

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: Jennifer Wilhelm	Email: jennifer.wilhelm@uky.edu	Phone: 257.6731	
d.	Requested Effective Date: <input checked="" type="checkbox"/> Semester following approval		OR	<input type="checkbox"/> Specific Term/Year ¹ : _____
2. Designation and Description of Proposed Course.				
a.	Prefix and Number: EDC 604			
b.	Full Title: History of STEM Education			
c.	Transcript Title (if full title is more than 40 characters): History of STEM Ed			
d.	To be Cross-Listed ² with (Prefix and Number): N/A			
e.	Courses must be described by <u>at least one</u> of the meeting patterns below. Include number of actual contact hours ³ for each meeting pattern type.			
	____ Lecture	____ Laboratory ¹	____ Recitation	1.5 Discussion
	____ Clinical	____ Colloquium	____ Practicum	1.5 Research
	____ Seminar	____ Studio	____ Other – Please explain: _____	
f.	Identify a grading system: <input checked="" type="checkbox"/> Letter (A, B, C, etc.)		<input type="checkbox"/> Pass/Fail	
g.	Number of credits: 3			
h.	Is this course repeatable for additional credit?			YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
	If YES: Maximum number of credit hours: _____			
	If YES: Will this course allow multiple registrations during the same semester?			YES <input type="checkbox"/> NO <input type="checkbox"/>
i.	Course Description for Bulletin:	The History of STEM Education course will begin with researching the background and development of each individual component of STEM (i.e. Science, Technology, Engineering, and Mathematics) Education. This will follow with a historical comparison of these components highlighting their similarities as well as their differences. The course will conclude with a study of the entity, STEM Education, from the early 19th century America to the present focusing on reports and documents that have connected the Science, Technology, Engineering, and Mathematics disciplines and shaped current research and reform efforts.		
j.	Prerequisites, if any: _____			
k.	Will this course also be offered through Distance Learning?			YES ⁴ <input checked="" type="checkbox"/> NO <input type="checkbox"/>

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.

REQUEST FOR NEW COURSE

1.	Supplementary teaching component, if any: <input checked="" type="checkbox"/> Community-Based Experience	<input type="checkbox"/> Service Learning	<input type="checkbox"/> Both
3.	Will this course be taught off campus?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
4.	Frequency of Course Offering.		
a.	Course will be offered (check all that apply):	<input type="checkbox"/> Fall	<input checked="" type="checkbox"/> Spring
b.	Will the course be offered every year?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
	If NO, explain: _____		
5.	Are facilities and personnel necessary for the proposed new course available?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
	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 <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
b.	Will it be of interest to a significant number of students outside the degree pgm?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
	If YES, explain: Students in STEM-related fields		
8.	Check the category most applicable to this course:		
	<input type="checkbox"/> Traditional – Offered in Corresponding Departments at Universities Elsewhere		
	<input type="checkbox"/> Relatively New – Now Being Widely Established		
	<input checked="" type="checkbox"/> 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 <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES, name the proposed new program: _____		
b.	Will this course be a new requirement ⁵ for ANY program?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
	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 <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
	If YES, the <i>differentiation for undergraduate and graduate students must be included</i> 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.	<input checked="" type="checkbox"/> 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.

REQUEST FOR NEW COURSE

Signature Routing Log

General Information:

Course Prefix and Number: EDC 604

Proposal Contact Person Name: Jennifer Wilhelm Phone: 257.6731 Email: jennifer.wilhelm@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	<i>Mary C. Shake</i>
Courses & Curricula	1/26/10	Jeff Reese 257-4909 jeff.reese@uky.edu	<i>Jeff Reese</i>
College of Education	2/9/10	Robert Shapiro 257-4795 rshap@12.uky.edu	<i>Robert Shapiro</i>
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁶
Undergraduate Council			
Graduate Council			
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 604: History of STEM Education SYLLABUS

“Research and Reflection for Learning and Leading”

Instructor:	Jennifer Wilhelm
Office Location	101 TEB
Phone Number	257.6731
Email	jennifer.wilhelm@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 IASC at iasc@uky.edu 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 or SharePoint
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 dllservice@email.uky.edu
DL Interlibrary Loan Service	

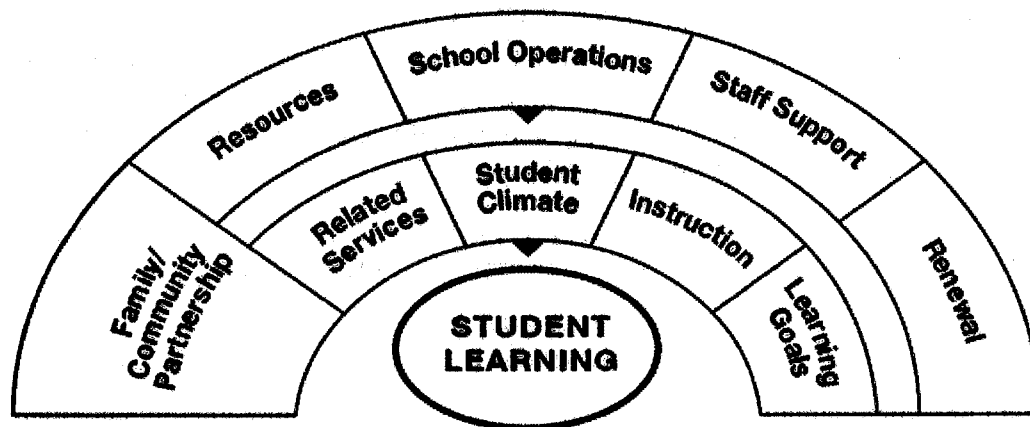
UK College of Education Professional Themes

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.

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 Accomplishments¹



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:

Course Overview:

The History of STEM Education course will begin with researching the background and development of each individual component of STEM (i.e. Science, Technology, Engineering, and

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

Mathematics) Education. This will follow with a historical comparison of these components highlighting their similarities as well as their differences. The course will conclude with a study of the entity, STEM Education, from the early 19th century America to the present focusing on reports and documents that have connected the Science, Technology, Engineering, and Mathematics disciplines and shaped current research and reform efforts.

Course Objectives and Learning Outcomes:

The purpose of this course is to assist and enlighten those individuals that guide STEM Education curriculum and instruction. In the context of school STEM education, the course will: 1) present a catalog of facts; 2) characterize historical change and the lessons from the past; 3) clarify the boundaries of STEM Education; 4) codify the issues of today; and 5) identify some big questions about what we know or do not know. What STEM is and how the citizenry experiences STEM education is constantly changing due to social and political influences. An informed teacher leader for school STEM education needs the perspective of history.

Students from this course will be conversant about the people and beliefs that have influenced the practice of teaching mathematics and science, and ultimately STEM education, from pre-school through higher education and the workforce.

Course Delivery

This proposed course is designed as an online course. Course participants will attend weekly class meetings online throughout the semester in an environment such as Adobe Connect. During this time students will work in on independent research projects, group projects, and participate in online discussions and online chats.

Grading Scale

100 – 91: A 90 – 81: B 80 – 71: C 70 and below: E

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
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Personal Choice Investigation	After investigating a historical notion in STEM Education of interest to you, you will create a digital story to share what you have learned. You will need to obtain prior approval before beginning the investigation. Such notions may be a STEM book, report, or a person. Projects should be approximately 10 minutes in length.	KTS 1 - 10
Reflections	Students will write critical or reflective responses to primary research and other readings; write reflections on course assignments and in-class discussions and activities; participate in online discussions; share presentations, individual, group or both.	KTS 1, 7-10
Historical Timeline	Students will group according to varying content areas and study the influences of STEM Education on their particular content area. Results will be presented in the format of a historical timeline marking and briefly describing major events (such as SPUTNIK, October 4, 1957), the influences, and their outcomes. End products will be uploaded to the class wiki within the course platform.	KTS 1 - 10
Historical Curriculum Thread	Students will write historical research paper of publication quality that traces the development of a STEM concept in the curriculum for the last 100 years to see how the discussion of topics in the curriculum evolves over time, highlighting social and political influences.	KTS 1 - 10

Course Outline

Week 1	What is STEM?
Week 2-5	The History of Science Education, Technology Education, Engineering Education, and Mathematics Education
Week 6-8	History of STEM Education
Weeks 8-9	History of Equity Issues in STEM Education
Weeks 10-11	History of Assessment Issues in STEM Education
Week 12-14	Comparing and Contrasting STEM

Achievement in the United States with other Countries	
Week 14-16	Systemic Reform Efforts in STEM Education

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 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 prior 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.

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. EDC 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 Curriculum and Instruction 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 Curriculum and Instruction 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 Curriculum and Instruction 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.

List of References

The following texts align with the Kentucky Teacher (Initial) Standards, NCATE/NCTM Standards, NCATE/NSTA Standards, Common Core Standards, Proposed Kentucky Teacher Leader Standards, ISTE, and EPSB theme.

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

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

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

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

- Abell, S.K. & Lederman, N.G. (2007). *Handbook Of Research On Science Education*, Lawrence Erlbaum Associates
- American Association for the Advancement of Science. (1993). *Benchmarks for science literacy*. New York: Oxford University Press.
- 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.
- Atkinson, P., & Hammersley, M. (1994). Ethnography and participant observation. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 248-261). Thousand Oaks, CA: Sage.
- 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
- Borrego, M. (2007). Development of engineering education as a rigorous discipline: A study of the publication patterns of four coalitions. *Journal of Engineering Education*, 96(1), 5-18.
- Bransford, J.; Brown, A.L.; & Cocking, R.R. (2000). *How people learn: Brain, mind, experience, and school*, Expanded Edition. Arlington: NSTA Press.
- Brophy, S., Klein, S., Portsmouth, M., & Rogers, C. (2008). Advancing engineering education in P-12 classrooms. *Journal of Engineering Education*, 97, 369-387.
- Bruner, J. S. (1960). On learning mathematics. *Mathematics Teacher*, 53: 610-619.
- 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.
- 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.
- Dewey, J. (1902). *The Child and the curriculum*. Chicago: The University of Chicago Press.
- Dewey, J. (1916). *Democracy and education*. New York: Free Press.
- Dewey, J. (1938). *Experience and education*. New York: Touchstone.

- Duschl, R. (1991). *Restructuring science education*. New York: Teachers College Press.
- English, L. (2002) (Ed.), *Handbook of international research in mathematics education* (219-240). Mahwah, NJ: Lawrence Erlbaum Associates.
- Friedman, T. (2005). *The world is flat*. New York: Picador.
- Fullan, M. G. (1993). Why teachers must become change agents. *Educational Leadership*, 50 (6), pp. 12-18.
- 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).
- International Technology Education Association. (1996). *Technology for all Americans: A rationale and structure for the study of technology*. Reston, VA: Author.
- International Technology Education Association. (2000). *Standards for technological literacy: Content for the study of technology*. Reston, VA: Author.
- Kentucky Council on Postsecondary Education STEM Task Force. (2007). *Kentucky's STEM imperative: Competing in the global economy*. Downloaded from <http://www.cpe.ky.gov/NR/rdonlyres/F42E412A-8508-4269-A50B-1E5F896CD42F/0/STEMreportFINALDRAFTwCovers.pdf>
- Knapp, M. (1995). *Teaching for meaning in high poverty classrooms*. New York: Teachers College Press.
- Lewis, V. K., & Shaha, S. H. (2003). Maximizing learning and attitudinal gains through integrated curricula. *Education*, 123(3).
- Lohmann, J. R. (2008). *Advancing the global capacity for engineering education research (AGCEER): A year of international dialogue*. In Proceedings of the 2008 American Society for Engineering Education Annual Conference, Pittsburgh, PA, June 22-25, 2008.
- 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.
- National Academy of Engineering and National Research Council. (2009) *Engineering in K-12 education: Understanding the status and improving the prospects*. Washington, D.C.: The National Academies Press.

- National Academy of Science (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, D.C.: National Academies Press.
- National Council of Teachers of Mathematics. (2007). *Mathematics teaching today* (2nd ed.). Reston, VA: NCTM.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: NCTM.
- National Council of Teachers of Mathematics. (1989). *Curriculum and evaluation standards for school mathematics*. Reston, VA: NCTM.
- National Council of Teachers of Mathematics (1991). *Professional standards for teaching mathematics*. Reston, VA: NCTM.
- National Research Council. (2001). *Adding it up: Helping children learn mathematics*. J. Kilpatrick, J. Swafford, and B. Findell (Eds.). Mathematics Learning Study Committee, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.
- National Research Council. (1996). *National science education standards*. Washington, D.C.: National Academy Press.
- Pearson, G. & Young, T. (Eds.) (2002). *Technically speaking: Why all Americans need to know more about technology*. Washington, D.C.: National Academy Press.
- Petroski, H. (1982). *To engineer is human: The role of failure in successful design*. New York: St. Martin's Press.
- Singular, N. (2008). *The history of the geometry curriculum in the United States*. Charlotte, NC: Information Age Publishing, Inc.
- Wicklein, R. S., & Schell, J. W. (1995). Case studies of multidisciplinary approaches to integrating mathematics, science and technology education. *Journal of Technology Education*, 6(2).
- Wiggins, G. & McTighe, J. (2001). *Understanding by design*. Prentice-Hall, Inc.: Upper Saddle River, New Jersey.
- Zinth, K. (2007). Recent state STEM initiatives. *Education Commission of the States*. Retrieved from <http://www.ecs.org/clearinghouse/70/72/7072.pdf>

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

Zinth, K. (2007). Recent state STEM initiatives. *Education Commission of the States*. Retrieved from <http://www.ecs.org/clearinghouse/70/72/7072.pdf>

Distance Learning Form

This form must accompany every submission of a new/change course form that requests distance learning delivery. This form may be required when changing a course already approved for DL delivery. **All fields are required!**

Introduction/Definition: For the purposes of the Commission on Colleges Southern Association of Colleges and Schools accreditation review, *distance learning* is defined as a formal educational process in which the majority of the instruction (interaction between students and instructors and among students) in a course occurs when students and instructors are not in the same place. Instruction may be synchronous or asynchronous. A distance learning (DL) course may employ correspondence study, or audio, video, or computer technologies.

A number of specific requirements are listed for DL courses. **The *department* proposing the change in delivery method is responsible for ensuring that the requirements below are satisfied at the individual course level.** It is the responsibility of the instructor to have read and understood the university-level assurances regarding an equivalent experience for students utilizing DL (available at <http://www.uky.edu/USC/New/forms.htm>).

Course Number and Prefix: EDC 720	Date: 11/6/09
Instructor Email: jennifer.wilhelm@uky.edu	
Instructor Name: Jennifer Wilhelm	
Check the method below that best reflects how the majority of course of the course content will be delivered.	
Internet/Web-based <input checked="" type="checkbox"/>	Interactive Video <input type="checkbox"/>
Hybrid <input type="checkbox"/>	

Curriculum and Instruction	
1.	<p>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?</p> <p>Timely and appropriate interaction will be assured through weekly use of asynchronous and synchronous online discussion groups and class meetings. Discussions will be facilitated by faculty member. Chats will also be used for weekly interaction. The syllabus does conform to the University Senate Guidelines and includes Distance Learning Considerations and information.</p>
2.	<p>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.</p> <p>The textbooks, course goals, and assessment of student learning outcomes are identical to a face-to-face class. This internet course will offer a mixed method of course presentation. In this class, the only differences are that class-based discussion is through electronic discussion boards and online chat, class materials are available from the download sites, and assignments are distributed and collected online. Students in the course will participate in online and activities, and group work online. All students will participate in the same experiences.</p>
3.	<p>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.</p>

Abbreviations: TASC = Teaching and Academic Support Center DL = distance learning DLP = Distance Learning Programs

Distance Learning Form

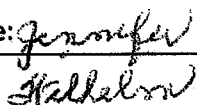
This form must accompany every submission of a new/change course form that requests distance learning delivery. This form may be required when changing a course already approved for DL delivery. **All fields are required!**

	<p>The integrity of student work is ensured by requiring the same requirements as a face-to-face class. As an advanced graduate class, course assessments are based on developed projects rather than examinations. The security of student work is facilitated by the security afforded of UK's Blackboard and SharePoint course system.</p>
4.	<p>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? Yes.</p> <p>If yes, which percentage, and which program(s)? <i>Fifty-percent of the Master of Science in STEM Education will be delivered through distance learning.</i></p> <p>*As a general rule, if approval of a course for DL delivery results in 50% or more of a program being delivered through DL, the effective date of the course's DL delivery will be six months from the date of approval.</p>
5.	<p>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?</p> <p>Course readings will be available online through UK's library sites. Textbooks will be available for purchase online. The instructor will maintain virtual office hours during which time students may participate in online chat sessions, email, or call the instructor for a live conversation. The syllabus includes details for accessing student services on campus for technology support and library support.</p>
<i>Library and Learning Resources</i>	
6.	<p>How do course requirements ensure that students make appropriate use of learning resources?</p> <p>The discussion boards and chats will be tracked for evidence of participation. Readings will be monitored for download. Downloaded readings will be the subjects of discussion boards and chats. Assignments require the use of technology and publication resources.</p>
7.	<p>Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.</p> <p>Technology tools used in the course will be available to students in class and in the College of Education Instructional Technology Center (ITC). Software and peripherals will be available for check out to students enrolled in the course.</p>
<i>Student Services</i>	
8.	<p>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 Teaching and Academic Support Center (http://www.uky.edu/TASC/index.php) and the Information Technology Customer Service Center (http://www.uky.edu/UKIT/)?</p> <p>Students are informed in the actual syllabus as well as in orientation letters emailed to the students.</p>

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10.	<p>Does the syllabus contain all the required components, below? <input checked="" type="checkbox"/> Yes</p> <ul style="list-style-type: none"><input type="checkbox"/> Instructor's <i>virtual</i> office hours, if any.<input type="checkbox"/> The technological requirements for the course.<input type="checkbox"/> Contact information for TASC (http://www.uky.edu/TASC/; 859-257-8272) and Information Technology Customer Service Center (http://www.uky.edu/UKIT/; 859-257-1300).<input type="checkbox"/> Procedure for resolving technical complaints.<input type="checkbox"/> Preferred method for reaching instructor, e.g. email, phone, text message.<input type="checkbox"/> Maximum timeframe for responding to student communications.<input type="checkbox"/> Language pertaining academic accommodations:<ul style="list-style-type: none">o "If you have a documented disability that requires academic accommodations in this course, please make your request to the University Disability Resource Center. The Center will require current disability documentation. When accommodations are approved, the Center will provide me with a Letter of Accommodation which details the recommended accommodations. Contact the Disability Resource Center, Jake Karnes, Director at 859-257-2754 or jkarnes@email.uky.edu."<input type="checkbox"/> Information on Distance Learning Library Services (http://www.uky.edu/Libraries/DLLS)<ul style="list-style-type: none">o Carla Cantagallo, DL Librariano Local phone number: 859 257-0500, ext. 2171; long-distance phone number: (800) 828-0439 (option #6)o Email: dllservice@email.uky.eduo DL Interlibrary Loan Service: http://www.uky.edu/Libraries/libpage.php?lweb_id=253&llib_id=16
11.	<p>I, the instructor of record, have read and understood all of the university-level statements regarding DL.</p> <p>Instructor Name: Jennifer Wilhelm</p> <p>Instructor Signature: </p>

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