REQUEST FOR NEW COURSE

1.	**General Information.**				
a.	**Submitted by the College of:** Education			**Today's Date:** 11.06.09	
b.	**Department/Division:** Curriculum & Instruction				
c.	**Contact person name:** Rebecca McNall Krall	**Email:**	rebecca.krall@coe.uky.edu	**Phone:**	257.2176
d.	**Requested Effective Date:** ☒ Semester following approval	OR	☐ Specific Term/Year[1]: _____		
2.	**Designation and Description of Proposed Course.**				
a.	**Prefix and Number:** EDC 613				
b.	**Full Title:** Effective Use of Technology for Modeling-based Inquiry in STEM Education				
c.	**Transcript Title (if full title is more than 40 characters):** Technology for MBI in STEM Ed				
d.	**To be Cross-Listed[2] with (Prefix and Number):** N/A				
e.	**Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours[3] for each meeting pattern type.**				
	1 Lecture	_____ Laboratory[1]	_____ Recitation	2 Discussion	_____ Indep. Study
	_____ Clinical	_____ Colloquium	_____ Practicum	_____ Research	_____ Residency
	_____ Seminar	_____ Studio	_____ Other – Please explain:	_____	
f.	**Identify a grading system:** ☒ Letter (A, B, C, etc.)	☐ Pass/Fail			
g.	**Number of credits:** 3				
h.	**Is this course repeatable for additional credit?**	YES ☐	NO ☒		
	If YES: Maximum number of credit hours: _____				
	If YES: Will this course allow multiple registrations during the same semester?	YES ☐	NO ☐		
i.	**Course Description for Bulletin:**	**This course is designed to teach effective uses of educational technologies towards engagement in modeling-based inquiry in STEM Education. Students will learn the key components of facilitating modeling-based inquiry through their own building of accurate conceptual models of explanations of key STEM theories and underlying concepts. Utilizing technologies implemented in authentic STEM practice, students will learn how to facilitate pupils' use of technologies to allow then to make controlled observations, analyze data, recognize patterns, propose and revise their models of explanation, and communicate their models to their peers.**			
j.	**Prerequisites, if any:** EDC 317 and/or EDC 607 or its equivalent or permission of instructor				
k.	**Will this course also be offered through Distance Learning?**	YES[4] ☒	NO ☐		

[1] Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.

[2] The chair of the cross-listing department must sign off on the Signature Routing Log.

[3] In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, represents at least two hours per week for a semester for one credit hour. (from *SR 5.2.1*)

[4] You must *also* submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

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1.	**Supplementary teaching component, if any:**	☒ Community-Based Experience	☐ Service Learning	☐ Both
3.	**Will this course be taught off campus?**	YES ☒	NO ☐	
4.	**Frequency of Course Offering.**			
a.	Course will be offered (check all that apply):	☒ Fall	☒ Spring	☐ Summer
b.	Will the course be offered every year?	YES ☐	NO ☒	
	If NO, explain:	The course will be offered every 3rd semester.		
5.	**Are facilities and personnel necessary for the proposed new course available?**	YES ☒	NO ☐	
	If NO, explain:	____		
6.	**What enrollment (per section per semester) may reasonably be expected?**	15		
7.	**Anticipated Student Demand.**			
a.	Will this course serve students primarily within the degree program?	YES ☒	NO ☐	
b.	Will it be of interest to a significant number of students outside the degree pgm?	YES ☒	NO ☐	
	If YES, explain:	graduate students in STEM related fields		
8.	**Check the category most applicable to this course:**			
	☐ Traditional – Offered in Corresponding Departments at Universities Elsewhere			
	☐ Relatively New – Now Being Widely Established			
	☒ Not Yet Found in Many (or Any) Other Universities			
9.	**Course Relationship to Program(s).**			
a.	Is this course part of a proposed new program?	YES ☐	NO ☒	
	If YES, name the proposed new program:	____		
b.	Will this course be a new requirement[5] for ANY program?	YES ☒	NO ☐	
	If YES[5], list affected programs:	Master of Science in STEM Education		
10.	**Information to be Placed on Syllabus.**			
a.	Is the course 400G or 500?	YES ☐	NO ☒	
	If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in ***10.b***. You must include: (i) identification of additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See *SR 3.1.4.*)			
b.	☒ The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from ***10.a*** above) are attached.			

[5] In order to change a program, a program change form must also be submitted.

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Signature Routing Log

General Information:

Course Prefix and Number: EDC 613

Proposal Contact Person Name: Rebecca McNall Krall Phone: 257.2176 Email: rebecca.krall@coe.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
Curriculum & Instruction	1/20/10	Mary Shake / 257.5676 / mcshak1@email.uky.edu	Mary C. Shake
Courses & Curricula	1/26/10	Jeff Reese 257-4909 jeff.reese@uky.edu	
College of Education	2/9/10	Robert Shapiro 257-9795 rshap01@uky.edu	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision[6]
Undergraduate Council			
Graduate Council		Jeannine Blackwell 2010.04.19 16:11:28 -04'00'	
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

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

EDC 613: Effective Use of Technology for Modeling-based Inquiry in STEM Education
SYLLABUS

"Research and Reflection for Learning and Leading"

Instructor	Rebecca McNall Krall
Office Location	114 TEB
Phone Number	257-2176
Email	Rebecca.krall@coe.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 or call 859.257.8272 Contact Information Technology Customer Service Center 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	
DL Librarian	Carla Cantagallo, DL Librarian; local 859.257.0500 ext 2171 Long distance: 800.828.0439, option 6 dlservice@email.uky.edu
DL Interlibrary Loan Service	

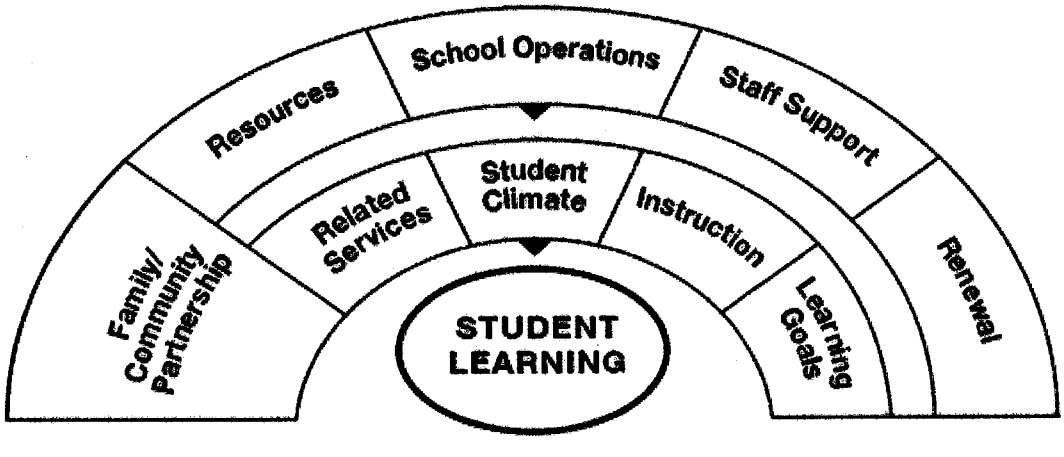
UK College of Education Professional Themes

This course will address the four themes outlined in 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.

Leadership, and specifically Teacher Leadership, within our framework of *Research and Reflection for Learning and Leading*, is informed by the "Framework for School Leadership Accomplishments" (Bellamy, Fulmer, Murphy, & Muth, 2007, p. 34). In this framework, ***student learning*** is the central objective and it is accomplished through nine interactive, collaborative efforts by diverse stakeholders (see Figure 1 below). Permission to use this model was granted by Bellamy and his colleagues.

Figure 1. Framework for School Leadership Accomplishments[1]



This framework is designed to help actualize the theme, *Research and Reflection for Learning and Leading*, and thus prepare a skilled and influential group of leaders who will work as members of learning communities focused on the essential goal of schools: student learning.

Course Overview/Objectives:

Prerequisites:
EDC 317 and/or EDC 607 or its equivalent or permission of instructor

[1] Bellamy, T., Fulmer, C., Murphy, M., & Muth, R. (2007). *Principal accomplishments: How school leaders succeed.* New York: Teachers College Press.

Course Overview

This course is designed to teach effective uses of educational technologies towards engagement in modeling-based inquiry in STEM Education. Students will learn the key components of facilitating modeling-based inquiry through their own building of accurate conceptual models of explanations of key STEM theories and underlying concepts. Utilizing technologies implemented in authentic STEM practice, students will learn how to facilitate pupils' use of technologies to allow then to make controlled observations, analyze data, recognize patterns, propose and revise their models of explanation, and communicate their models to their peers. Review of research on the use on educational technology in teaching STEM education, especially related to integrating science, mathematics, and engineering through inquiry, will be explored. Assignments in the course will specifically integrate the use of educational technology in teaching specific STEM concepts through modeling-based inquiry. In addition, course participants will develop a library of modeling-based, technology-integrated activities for teaching specific STEM concepts, and develop lessons they will teach to their peers.

Course Objectives/Student Learning Objectives:

- Students will learn the processes associated with modeling-based inquiry and how to facilitate these practices to create communities in their classrooms that mimic those of STEM practitioners.
- Students will become familiar with software, peripherals, animations, and simulations, and Web resources for teaching modeling-based STEM Education rooted in the standards.
- Students will demonstrate effective uses of educational technology for teaching specific concepts in STEM Education through modeling-based inquiry.
- Students will read and discuss research on the use of educational technology for improving student learning, engagement, and problem solving in STEM Education.
- Students will design modeling-based inquiry curricula with effective uses of educational technology and that addresses specific standards-based key concepts in STEM.
- Students will articulate and demonstrate ways to differentiate the use of modeling-based inquiry to foster learning in STEM Education for diverse student populations.
- Students will critique lessons using the lesson study method.

Course Delivery

This proposed course is designed as a hybrid course. Course participants will attend class on campus for the first half of the semester. Thereafter, online distance learning instruction will be conducted throughout the second half of the semester. During this time students will work in small groups developing model-based inquiry activities and mini units. Students will participate in online discussions, review of lesson study design and critique, and team planning activities during the distance learning segment of the course. Class will meet on campus two times during the second part of the semester to participate in peer review of mini unit drafts, to present outcomes from the mini units, and to exchange online activities.

Software and Peripherals

(Software and peripherals will be provided in the course and will be available at the College of Education Instructional Technology Center, 151 Taylor Education Building.)

Microsoft Office Suite
Geometer's Sketchpad
TI-84 calculator
TI-Navigator
Fathom/Tinkerplots
Google Sketch-up
Vernier Probeware
Logger Lite
Explore Learning animations/simulations
Starry Night
Digital microscope (QX5 Digital Blue/Motic)
SmartBoard
National Library of Virtual Manipulatives
Geogebra

Grading

Participants' grades will be based on five assessment tasks and class participation as described below. These tasks will be assessed according to the level of thoroughness and the degree to which participants adhere to the assignment guidelines as well as standard language and reference conventions. Guidelines and assessment rubrics will be distributed in class for each assignment. In general, criteria used to grade assessment tasks include: comprehensiveness, coherence, cohesiveness, clarity, level of detail (e.g., inclusion of evidence and/or examples to support points), organization, and application to practice and adherence to language and reference conventions. Written work should be generated in a word processing program, double spaced (12 point font), and paginated.

Task	Distribution	Grading Scale
Reflective writing	10%	91 - 100% A
Technology –integrated lessons	20%	81 – 90% B
Technology-integrated Activities Library	20%	71 – 80% C
Research paper	20%	70% and below E
Mini Unit	20%	
Class Participation	10%	

Course Assessment Tasks:

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 and evaluation rubrics for each are appended to this syllabus.

Task	Task Description	Standards Alignment

Reflective writing	Students will write critical and reflective responses to primary readings, class discussions, and assignments. Some of these responses will include participation in online discussions.	KTS 1, 2, 6, 7, 10
Technology-integrated lessons	Students will work in class and online with a small group to develop five model-based inquiry lessons that use technologies to teach particular standards-based concepts in STEM. Students will critique their peers' lessons.	KTS 1, 2, 4, 6, 7, 8, 10
Technology-integrated Activities Library	Students will develop a library of 12 technology-integrated, modeling-based inquiry activities, software, and Web resources for use in STEM Education with a particular focus on their subject discipline.	KTS 1, 2, 10
Research paper	Students will write a research paper on the use of inquiry for teaching STEM, the benefits of inquiry instruction, and technology tools that could be used for teaching particular concepts in STEM. Technology reviewed in the paper will be used in the mini unit.	KTS 1, 7, 8, 10
Mini Unit	Students will work in teams of two or three to develop and teach three standards-based lessons to K-12 students that address a particular STEM concept in which one or more technology tools are used. Technology tools must be used to help promote student understanding through engagement in modeling-based inquiry. Unit will include assessment strategies for monitoring student progress. Team will teach the unit to at least one group of K-12 students and will assess outcomes of the unit.	KTS 1 – 10

Outline of Course Topics

Week	Summary of Course Topics
1-3	Research on constructing understanding, Inquiry in STEM, cognitive load, experiencing model-based inquiry as a student and facilitating it as a teacher
4-8	Properties of media and using technology to promote model-based inquiry in math and science
6-8	Using technology to promote design and inquiry in science and mathematics; Development of modeling-based inquiry lessons
9-10	Lesson study critique of model-based instruction; development and planning model-based inquiry mini units
11-15	Development, critique, and implementation of model-based inquiry units
16	Presentation of model-based inquiry units

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 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

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