will be used to determine the outcome of borderline grades. In cases of extreme or frequent misconduct, the instructor reserves the right to dismiss a student from class and notify the department and college for potential disciplinary action.

In relation to participation and expectations for student behavior, cell phones need to be kept off during class meetings. If you are on call for emergency reasons please alert the instructor. Note taking and in-class work via laptop computers is acceptable. Social networking, writing e-mails, texting, or reading sources unrelated to class content is unacceptable.

Students who fail to attend class on a regular basis, participate as expected, and/or conduct themselves professionally or ethically will be required to meet with the instructor to set improvement goals, and may face failure or expulsion based on due process policies set by the College of Education and Teacher Education Preparation program. You are encouraged to communicate regularly with the instructor so that you are aware of your standing. This may be accomplished via face-face meetings during office hours and via email.

Field Experience

The schools you will be working and learning in count on you to behave professionally and ethically. If an emergency prevents or delays your attendance at school, you must notify the school, all cooperating teachers, and Dr. Mohr-Schroeder or Dr. Bouwma-Gearhart. Absences must be made up before the end of the fall semester. Failure to make up absences will result in an incomplete grade for the course.

Students with Special Needs

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protections for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides a reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please notify your instructor and contact the Disability Resource Center (Mr. Jake Karnes, jkarnes@uky.edu) 257-2754, room 2 Alumni Gym.

The course will be conducted with openness and respect to all individuals' points of view and experience. The activities and discussions will not tolerate discrimination or prejudice toward any person or group's religion, ethnicity, disability, gender, or sexual orientation.

Ethics Statement

This course and its participants will not tolerate discrimination, violence, or vandalism. STEM Education is an open and affirming department for all people, including those who are subjected to racial profiling, hate crimes, heterosexism, and violence. We insist that appropriate action be taken against those who perpetrate discrimination, violence, or vandalism. The University of Kentucky is an Affirmative Action and Equal Opportunity institution and affirms its dedication to non-discrimination on the basis of race, color, religion, gender, age, sexual orientation, domestic partner status, national origin, or disability in employment, programs, and services. Our commitment to non-discrimination and affirmation action embraces the entire university community including faculty, staff, and students.

All students are expected to conduct themselves in an appropriate and ethical manner during their UK classes and related field placements, as befitting students, future teachers, and ambassadors for the University of Kentucky. Any unethical behavior in class or during your field placements may result in failure for the course and/or expulsion from the STEM PLUS program, determined on a case-by-case basis. Faculty will follow all university due process procedures in cases of academic or ethical misconduct. Please consult Dr. Schroeder or Dr. Bouwma-Gearhart if you have questions regarding this requirement.

Statement on Plagiarism

All materials generated for this class (which may include but are not limited to syllabi and in-class materials) are copyrighted. You do not have the right to copy such materials unless the professor or assistant expressly grants permission. As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and

turn it in as your own, even if you should have permission of that person. Plagiarism is one of the worst academic violations, for the plagiarist destroys trust among others.

Legal Action

STEM PLUS students charged with violations of criminal law will be suspended immediately from the Teacher Education Program and/or field experiences until the case is settled. Students are responsible for reporting such charges to the Program Faculty Chair.

Commitment to Diversity & Equity

The STEM PLUS Program is committed to: making diversity central to policies, decisions, and practices; evaluating progress toward diversity in the program; disseminating results widely; and using these results to strengthen diversity for the Commonwealth.

Equitable access to high quality mathematics instruction in Kentucky's secondary schools is directly and indirectly affected by UK's STEM PLUS program's beliefs in and support for social diversity in schools. Moreover, the Commonwealth is directly affected by the ability of its youth to acquire high levels of skill in mathematics that can then be used by them as citizens to enhance their communities and participate in the state's ongoing progress and prosperity in local, regional, national, and global contexts. Therefore, it is essential for our teacher candidates to understand issues related to social diversity and make a commitment to value diversity as they engaged in teaching, research, reflection, learning, and leadership. By valuing diversity, our program is committed to enabling and empowering all people in educational contexts regardless of their race, ethnicity, gender, social class, sexual orientation, domestic partner status, and so forth.

Students who speak a first language other than English or have related cultural differences must not face special barriers to learning mathematics, science, and computer science. Every student's cultural heritage should be accepted and celebrated for the diversity that it brings to the learning environment. Expanded opportunities should be available to English language learners (ELL students) who need them to develop mathematical and scientific understanding and proficiency. Mathematics, Science, and Computer Science teachers should have knowledge of content and pedagogy that support ELL students, including an understanding of the role of the first language. (NCTM, 2008)

Excellence in mathematics, science, and computer science education rests on equity—high expectations, respect, understanding, and strong support for all students. Policies, practices, attitudes, and beliefs related to mathematics teaching and learning must be assessed continually to ensure that all students have equal access to the resources with the greatest potential to promote learning. A culture of equity maximizes the learning potential of all students. (NCTM, 2008)

Commitment to Addressing the Achievement Gap

The UK STEM PLUS Program aligns itself with the positions of the National Council of Teachers of Mathematics regarding cultural and linguistic diversity in STEM education. The program

seeks to underscore that cultural and linguistic diversity should be treated as integral components of STEM education, and that the failure to accommodate such diversity in curriculum and instruction lies at the heart of disparities in mathematics achievement between Caucasian and Minority racial populations—a phenomenon popularly referred to as “the achievement gap.” The NCTM (2005) offers the following belief statement that underscores our program’s commitment to diversity in education:

Every student should have equitable and optimal opportunities to learn mathematics free from bias—intentional or unintentional—based on race, gender, socioeconomic status, or language. In order to close the achievement gap, all students need the opportunity to learn challenging mathematics from a well-qualified teacher who will make connections to the background, needs, and cultures of all learners. (¶ 2)

Commitment to Technology

The Initial Preparation Certification Program in STEM Education is committed to teaching candidates so they use technology as a personal and professional tool. Our program is guided by NCATE standards and EPSB Kentucky Teacher Standards as they relate to technology. Candidates are required to use technology for a majority of their classes. Candidates use technology for class assignments, lesson plan design and preparation, class presentations, record keeping, and data analysis. Candidates are required to successfully complete course work focusing on using technology. Our candidates are required to communicate via electronic mail, use list serves, access the Internet and online databases, and use digital texts and modes for research projects and presentations. Our candidates use Microsoft Word, Excel, Access, and PowerPoint. They are given multiple opportunities during student teaching to videotape their teaching for use in self-analysis toward professional development. Our program offers candidates access to “smart” classrooms and technology labs in order to further facilitate their use of technology.

In addition to its alignment with NCATE standards, EPSB themes, and UK College of Education Technology Standards, the UK STEM PLUS Program aligns itself with the position of the National Council of Teachers of Mathematics regarding the use of technology and media in STEM education. NCTM’s (2008) statements underscore our program’s commitment to technology as follows:

Technology is an essential tool for learning mathematics in the 21st century, and all schools must ensure that all their students have access to technology. Effective teachers maximize the potential of technology to develop students’ understanding, stimulate their interest, and increase their proficiency in mathematics. When technology is used strategically, it can provide access to mathematics for all students. ...

Programs in teacher education and professional development must continually update practitioners’ knowledge of technology and its classroom applications. Such programs should include the development of mathematics lessons that take advantage of technology-rich environments and the integration of technology in day-to-day

instruction, instilling an appreciation for the power of technological tools and their potential impact on students' learning and use of mathematics. All teachers must remain open to learning new technologies, implementing them effectively in a coherent and balanced instructional program. These tools, including those used specifically for teaching and learning mathematics, not only complement mathematics teaching and learning but also prepare all students for their future lives, which technology will influence every day.

Course Components

Note: course readings and assignments have been selected and arranged in compliance with policies set forth by Senate Bill 1 (March 2009), the Kentucky Education Professional Standards Board (EPSB) themes of Diversity, Assessment, Literacy, and Closing the Achievement Gap, and the National Council for the Accreditation of Teacher Education Standards.

- ✓ Due throughout the semester:
 - **Homework problems/Reflections:** Write-ups of work done in class and home. All reflections should be typed and submitted properly unless otherwise noted.
 - **Participation:** Each class period all students are required to actively participate in class (see above for participation guidelines). Failure to participate will result in a 5% deduction from your overall, final grade.
(KTS-I 1, 2-5, 7, 8; NCATE/NCTM 1-15; Diversity, Assessment, Literacy/Reading, Closing the Achievement Gap)

- ✓ **Article Analyses (15 pts. each):** You will be expected to select, read, summarize, and **analyze 2 articles** from a mathematics education or general education **professional journal** (print or electronic format) during the semester. The publication date of these articles is not to predate January 1, 2006. These articles must be from the following categories (you may not repeat a category).

You will be given a form to follow to guide you in your analysis. The form can be found on the course website. The summary/analysis should be 1-2 pages in length. Please refer to the specifications above for turning in assignments. You will need to hand in a copy of the article in addition to your analysis/summary, and the form. If the article is available on the web, you may provide the link to the article on the form and do **not** need to turn in a hard copy. Evaluation will be based upon content as well as proper writing structure. You are encouraged to hand in as many as you can as early in the semester as possible, but I expect the deadlines given on the calendar for the written analyses on the articles. Please refer to the course calendar for due dates.

Categories: Manipulatives in the classroom, technology in the classroom, alternative assessment, discipline, classroom management, the content standards, cooperative learning, diversity in the classroom, special education in the classroom, writing in the classroom, and inclusion in the classroom.

Due September 30 and October 7. (KTS-I 7,9; NCATE/NCTM 3, 4, 7, 8; Diversity, Literacy/Reading)

Article Analysis # _____

Name: _____

This article addresses the following topic: _____

Publication: _____

Date, volume, and issue number of publication: _____

Page numbers: _____

Analysis and Summary of the Article (1-2 page summary and analysis):

- 1) What are the theses and key points of article?
- 2) Explain the significance of this article for your learning or future work as a STEM teacher. For example, how would you modify or implement the ideas or activities it describes?
- 3) Evaluate the article based on its clarity, usefulness/practicality, and your knowledge of content and pedagogy. Be specific when connecting to other texts or ideas you may have studied.

Article Analysis Scoring Guide

Objective	Points Possible	Points Earned
1. The student gives an accurate summary of the article	5	
2. The student explains the significance of the article by connecting it with his/her current learning or beliefs about future classroom practice, using evidence and examples where appropriate.	5	
3. The student evaluates the usefulness of the article to his/her teaching practice and/or professional development, and connects it with other specific texts s/he may have studied about teaching and content in their content area(s)	5	
Total	15	

- ✓ **Field Experiences (P/F):** You will be expected to complete a minimum of 100 hours of field experience in an adolescent classroom in your content area(s) of interest. This will be completed between XXX and XXX. The placement will be made for you at the beginning of the semester. It is your responsibility to communicate with your supervising teacher the expectations and needs of your placement. You are not to just observe in the classroom. Rather, you will be given a specific task to focus on each week. Below is a list of core activities you should focus on during your field experience:
 1. Observe classroom teaching.
 - a. Students should regularly spend time observing classrooms in action. They have been prepared to conduct observations in a focused manner, including observing and analyzing teacher actions and behaviors, and observing/interpreting student responses, behaviors, and learning. Focused

observation is a key activity in learning to teach at this phase of their development.

2. Discuss classroom episodes with the cooperating teacher.
 - a. Learn about rationales, teacher decision-making, classroom management techniques, instructional methods, etc., by talking with the cooperating teacher. Discussions may be as brief as 5 minutes.
 3. Analyze the cooperating teacher's lesson plans.
 - a. When possible, please share samples of your lesson and unit planning with the cohort student so s/he can use them as models for his/her own planning.
 - b. It is also valuable for students to study and review building and district level curriculum guides. Please give students access to any curriculum documents available: scope/sequence guides, etc.
 4. Co-plan lessons with the cooperating teacher when possible/appropriate.
 5. Co-teach lessons with the cooperating teacher when possible.
 6. Teach mini-lessons on skills and strategies related to a lesson or unit, with the supervision of the cooperating teacher.
 7. Lead/coach selected cooperative/small learning groups.
 8. Assist with class discussions and activities.
 9. Lead class discussions with the supervision of the cooperating teacher.
 10. Assist students with seatwork by circulating during class.
 11. Tutor students, including both struggling students and students in need of enrichment.
 12. Explain assignments to the class.
 13. Develop assessment rubrics with cooperating teacher supervision.
 14. Supervise classroom routines.
 15. Use/assist with technology in the classroom.
 16. Review and prepare instructional materials.
- ✓ **Digital Technology Exploration (25 pts.):** You will need to explore the use of a digital technology/Web 2.0 technology. You will create a digital story about the technology and include its application to the secondary STEM classroom. Please limit the stories to less than 8 minutes. More details will be discussed when the assignment is given. **(KTS-I 1, 5, 6, 9; NCATE/NCTM 3, 4, 5, 6, 7, 8, 9-15; Diversity, Literacy/Reading)**
- ✓ **Self-Assessment (30 pts):** You will complete a self-assessment of your dispositions and knowledge of standards as related to teacher education. You will evaluate your strengths and weaknesses and create dispositional goals. You will then reflect on your progress towards these goals and complete an online dispositions self-assessment at the end of the semester.
- ✓ **Mini teaching unit (100 pts)**
Plan for roughly 3 class-long (assuming periods of 60 minutes). Topics will be decided upon in class and will be distributed across subjects typically and appropriately covered in secondary school. Lesson plans need to follow the KTIP format. The unit should

include learning targets, necessary background teaching knowledge, a review of possible pre-existing student conceptions to address, a **detailed** description of teaching and learning activities, lists of materials and instructional resources, and tools for evaluating students. Units must reflect the ideas and methods emphasized in this class!!! Lessons that are too heavily dependent upon lecture techniques will not be accepted. Units must help students build understanding of scientific model(s) central to the discipline you will be teaching.

- ✓ **Players vs. Haters (100 pts.):** You will interview 3 “haters” of mathematics/science and three “players” of mathematics/science. You will compare the data, create a word cloud, and reflect on the data and word cloud and the implications it has for the secondary STEM classroom, especially in terms of differentiation instruction and reaching **all** students. Please see attached document for more detailed information. **(KTS 2 – 10; NCATE/NCTM 3, 4, 7, 8; Diversity, Literacy/Reading, Closing the Achievement gap)**

Most STEM PLUS students, if not all of them, are people who enjoyed mathematics and/or science during their own schooling. Not everyone is like us. Some people may love mathematics and/or science, but many claim to “hate” it. This assignment is designed to help you learn more about the adolescents you will be working with as a student teacher, and think about how you can design plans and activities that will make your teaching relevant to your students.

Go and observe your assigned mentor’s classroom during the semester (or, work with the teachers you observe in your school’s mathematics and/or science department). As much as possible, interact with the students and participate in the life of the classroom. With your cooperating teacher’s permission, identify three students with different backgrounds (grade, gender, race, social class, etc.) who seem to “love” mathematics and/or science class, and three who seem to “hate” mathematics and/or science class. Interview these students using the following questions to guide you:

1. What do you think of mathematics and/or science class? How come?
 - a. Have you always felt this way about it? If not, what happened that made you change your mind?
2. What do you like to do in mathematics and/or science classes? What do you get out of that?
3. What makes you want to learn something? Has that ever happened in mathematics and/or science class?
4. What do mathematics and/or science teachers do that makes you want to try and work hard in their classes?
 - a. What do they do that makes you want to give up, tune out, or mess around?
5. What would it take to make you “love/hate” mathematics and/or science? (If they love it, ask them what it would take to make them hate it. If they hate it, ask them what it would take to make them love it.)

Write down the responses of all the students you interview. Compile these answers under the headings of “Players” (students who LOVE mathematics and/or science) and “Haters” (students who HATE mathematics and/or science). Review the responses carefully. What patterns do you see in the answers? Are there any patterns that move *across* the two categories? What surprises you? What is predictable? How can you use this stuff to engage and motivate your students when YOU are their teacher?

Type up the responses to the students you interview as comprehensive as possible. Do not worry about sentence structure or grammar. Copy and paste the text into the Wordle.net tool and create your picture. Make changes to your word cloud as you see fit. Print the picture as a pdf or save the word cloud as a screen shot. Include it in your reflective paper you turn in (discussed below).

Based on your findings and reflections, write a reflective paper about how your students feel about mathematics and/or science class, why they feel that way, and what you can do AS A TEACHER to help them ALL be happier and more successful students in our favorite subject. Use your word cloud to help identify salient words and thoughts that seem to be themes throughout the interviews. How do your findings and conclusions match up with the standards, guidelines, and other texts we’ve studied about how to teach high school mathematics and/or science?

Players and Haters Project Scoring Rubric				
Content				
1	2	3	4	5
<ul style="list-style-type: none"> --Lacks purpose --Lacks development; may provide random details --Provides little, no, inappropriate, or inaccurate support for statements and claims --Lacks analysis and reflection 	<ul style="list-style-type: none"> --Attempts to establish a purpose; lacks focus --Shows limited idea development; analysis is present but insufficient --Provides sparse evidence for statements and claims; may be inaccurate --Shows limited capacity for analysis and reflection as a new teacher 	<ul style="list-style-type: none"> --Establishes only a narrow purpose; some lapses in focus --Develops and analyzes ideas --Provides some specific support for statements and claims --Support may be irrelevant or repetitious --Demonstrates basic professional reflection as a new teacher 	<ul style="list-style-type: none"> --Maintains a focused purpose --Style is appropriate and fluent --Develops ideas using specific references to support statements and claims --Analysis is substantive and shows thorough understanding --Demonstrates professional reflection as a new teacher 	<ul style="list-style-type: none"> --Maintains an insightful and focused purpose --Style enhances meaning and fluency --Supports ideas and indicates advanced analytical ability --Demonstrates superior abilities for professional reflection as a new teacher
Structure				
1	2	3	4	5
<ul style="list-style-type: none"> --Lacks awareness of audience --Lacks organization; incoherent --Fails to thoroughly address all parts of assignment 	<ul style="list-style-type: none"> --Limited awareness of audience needs --Attempts to organize ideas with limited success/coherence --May attempt to address all parts of assignment but does so unsatisfactorily 	<ul style="list-style-type: none"> --Indicates some awareness of audience needs; attempts to assume a professional tone --Demonstrates adequate organization; generally coherent --Responds in general to all parts assignment 	<ul style="list-style-type: none"> --Demonstrates clear awareness of audience needs --Demonstrates competent organization of ideas and writes coherently --Responds to all parts of assignment 	<ul style="list-style-type: none"> --Indicates complete awareness of audience needs --Organizes responses and make arguments in ways that enhance content --Responds skillfully to all parts of assignment

Conventions				
0	1	2	3	4
	--Lacks control in grammar and usage --Lacks transitional elements --Lacks control of conventions in edited English.	--Some control of grammar and usage; errors do not interfere --Simplistic and/or imprecise word choice --Some control of correctness with some errors that do not interfere	--Controls grammar and usage relative to length and complexity --Appropriate word choice for audience and purpose --Controls conventions relative to length and complexity	--Uses grammar and usage to enhance meaning --Shows accurate, rich, and/or precise word choice appropriate for audience and purpose --Uses conventions to enhance communication
Content x 10 = ____/50 Structure x 6 = ____/30 Conventions x 5 = ____/20 Total Score = ____/100 points				

Professional Development Pass/Fail Components

There are aspects of this course that you will be expected to complete prior to receiving your grade for this course. *Failure to satisfactorily complete any **one** of these components will result in the lowering of your final grade by 1 letter grades.*

- ✓ **Professional Development:** Learning to be a STEM education teacher cannot be accomplished within one semester; it is an ongoing, lifelong endeavor. Throughout the semester, each student is expected to demonstrate evidence of willingness to become a lifelong learner. Several opportunities are available, including (but not limited to): (1) joining and attending BBCTM or UK NSTA Meetings, (2) joining the NCTM or NSTA through a regular student membership, (4) observing secondary mathematics, science, and/or computer science teachers outside of the assigned placement, (5) reading a book or series of articles on STEM education other than those required for class, (6) conducting Web searches of teaching resources, compiling, and submitting a bibliography, (7) attending a campus technology training session, (8) attending conferences and so on. For this course you are required to **attend two professional development sessions** as deemed above or other opportunities presented by the Instructor. You will be required to turn in a 2-3 page reflection on the PD overall and how it helped you grow as a future secondary mathematics teacher. **(KTS-I 6-10; NCATE/NCTM 7; Diversity, Assessment, Closing the Achievement Gap)**
- ✓ **Department Meeting:** You will need to attend at least one department meeting at your placement school. Write a summary and reflection about this department meeting. **(KTS-I 6-10; NCATE/NCTM 7; Diversity, Assessment, Closing the Achievement Gap)**

THE INSTRUCTOR RESERVES THE RIGHT TO CHANGE ANY PART OF THIS SYLLABUS DURING ANYTIME IN THE SEMESTER. STUDENTS WILL BE ADEQUATELY NOTIFIED WHENEVER CHANGES OCCUR.

Course Schedule and Outline

Class Number and Date	Topics, Agenda, and Readings
Class 1	<p><i>Welcome!</i></p> <ul style="list-style-type: none"> • Go over Syllabus • Class Opener • Hopes, fears, orientations • Requirements and scheduling of field experience hours • Use of POM tool • Self Assessment Activity • Reflection: What are my current strengths as a secondary teacher? What weaknesses do I need to work on and how might I accomplish this?
Class 2	<p><i>Inquiry, models, and modeling in STEM Education</i></p> <ul style="list-style-type: none"> • Shulman, L. (1986). Those who understand: Knowledge growth in teaching. <i>Educational Researcher</i>, 15(2), 4-14 • How to observe and reflect in field experience • Reflection: What does it mean to do, teach, and learn mathematics and/or science?
Class 3	<p><i>Modeling Based Inquiry</i></p> <p>Stewart, Cartier, and Passmore. (2005). Developing Understanding Through Modeling-Based Inquiry. In <i>How Students Learn: Science in the Classroom</i>. Committee on How People Learn: A Targeted Report for Teachers; National Research Council. M. Suzanne Donovan and John D. Bransford (Editors) (http://www.nap.edu/catalog.php?record_id=11102)</p> <ul style="list-style-type: none"> • Complete self-assessment • Reflection: Propose a strategy for creating modeling-based curriculum and instruction for mathematics or science content with which you are not comfortable.
Class 4	<p><i>Classroom Management in an inquiry based classroom</i></p> <ul style="list-style-type: none"> • Bouwma-Gearhart article • Developing rules and procedures • Discipline and consequences • Student Responsibility • Getting off to a good start • Wong Video • Reflection: Propose rules and procedures, consequences, and student and teacher responsibilities for your classroom. Limit to 2 pages.
Class 5	<p><i>Assessment Issues in STEM Education</i></p> <ul style="list-style-type: none"> • Balanced Assessment • Assessing for deep understanding • Authentic Assessment • Reflection: Create an assessment based on a list of given learning targets. Limit to a 45 minute student test.

Class 6	<p><i>Assessment Issues in STEM Education</i></p> <ul style="list-style-type: none"> • Assessing for deep understanding • Peer evaluation of assessments (taking and evaluation of tests) • Reflection: Reflect on the assessment you created. What were your goals? How did you attend to these goals? What was your overall process in creating the assessment? What was most challenging in creating the assessment? Based on feedback given today, what would you change about your assessment?
Class 7	FIELD EXPERIENCE BREAK
Class 8	<p><i>Addressing student misconceptions</i></p> <ul style="list-style-type: none"> • Watson, B. & Kopniczek, R. (1990). Teaching for Conceptual Change: Confronting Children's Experience. <i>Phi Delta Kappan</i>, 680-684. • Addressing student misconceptions • Teaching for conceptual change • Assign mini-teaching unit (complete in pairs) • Reflection: Design a system for determining final grades in your class; include any categories of evidence that you wish and their weighing as percentages (if applicable). Explain how the system is fair, equitable, and meets the criteria in the assessment Standards and the assessment Principle. Typed response, 1-2 pages explanation and cover page.
Class 9	<p><i>Standards-based Education</i></p> <ul style="list-style-type: none"> • Standards Readings for particular content area(s) • NCLB and testing mandates • The call for excellence in STEM • Reflection: What are the strengths and weaknesses of the standards with respect to what they mean for teacher practice and student learning?
Class 10	<p><i>Societal Influences on STEM Education</i></p> <ul style="list-style-type: none"> • Tolley, Kim. (Summer 1996). Science for ladies, classics for gentlemen: a comparative analysis of scientific subjects in the curricula of boys' and girls' secondary schools in the United States, 1794-1850. <i>History of Education Quarterly</i>, 36, 129-53. • Sputnik and other societal influences on STEM Education • Social issues in the STEM Classroom • Begin Players vs. Haters Assignment • Reflection: What types of activities and classroom environment characteristics promote equal access to mathematics and science for all students?

Class 11	<p><i>Uniting the STEM disciplines</i></p> <ul style="list-style-type: none"> • Engineering connections • Working in groups of two, plan or revise the work of others to create two lesson plans (55 – 90 minutes each) that: <ul style="list-style-type: none"> ○ Unite mathematics and science or computer science and mathematics (one lesson) ○ Unite engineering, students’ use of technology, and your content area (one lesson) • Reflection: Finish up work on lesson plans
Class 12	<i>FIELD EXPERIENCE BREAK</i>
Class 13	<p><i>Uniting STEM disciplines</i></p> <ul style="list-style-type: none"> • Presentation of lessons • Engineering and technology connections • Reflection: How can I promote all components of STEM in my own classroom?
Class 14	<p><i>Characteristics of Highly Effective Teaching and Learning in STEM</i></p> <ul style="list-style-type: none"> • Effective Teaching and Instruction • Effective Schools
Class 15	<p><i>Mini Unit wrap-up and reflection</i></p> <ul style="list-style-type: none"> • Next steps in STEM PLUS Program
Class 16	<i>Final – Mini Unit presentations</i>

THIS SCHEDULE IS SUBJECT TO CHANGE WITH PRIOR COMMUNICATION TO STUDENTS.