Course Information

Date Submitted: 1/14/2016

Current Prefix and Number: SEM - Science, Technology, Engineering, and Mathematics, SEM 704 PROJECT-BASED STEM ED

Other Course:

Proposed Prefix and Number: SEM 504

What type of change is being proposed?

Major Change

Should this course be a UK Core Course? No

1. General Information

a. Submitted by the College of: EDUCATION

b. Department/Division: STEM Education

c. Is there a change in 'ownership' of the course? No

If YES, what college/department will offer the course instead: STEM Education

e. Contact Person

Name: Jennifer Wilhelm

Email: jennifer.wilhelm@uky.edu

Phone: 859-257-1291

Responsible Faculty ID (if different from Contact)

Name: u$721471

Email: jennifer.wilhelm@uky.edu

Phone: 859-257-1291

f. Requested Effective Date

Semester Following Approval: No OR Effective Semester: ASAP

2. Designation and Description of Proposed Course

a. Current Distance Learning (DL) Status: Already approved for DL*

b. Full Title: DESIGNING PROJECT-BASED ENVIRONMENTS IN STEM EDUCATION

Proposed Title: Designing Project-Based Environments in STEM Education

c. Current Transcript Title: PROJECT-BASED STEM ED

Proposed Transcript Title:

d. Current Cross-listing: none

Proposed – ADD Cross-listing :

Proposed – REMOVE Cross-listing:

e. Current Meeting Patterns

Proposed Meeting Patterns

f. Current Grading System: Graduate School Grade Scale

Proposed Grading System: *Graduate School Grade Scale*

g. Current number of credit hours: 3

Proposed number of credit hours: 3

h. Currently, is this course repeatable for additional credit? No

Proposed to be repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester? No

2i. Current Course Description for Bulletin: SEM 704 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 704 students will experience, evaluate, and design interdisciplinary, project-enhanced environments within STEM classrooms.

Proposed Course Description for Bulletin: 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.

2j. Current Prerequisites, if any: Prereq: SEM 603 or permission of instructor.

Proposed Prerequisites, if any: None

2k. Current Supplementary Teaching Component:

Proposed Supplementary Teaching Component:

3. Currently, is this course taught off campus? No

Proposed to be taught off campus? No

If YES, enter the off campus address:

4. Are significant changes in content/student learning outcomes of the course being proposed? No

If YES, explain and offer brief rational:

5a. Are there other depts. and/or pgms that could be affected by the proposed change? No

If YES, identify the depts. and/or pgms:

5b. Will modifying this course result in a new requirement of ANY program? No

If YES, list the program(s) here:

6. Check box if changed to 400G or 500: Yes

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1.How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2.How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.

3.How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.

4.Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

5.How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?

6.How do course requirements ensure that students make appropriate use of learning resources?

7.Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.

8.How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?

9.Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10.Does the syllabus contain all the required components? NO

11.I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE|MYRT|Martha L Geoghegan|SEM 704 CHANGE College Review (MINOR CHANGE)|20151124

Brothers, Sheila C

From: Nikou, Roshan
Sent: Tuesday, January 12, 2016 2:34 PM
To: Brothers, Sheila C; Carvalho, Susan E; Ellis, Janie; Ett, Joanie M; Hippisley, Andrew R; Jackson, Brian A; Lindsay, Jim D.; Nikou, Roshan; Price, Cleo; Timoney, David M
Cc: Mellon, Isabel; Ivanov, Bobi; Perkins, Andrea L; Rostosky, Sharon S; Glauert, Howard P; Rogers, Nels J; Bradley, Kelly D
Subject: Transmittal
Attachments: SEM504Proposal-signed.pdf

TO: Andrew Hippisley, Chair and Sheila Brothers, Coordinator
Senate Council

FROM: Susan Carvalho, Chair and Roshan Nikou, Coordinator
Graduate Council

The Graduate Council approved the following proposals and is now forwarding them to the Senate Council to approve. All the courses listed below, are accessible via E-Cats' workflow with exception of SEM 504, which was sent to the GC via email.

Drop Courses

CJT 650 Distance Education: Delivery

CJT 652 Distance Education: Management/Support

RUS 400G Russian Cultural Studies (SR)

RUS 460G Major Russian Writers (SR)

New Courses

CPH 651 Population Health: Measurement, Management

EDP 704 Social Justice Consultation and Evaluation

PHS 711 Fundamentals of BioEthics

RUS 420G Reading in Russian Literature: (SR)

Course Changes

CPH 608 Public Health Capstone

CPH 650 Management of Public Health Organization

EPE 557 Gathering, Analyzing, and Using Education

NS 782 Special Problems

SEM 504 Designing Project-Based Environments in STEM Education

TOX 790 Research in Toxicology

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The Graduate School
The University of Kentucky
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Roshan.Nikou@uky.edu

Ett, Joanie M

From: Ett, Joanie M
Sent: Monday, August 29, 2016 1:50 PM
To: Ellis, Janie
Subject: RE: SEM 704 to SEM 504

Hi Janie,

This course has now been approved by the UGC, and the updated syllabus is in eCATS. The course skipped us in eCATS, so you should have this one already in your inbox.

Thanks!
Joanie

SEM 704: Designing Project-Based Environments in Science and Mathematics Education
SYLLABUS

"Research and Reflection for Learning and Leading"

Instructor:	Dr. Jennifer Wilhelm
Office Location	101B TEB
Phone Number	859.257.1291
Email	Jennifer.wilhelm@uky.edu
Office Hours	Available on Mondays, 2:00 – 3:00 pm 101B Taylor Ed. Bldg. and by appointment
Technological Requirements	Computer with Internet access and VPN or access to UK computer facilities, webcam with microphone headset. Access to digital video recording devices (digital camera and digital video recorder)
For Technological assistance	Contact TASC at http://www.uky.edu/TASC or call 859.218.4357 Contact Information Technology Customer Service Center http://www.uky.edu/UKIT or 859.218.4357
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 859.218.4357
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 859.218.1240 dllservice@lsv.uky.edu
DL Interlibrary Loan Service	http://libraries.uky.edu/ILL
Class Website	http://www.uky.edu/~jwi229/courses/SEM704/SEM704_main.html Blackboard

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 Overview/Objectives:

Course Overview:

SEM 704 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 704 students will experience, evaluate, and design interdisciplinary, project-enhanced environments within STEM classrooms.

Course Objectives:

Student Learning Outcomes	Assessment
By the conclusion of SEM 704, students will:	*Student performance will be assessed using a rubric for the following:*
Describe a variety of research-based technologies, models, and/or visual representations to aid in the development of and discourse within a project-enhanced STEM classroom.	The student will design a project-enhanced instructional unit that is complete with relevant models, visual representations, and/or technologies to teach mathematical/science concepts. (summative)
Experience and analyze research-based, project-enhanced units that use a range of methods and materials that will support instruction accounting for developmental, cultural, and linguistic differences among students.	The student will analyze existing project-enhanced STEM environments (formative); The student will participate in a project-based environment and complete a follow-up project (summative); The student will design his/her own project-based unit (summative).

Describe a variety of research-based assessments to inform instruction.	The student will design a project-enhanced instructional unit that is complete with a variety of relevant formative and summative assessments to inform instruction and evaluate student understanding. (summative)
Conduct focused and sustained observations of physical phenomena.	The student will maintain a sustained observation and reflective journal recording data, patterns, predictions, and explanations (formative).

Course Delivery - This course relies heavily on the participation of students. Whether face-to-face or online, students will participate in class discussions, project work, and presentations. Project work will often involve students working collaboratively in groups.

Grading Scale

Undergraduates

100 – 90: A 89 – 80: B 79 – 70: C 69 and below: E

Graduates

100 – 93: A 92 – 83: B 82 – 73: C 72 and below: E

Course Assessment Tasks:

The following assessments align with the Kentucky Teacher (Advanced) Standards, NCATE/NCTM Standards, NCATE/NSTA Standards, Kentucky Core Academic Standards (as they become available), University of Kentucky Teacher Leader Standards, University of Kentucky Action Research Standards, University of Kentucky Functional Skills and Dispositions, University of Kentucky Technology Standards, ISTE, and EPSB themes.

Assignments must be submitted on or before the due dates given in the course schedule. **Five percent will be deducted from the value of an assignment for each day it is late**, unless prior arrangements have been made with the instructor. Full descriptions of these assignments are appended to this syllabus.

Task	Task Description	Standards Alignment
Class Project	Students will participate in a semester-long class project and will present/share their project investigation status with peers throughout the semester. This research project will involve investigating a driving research question, designing a data collection and analysis plan, collecting data, analyzing data, representing the data either within a model or a graph, and communicating project work results.	KTS 1, 2, 3, 4, 5, 6, 10 UKTLS 7 UKARS 1, 2, 4 FSD 1, 3, 4 COET 1, 2, 3, 4 NCATE/NCTM 1,

		2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15 NCATE/NSTA 1, 2, 3, 4, 7, 10
Discussion leader and class participation	Students will be responsible for leading at least one class discussion on primary readings; students will participate in oral discussion - individual or group; and participate in online discussions.	KTS 7, 8, 10 UKTLS 1, 2, 3, 4, 7 UKARS 1 FSD 1, 2, 3, 4, 5 COET 1 NCATE/NCTM 1, 2, 3, 8 NCATE/NSTA 1, 2, 3, 4, 6, 7, 9
STEM Research Journal Notebook	Students will maintain an observation and reflective STEM notebook concerning their semester-long class project work. This notebook will contain detailed research design plans, collected data, and visual representations (in the form of graphs, and/or models) of their data set.	KTS 1, 5, 10 UKTLS 3 FSD 1, 3 NCATE/NCTM 2, 3, 4, 5, 6, 10, 11, 14, 15, NCATE/NSTA 1, 2, 3, 6
Project-based Unit	Students will prepare a project-enhanced STEM unit accompanied by a scholarly research paper that describes the design and purpose of the unit. The project-based unit should contain at least one technology for use in advancing or scaffolding learning. The STEM unit should be unique to the individual student and designed specifically for the grade level and subject matter of interest to the student.	KTS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 UKTLS 1, 2, 4, 5, 7 UKARS 1, 2 FSD 1, 2 COET 1, 2, 3, 4, 5 NCATE/NCTM 1, 2, 3, 4, 5, 6, 7, 8, 9-15 NCATE/NSTA 1-9

Course Outline

Week 1-2	**What is a Driving Research Question?**
Week 3-4	***Contextualizing Instruction***

Weeks 5-6	**The Role of Benchmark Lessons in a Project-enhanced Classroom**
Week 7	**Enacting a Project-Enhanced Classroom – Is it difficult?**
Week 8	**Acting in the STEM Moment**
Week 9	**Diversity Issue**
Week 10	**The meaning of projects within math and within science classrooms—How is it the same/different; how can we integrate?**
Week 11	**Assessment in a Project-Enhanced Classroom**
Week 12-13	**Technology's Role in the Project Classroom**
Week 14-16	**Establishing Project-based Learning Communities Worldwide**

Class Schedule, Instructional Topics and Assignments

Week #	Date	Topics	Readings	What's Due.
1	Sept. 2 *Face to Face*	Introductions Download Stellarium and set it up from a Lexington, Kentucky perspective	Read: Chancer & Rester-Zodrow *Moon Journals*; Boaler ix – 23; Krajcik & Czerniak Text Chapter 2	

2	Sept. 9 *Face to Face*	What is a Driving Question? Stellarium Moon Hoax Investigations	Read: Boaler Chapter 4; Polman Chapters 1; Krajcik & Czerniak Text Chapter 3	Readings
3	Sept. 16	Driving Question (continued)	Read: Rivet & Krajcik article *Contextualizing Instruction;* Polman Chapter 2; Curnow (*Aboriginal Skies*)	Readings
4	Sept. 23	Hoax Presentations (made as a YouTube Video)	Read: Forbes & Davis (2010); Krajcik & Czerniak Text Chapter 7	Readings Moon Hoax Claims YouTube Videos Submitted
5	Sept. 30 *Face to Face*	The Role of Benchmark Lessons in a Project-enhanced Classroom Earth/Moon/Mars Benchmark 5E (PPT)	Read: Polman Chapter 3-4; Norris (*Emu Dreaming*); Fidler & Dotger (2009)	Readings
6	Oct. 7	Enacting a Project-enhanced classroom—is it difficult? *How new is it?* Crater Benchmark	Read: Boaler Chapter 5 - 6; Wilhelm and Confrey *Designing Project-Enhanced Environments;* Marshall, Petrosino, & Martin (2010)	Readings What affects a Crater's Size? (submitted as a YouTube Video)
7	Oct. 14 *Face to Face*	Moon Finale Follow-Up Lunar	Read: Duckworth *Teaching as*	Readings Unit

		projects	*Research;* Hirshfeld (2004).	proposal
8	Oct. 21	Acting in the Moment *Wilhelm's Waves Project* (PPT)	Read: Leonard & Dantley *Breaking Through the Ice;* NEEL *Addressing Diversity in the Mathematics Classroom*	
9	Oct. 28	Diversity Issues	Read: Boaler Chapters 7-8; Polman Chapter 5; Ericson (2014)	Readings Follow-up Moon Project Driving question and names of group members via Blackboard.
10	Nov. 4 *Face to Face*	The meaning of projects within math & science classrooms—How is it the same/different; how can we integrate?	Read: Boaler Chapters 9; Polman Chapters 6-7	Readings
11	Nov. 11		Read: Bhattacharyya article *Technology-Integrated Project-Based Approach to Science Education;* Ardaiz-Villanueva, Oscar, et al. (2011)	Readings Literature Review
12	Nov. 18 *Face to Face*	Technologies' Role in the Project Classroom	Read: Polman Chapters 8-10;	Readings Milestone: Be prepared to present a representation of your follow-up

				moon project data collection.
13	Nov. 25	Project Work	Polman Chapter 11; Boaler Chapter 10-11	Readings
14	Dec. 2 *Face to Face*			Unit/Paper Drafts
15	Dec. 9 *Face to Face*	Sharing Analyses Follow-up Moon Project Presentations Post-Assessment		Readings, Follow-Up Moon Project & Analysis of Partner's Drafts
16	Dec. 16 5:30 pm Final Unit Due			

Writing Style

Written work in this course should adhere to the American Psychological Association (APA) (2010, 6th ed. or later version).

Assignments and Grading

1. Complete all readings and be prepared to discuss them in class. Active participation in class discussions is essential to your learning and the learning of others in this course. One-page reflections of the readings must be submitted in blackboard (discussion board) by Monday evening (10:00 pm) each week. In addition to this one-page reflection, please provide a question to solicit further discussion.

a. When meeting face to face - Discussants will lead the class discussions on the readings based on their own reflections/questions as well as the class reflections and posed questions.

b. When meeting on-line - Discussants will lead the class discussion regarding the readings online. Classmates are required to respond substantially at least twice throughout the week's discussion (which will end by Saturday (Noon)). Discussants must facilitate these discussions throughout the online week (Tuesday through Saturday). The following week's reading assignment will again be due Monday evening (10:00 pm).

2. You will begin the Moon project by taking Moon observations at least one time per day from September 2nd - October 7th. Observations should be kept in a journal and should include Moon location, Moon sketch, and time of day. As you begin making these observations, you should write down if the Moon was where you expected and looked as you expected based on your previous observations. Each journal entry must include at least 2 sentences. These two sentences should include patterns that you may have noticed and/or predictions of what you expect the Moon to look like on future dates (including its location). You can also record other objects in the sky that you have observed. **(Moon data should be collected at approximately the same time every day; however, there may be a point where you will have to adjust your observation time).**

Other Moon project activities will include a Moon Landing Hoax investigation, a Moon Finale, and a follow-up Moon project. The final follow-up Moon project will be due and presented on December 9th. More information regarding the follow-up project will be provided at a later date.

3. Design a project-enhanced unit accompanied by a scholarly research paper that describes the design and purpose of your unit. Your project-enhanced unit and paper will be developed in groups of 2 or 3. Your unit should contain at least three benchmark lessons, contain appropriate assessment pieces, and describe potential projects that students would research. The accompanying paper should be 10 to 15 double-spaced pages in length with an appropriate bibliography. I am spreading this unit and paper out over the semester so that you do not feel overwhelmed at the end of the course. This assignment will be broken into several milestones.

a. Milestone one - *Proposal:*

Due October 14th sent via Blackboard. The unit proposal should be approximately two pages in length, and it should include the following:

- The overall goal of the unit;
- The preliminary driving question;
- An example of one benchmark lesson;

- One potential student sub-driving question;
- A possible technology that will assist development of students' learning;
- An example of a possible assessment that will aid in evaluating students' learning.

In your proposal you will need to state the goals of your unit and your driving question. Provide a 2 paragraph explanation of what this driving question means and why it is important in helping students to understand the concepts embedded within your overall goal of the unit. Also describe at least one benchmark lesson that will help to ensure students' content learning and describe at least one potential student-generated, sub-driving question. Finally, include an at least 1 – 2 paragraph explanation of how you plan to assess students' understanding.

b. Milestone two - *Bibliography/Literature Review:*

Due November 11th sent via Blackboard. To assist in the design of your unit, you will need to prepare an annotated bibliography of articles, books, and reports that are relevant to your unit's goal. Each annotated bibliography will be posted on Blackboard so that your peers may learn from your review. Your annotated bibliography should take the form of the following table:

Author/Study	Subjects	Methods	Major claims of each article	How related to my project-based unit
1. Author	Ex. (First through 12th graders)	Ex. Series of evaluation studies over a 3-year period.	➢ Claim 1 ➢ Claim 2 ➢ Claim 3	
Etc.			Etc.	

Following this table you will need to write a 3-4 page analysis of the major themes in your literature that you reviewed. This analysis will be a very important component in aiding the design of your unit.

c. Milestone three - *Draft of your unit and accompanying paper and analysis of partner group's draft:*

On December 2nd, a draft of your unit and its accompanying paper will be submitted via Blackboard. This draft will be submitted to Dr. Wilhelm and to a class peer/partner in order to be reviewed and given feedback. On December 9th, you will submit your thoughtful review (via Blackboard) to Dr. Wilhelm and back to the unit designer. When reviewing the drafts, please respond to the following questions:

- Is the goal of the unit clearly presented as well as its importance to students' understanding?
- Is the review of literature complete, thorough, relevant, and up to date?
- Is the design well researched and potentially promising to ensure students' content understanding?

The purposes of the reviews are to give the authors multiple perspectives toward the development of their unit and accompanying manuscript and to gain experience in reading and critiquing others' work. This at least one-page written analysis of your partner's draft is due on December 9th (via Blackboard).

d. Milestone four – *Final unit and paper:*

Your final unit and paper are due by 5:30 pm on Tuesday, December 16th. The final paper should be roughly 10 to 15 pages in length. Please follow APA guidelines.

Evaluation - The course grade will be determined as follows:

Assignments	Points	Due Date
Readings, submitted questions, discussion leader, and class participation	15 points	Weekly
Moon Journal and Observations	10 points	September 2nd – October 7th
Hoax Mini-Project	10 points	September 23rd
Follow-up Moon Project	15 points	December 9th
Unit Proposal	10 points	October 14th
Literature Review	10 points	November 11th
Unit and Paper Drafts	10 points	December 2nd
Analysis of partner group's draft	5 points	December 9th

Final Unit and Paper (submit in Blackboard)	15 points	December 12th

Final Word

The instructor reserves the right to amend this syllabus at any time during the semester. In order to avoid student disappointment, it is the responsibility of the student to clarify any issues with the instructor prior to grading.

Course Policies

Addressing Themes of Diversity, Assessment, and Technology

All UK professional education programs address and affirm the value of diversity in education, the use of technology to support all aspects of instructional programming, and the importance of attaining high levels of skill in assessing the outcomes of instruction. This course will provide students an opportunity to demonstrate attention to these themes and reflect on the mechanisms that this course has provided to demonstrate improved skills in these areas.

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 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

Evidence of professional dedication will be expected throughout this course and in all course-related interactions. Credit for participation and professionalism will be part of the evaluation. This means, in part, that we expect your regular, punctual attendance and participation. If you miss a class for any reason, it is **your** responsibility to contact the instructor and to make up any work.

Attendance, Participation, and Professionalism together

1. Students will attend all class meetings and field placement sessions.
2. Students will complete all assignments prior to scheduled discussions and due dates (see course calendar).
3. Students will attend all class meetings and be active participants.
    a. Active participation may include: verbal participation in discussions, asking questions or responding to peers or instructor in constructive ways, clearly demonstrating active listening (taking notes, paying attention, etc.), and communicating with the instructor via office meetings and/or email.
4. Absences will be communicated in advance and in writing to the instructor, or will do so as soon as possible.
    a. It is the **student's** responsibility to pursue make-up work and collect materials and information from missed class meetings.

    Students will conduct themselves in a professional and ethical manner.
    b. They will be punctual, presentable, respectful of peers and instructors, and they will be honest in their academic efforts.
    c. They will attend to and engage course materials to learn and improve their knowledge, understanding, and practice as teachers.
5. Attendance, participation, and professionalism will be assessed holistically based on the above criteria, and will be used to determine the outcome of borderline grades.
6. Students are encouraged to communicate regularly with the instructor so that they are aware of their standing.
7. Students who fail to attend class, participate as expected, and/or conduct themselves professionally or ethically will be required to meet with the instructor to set improvement goals.
8. Poor conduct or lack of participation may negatively affect their course grades.
9. 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.
10. In non-emergency situations, late work will not be accepted without <u>prior</u> arrangements with the instructor.

a. The instructor reserves the right to refuse late work or to accept late work for reduced credit unless the student has made prior arrangements with the instructor.

Each student is expected to participate and contribute. The quality of the course depends on the extent to which you share, reflect, and participate. Please give the class your best effort.

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.

Classroom Behavior, Decorum, and Civility (aka, Ethics Statement)

This course and its participants will not tolerate discrimination, violence, or vandalism. SEM 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 graduate students, future teachers, and ambassadors for the University of Kentucky. Any unethical behavior in class may result in failure for the course and/or expulsion from the 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 the instructor 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.

Commitment to Diversity

The UK Department of Science, Technology, Engineering, and Mathematics (STEM) Education 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 instruction in Kentucky's secondary schools is directly and indirectly affected by this department'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 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 students 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.

Commitment to Addressing the Achievement Gap

The UK Department of STEM Education aligns itself with the positions of the NCTM, NCSS, NSTA, and NCTE regarding cultural and linguistic diversity. The program seeks to underscore that cultural and linguistic diversity should be treated as integral components of public education, and that the failure to accommodate such diversity in curriculum and instruction contributes to disparities in student achievement across racial populations—a phenomenon popularly referred to as "the achievement gap."

Commitment to Technology

The UK Department of STEM Education is committed to teaching students so they use technology as a personal and professional tool. Our program is guided by NCATE standards, UK College of Education Technology Standards, EPSB Teacher Standards, and SPA Standards as they relate to technology. Students are required to use technology for a majority of their classes. Students use technology for class assignments, lesson plan design and preparation, class presentations, record keeping, and data analysis. Students are required to successfully complete course work focusing on using technology. Our students 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 students 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 students access to "smart" classrooms and technology labs in order to further facilitate their use of technology.

Required Texts:

The following texts align with the Kentucky Teacher (Advanced) Standards, NCATE/NCTM Standards, NCATE/NSTA Standards, Kentucky Core Academic Standards (as they become available), University of Kentucky Teacher Leader Standards, University of Kentucky Action Research Standards, University of Kentucky Functional Skills and Dispositions, ISTE, and EPSB themes.

Textbooks

Boaler, J. (2002). *Experiencing school mathematics: Traditional and reform approaches to teaching and their impact on student learning* (Volume in the Studies in Mathematical Thinking and Learning Series). Erlbaum Associates, Inc., Mahwah, New Jersey. ISBN # 0-8058-4004-4

Chancer, J. & Rester-Zodrow, G. (1997). *Moon journals: Writing, art, and inquiry through focused nature study*. Portmouth, NH: Heineman.

Common Core Standards (as they become available) and their related documents (www.commoncore.org)

Forbes, C.T. & Davis, E.A. (2010). Beginning elementary teachers' beliefs about the use of anchoring questions in science: A longitudinal study. *Science Education, 94*(2), 365-387.

Fidler,C. & Dotger, S. (2009). Visualizing the Earth and Moon relationship via scaled drawings. *Science Scope, 33*(4), 14-19.

Hirshfeld, A. (2004). The triangles of Aristarchus. *Mathematics Teacher, 97*(4), 228-231.

Kilpatrick, W., (1918). The project method. *Teachers College Record, 19*, 319-335.

Krajcik, J. & Czerniak, C. (2014). Teaching science in elementary and middle school classrooms: A project-based approach. Fourth Edition, Routledge, New York, NY.

Krajcik, J., Blumenfeld, P., Marx, R., Bass, K., Fredricks, J., & Soloway, E. (1998). Inquiry in project-based science classrooms: Initial attempts by middle school students. *The Journal of the Learning Sciences, 7*, 313-350. doi:10.1207/s15327809jls0703&4_3

Laffey, J., & Singer, J. (1998). Using mapping for cognitive assessment in project-based science. *Journal of Interactive Learning Researc*h, *8*(3/4), 363- 388.

Leonard, J., & Dantley, S.J. (2005). Breaking through the ice: Dealing with issues of diversity in mathematics and science education courses. In A.J. Rodriguez & R.S. Kitchen (Eds.), *Preparing mathematics and science teachers for diverse classrooms: Promising strategies for transformative pedagogy* (pp. 87-118). Mahwah, NJ: Lawrence Erlbaum Associates.

KY Learner Goals and Expectations, Program of Studies and Core Content – online documents (or their replacements as they become available)

National Research Council. (1996). *National science education standards*. Washington, D.C.: National Academy Press.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reston, VA: National Council of Teachers of Mathematics.

Neel, K. S. (2005). Addressing diversity in the mathematics classroom with cultural artifacts. *Mathematics Teaching in the Middle School, 11*(2), 54-59.

Polman, J. (2000). *Designing project-based science: Connecting learners through guided inquiry.* New York: Teachers College Press. ISBN # 0-8077-3913-8

Rivet, A. E., & Krajcik, J. S. (2002). Contextualizing instruction: Leveraging students' prior knowledge and experiences to foster understanding of middle school science. In P. Bell, R. Stevens & T. Satwicz (Eds.), *Keeping Learning Complex: The Proceedings of the Fifth International Conference for the Learning Sciences (ICLS)*. Mahwah, NJ: Erlbaum.

Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D., N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(1), pp. 76-101. Retrieved from http://futureofchildren.org/futureofchildren/publications/docs/10_02_03.pdf.

Stevens, R. (2000). Who counts what as math: Emergent and assigned mathematical problems in a project-based classroom. In J. Boaler (Ed.), *Multiple perspectives on Mathematics Education*. New York: Elsivier.

Subject-area Professional Association (SPA) K-12 standards.

Wilhelm, J., & Confrey, J. (2005). Designing project-enhanced environments: Students investigate waves and sound. *Science Teacher, 72*(9), 42-45.

Wilhelm, J. (2009). A case study of three children's original interpretations of the moon's changing appearance. *School Science and Mathematics*, 109(5), p. 258-273.

Additionally, the following list reflects suggested readings that would guide the curriculum of the course.

Alberty, H. B. (1927). *A Study of the Project Method in Education*. Columbus, OH: Ohio State University Press.

Ameis, J. A. (2000). *Mathematics on the Internet*. Upper Saddle River, New Jersey: Merrill.

American Association for the Advancement of Science. (1993). *Benchmarks for science literacy*. New York: Oxford University Press.

Artzt, A. F., & Armour-Thomas, E. (2002). *Becoming a reflective mathematics teacher: A guide for observations and self-assessment*. Mahwah, NJ: Lawrence Erlbaum Associates.

Atkin, J. M. (1998). The OECD (Organization for Economic Cooperation and Development) study of innovations in science, math and technology education. *Journal of Curriculum Studies*, 30 (6), 647-660.

Baroody, A. J. (1993). *Problem solving, reasoning, and communicating (K-8): Helping children think mathematically*. New York: Macmillan Publishing Company.

Barron, B. Schwartz, D., Vye, N., Moore, A., Petrosino, A., Zech, L., & Bransford, J.(1998). Doing with understanding: Lessons from research on problem- and project-based learning. *The Journal of the Learning Sciences, 7*, 271-311. doi:10.1207/s15327809jls0703&4_2

Blumenfeld, P.C., Soloway, E., Marx, R. W., Krajcik, J.S., Guzdial, M., and Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist, 26*, 369-398.

Borich, G. D. (1993). *Clearly outstanding: Making each day count in your classroom*. Boston: Allyn and Bacon.

Borich, G. D. (1992). *Effective teaching methods* (2nd ed.). New York: Macmillan Publishing Company.

Bransford, J.; Brown, A.L.; & Cocking, R.R. (2000). *How people learn: Brain, mind, experience, and school*, Expanded Edition. Arlington: NSTA Press.

Brown, A. L., Bransford, J. D., Ferrara, R., & Campione, J. (1983) Learning, remembering and understanding. In J. H. Flavell and E. M. Mardman (Eds.), *Handbook of child psychology: Vol 3. Cognitive development* (4th ed.), pp. 77-166. New York: Wiley.

Bruner, J. S. (1960). On learning mathematics. *Mathematics Teacher, 53*: 610-619.

Burns, M., & Silbey, R. (2000). *So you have to teach math? : Sound advice for K-6 teachers*. Sausalito, CA: Math Solutions Publications.

Campbell, B. & Fulton, L. (2003). *Science notebooks: Writing about inquiry*. Arlington: NSTA Press.

Clark, E. T. (2002). *Designing and implementing an integrated curriculum: A student-centered approach*. Brandon, VT: Holistic Education Press.

Cobb, P., Yackel, E., & McClain, K. (2000). *Symbolizing and communicating: Perspectives on discourse, tools, and instructional design*. Mahwah, NJ: Lawrence Erlbaum Associates.

Cohen, D. K., & Barnes, C. A. (1993). Pedagogy and policy, and conclusion: A new pedagogy for policy? In D. K. Cohen, M. W. McLaughlin & J. E. Talbert (Eds.), *Teaching for Understanding: Challenges for Policy and Practice*, San Francisco, CA: Jossey-Bass, p. 207-275.

Collins, A. (1996). Design issues for learning environments. In S. Vosniadou, E. De Corte, R. Glase, & H. Mandl (Eds.), *International Perspectives on the Design of Technology-supported Learning Environments*. Mahwah, NJ: Lawrence Erlbaum Associates.

Collins, A., Brown, J. S., & Newman, S. (1989). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics. In L. Resnick (Ed.), *Cognition and Instruction: Issues and Agendas* (p. 453-494). Hillsdale, NJ: Lawrence Erlbaum Associates.

Collins, A., Greeno, J.G., & Resnick, L.B. (1994). Learning environments. In T. Husen & T.N. Postlethwaite (Eds.), *International Encyclopedia of Education* (2nd ed.), p. 3297-3302. Oxford, UK: Pergamon.

Cuban, L. (1990). Reforming again, again, and again. *Educational Researcher*, 19 (1), pp. 3-13.

DeBoer, G. (1990). *A history of ideas in science education*. New York: Teachers College Press.

Dienes, Z. P. (1960). *Building up mathematics*. London: Hutchinson Educational, Ltd.

Dewey, J. (1902). *The Child and the curriculum*. Chicago: The University of Chicago Press.

Dewey, J. (1916). *Democracy and education*. New York: Free Press.

Drake, S. M., & Burns, R. (2004). *Meeting standards through integrated curriculum*, ASCD, Virginia, USA.

Duckworth, E. (1996). *The having of wonderful ideas and other essays on teaching and learning*. New York, NY: Teachers College Press.

Duschl, R. (1991). *Restructuring science education*. New York: Teachers College Press.

Even, R., & Tirosh, D. (2002). Teacher knowledge and understanding of students' mathematical learning. In L. English (Ed.), *Handbook of international research in mathematics education* (219-240). Mahwah, NJ: Lawrence Erlbaum Associates.

Frankenstein, M. (1990). Incorporating race, class, and gender issues into a critical mathematical literacy curriculum. *The Journal of Negro Education*, 59 (3): 336.

Fullan, M. G. (1993). Why teachers must become change agents. *Educational Leadership*, 50 (6), pp. 12-18.

Good, T. L., Grouws, D. A., & Ebmeier, H. (1983). *Active mathematics teaching*. New York: Longman, Inc.

Hatfield, M. M., Edwards, N. T., Bitter, G. G., & Morrow, J. (2000*). Mathematics methods for elementary and middle school teachers* (4th ed). New York: John Wiley and Sons, Inc.

Heaton, R. M. (2000). *Teaching mathematics to the new standards: Relearning the dance*. Reston, VA: National Council of Teachers of Mathematics.

Hernandez, V. M., & Brendefur, J. L. (2003). Developing authentic, integrated, standards-based mathematics curriculum: More than just an interdisciplinary collaborative approach. *Journal of Vocational Education Research*, *28*(3).

Kelly, G. J., & Chen, C. (1999). The sound of music: Constructing science as sociocultural practice through oral and written discourse. *Journal of Research in Science Teaching*, *36*, 883-915. doi:10.1002/(SICI)1098-2736(199910)36:8<883::AID-TEA1>3.3.CO;2-9

Kennedy, L. M. (2000). *Guiding children's learning in mathematics* (9th ed). Belmont, CA: Wadsworth Publishing Company.

Knapp, M. (1995). *Teaching for meaning in high poverty classrooms*. New York: Teachers College Press.

Koirala, H. P., & Bowman, J. K. (2003). Preparing middle level preservice teachers to integrate mathematics and science: Problems and possibilities. *School Science and Mathematics*, *103*(3).

Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*, Cambridge University Press, UK.

Lewis, V. K., & Shaha, S. H. (2003). Maximizing learning and attitudinal gains through integrated curricula. *Education*, *123*(3).

Mitman, A., & Lambert, V. (1993). Implementing instructional reform at the middle grades: Case studies of seventeen California schools. *The Elementary School Journal*. *93*(5), 495-517.

Moore, A., Sherwood, R., Bateman, H., Bransford, J. & Goldman, S. (1996, April). Using Problem-based learning to prepare for project-based learning. *Paper presented at the annual meeting of the American Educational Research Association*, New York.

Morris, R. M. (2003). A guide to curricular integration. *Kappa Delta Pi Record*, Summer, 2003.

National Council of Teachers of Mathematics. *Preparing NCATE Program Reviews in Mathematics*. Reston, VA: NCTM.

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National Council of Teachers of Mathematics (1991). *Professional standards for teaching mathematics*. Reston, VA: NCTM.

National Research Council (1999). *How people learn: Brain, mind, experience, and school*. National Academy Press, Washington, D.C.

Owen, L. B. & Lamb, C. E. (1996). *Bringing the NCTM standards to life: Best practices from elementary educators*. Princeton, NJ: Eye on Education.

Owens, D. T., Ed. (1993). *Research ideas for the classroom: Middle grade mathematics*. Reston, VA: NCTM.

Parker, R. E. (1993). *Mathematical power*. Portsmouth, NH: Heinemann.

Polman, J. (1996). Guiding expeditions: The iterative, situated design of a learning environmentfor project-based science. In D. C. Edelson & E. A. Domeshek (Eds.) *Proceedings of the International Conference on the Learning Sciences*, (pp. 585-586). Doctoral Consortium conducted at ICLS 96. Charlottesville, VA: AACE.

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Reys, R. E., Suydam, M. N, Smith, N. L., Lindquist, M. M, & Helland, F. (1999). *Helping children learn mathematics* (5th ed). Boston: Allyn and Bacon.

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Ruopp, R., Gal, S. Drayton, B., & Pfister, M. (1993). *LabNet: Toward a community of practice*. Hillsdale, NJ: Erlbaum Publishers,

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Stenmark, J. K., ed. (1991). *Mathematics assessment*. Reston, VA: NCTM.

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Stein, M. K., Smith, M. S., Henningsen, M. A., & Silver, E. A. (2000). *Implementing standards-based mathematics instruction: A casebook for professional development.* Reston, VA: NCTM..

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Tucker, B. F., Singleton, A. H., & Weaver, T. L. (2002). *Teaching mathematics to all children: Designing and adapting instruction to meet the needs of diverse learners*. Upper Saddle River, NJ: Merrill Prentice Hall.

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Wiggins, G. & McTighe, J. (2001). *Understanding by design*. Prentice-Hall, Inc.: Upper Saddle River, New Jersey.

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