

Appendix 12A

Planning and Implementation of Preservice Course Changes; Timeline for Science Strand

Planning and Implementation of Preservice Course Changes: Time Line for Science Strand

<u>Project Year</u>	<u>Fall</u>	<u>Spring</u>
1	2002 Planning Meetings of Partners	2003 Planning for Elem. Physical Science
2	2003 Implement Elem. Phy. Sci. Plan Elem Earth Sci & Middle School Phy. Sci.	2004 Implement Elem Phy. Plan Elem. Earth Sci. & Middle School Phy. Sci.
3	2004 Implement Elem. Earth Sci & Middle School Phy. Sci. Plan Elem. Biological Sci. Middle School Earth & High School Phy. Sci.	2005 Implement Elem Earth Sci & Middle School Phy. Sci. Plan Elem. Biol. Sci., Middle School Earth & High School Phy. Sci.
4	2005 Implement Elem. Biological, Middle School Earth Sci. & High School Phy. Sci. Plan Middle School Biological & High School Earth & Biol. Sci.	2006 Implement Elem. Biological, Middle School Earth Sci. & High School Phy. Sci. Plan Middle School Biological & High School Earth & Biol. Sci.
5	2006 Implement Middle School Biological, High School Earth, & High School Biological Sci.	2007 Implement Middle School Biological, High School Earth & High School Biological Sci.

Note: The order in which content areas and levels (e.g., middle school biological science) are addressed is subject to change as the partners collectively deem appropriate. However, to insure the needed collaboration among partners and the desired integration of preservice and inservice components, the preservice course development, summer institutes, and mentored implementation for a content area and level will occur in the same two-year interval.

Summer Institutes and Mentored Implementation: Time Line for Science Strand

<u>Project Year</u>	<u>Fall</u>	<u>Spring</u>	<u>Summer Institutes</u>
1	2002 Planning Meetings of Partners	2003 Plan for Elem. Phy Sci.	2003 Elem. Physical Sci. 3 wks.@ UK & at each of 3 higher ed. Partners (4 Institutes)
2	2003 Mentored Implementation Elem. Phy. Sci. Plan Elem. Earth Sci. & Middle School Phy. Sci.	2004 Mentored Implementation Elem. Phy. Sci. Plan Elem. Earth Sci. & Mid. Sch. Phys. Sci.	2004 Elem. Earth Sci., 3 wks.@ UK &.at each of 3 higher ed. Partners Mid. Sch. Phy. Sci. 3 wks. at ea of 3 Part.. (7 Institutes)
3	2004 Mentored Implementation Elem. Earth Sci. & Middle Sch. Phy. Sci. Plan Elem. Biol. Sci., Mid. Sch. Earth & High Sch. Phy. Sci.	2005 Mentored Implementation Elem. Earth Sci. & Middle Sch. Phy. Sci. Plan Elem. Biol. Sci., Mid. Sch. Earth & High Sch. Phy. Sci.	2005 Elem. Biol. Sci., 3 wks at UK & at each of 3 higher ed.Partners Mid. Sch. Earth Sci. 3 wks. at ea of 3 Part. High Sch. Phys. Sci., 3 wks. at ea of 2 Part.. (9 Institutes)
4	2005 Mentored implementation Elem. Biol. Sci, Mid. Sch. Earth Sci. & High Sch. Phy. Sci.. Plan Mid. Sch. Biol. & High Sch. Earth & Biol. Sci.	2006 Mentored implementation Elem. Biol. Sci., Mid. Sch.. Earth Sci., & High Sch. Phy. Sci. Plan Mid. Sch. Biol. & High Sch. Earth & Biol. Sci.	2006 Mid. Sch. Biol. Sci, 3 wks at each of 3 Partners. High Sch. Earth Sci., 3 wks at each of 2 Part. High Sch. Biol. Sci., 3 wks at each of 2 Part.. (7 Institutes)
5	2006 Mentored implementation Mid. Sch. Biol. & High Sch. Earth & Biol. Sci.	2007 Mentored implementation Mid. Sch. Biol. & High Sch. Earth & Biol. Sci.	

Appendix 12B

Timeline for Mathematics Strand

TIMETABLE FOR MATHEMATICS STRAND

The following tables lists (in broad terms) the set of mathematics program activities that have been agreed upon by the mathematics AMSP partners and (again, in general terms) the groups on which they have their primary impact. Each row corresponds to an activity and each column to an impacted group. The entry indicates in which year specific partner institutions will become involved in that aspect of the activity. For each activity there are lead institutions (indicated in parentheses in the title cell for each row. Within each cell are the years in which partner institutions will initiate the activity.

Example. The Combinatorial Geometry course, with UK as the lead institution, indicates that UK is already involved in this activity in 2002 with pre-service teachers. UK will conduct workshops for college faculty at ECU, KSU, PC and UC in 2003, and UTK and SCC in 2004 (to export and adapt the course at the partner college institutions). The implementation of these courses at these partner colleges will impact pre-service teachers at UK in 2003, ECU beginning in 2004, KSU and SCC in 2005, and UTK in 2006. UK will also conduct workshops for in-service middle school teachers in 2003, and the mentored implementation by these middle school teachers will impact middle school students beginning in 2004.

The lead institutions for each activity were selected by virtue of their experience and interest in the activity and have agreed to lead the study, development, dissemination, adaptation, and implementation of the activity. The formal introduction of the activity to the partners is indicated in the table in the column labeled “In-Service for College Teachers.” These will usually take place at one of the bi-annual math program meetings whose locations will rotate among the partners. The reader will note that typically the lead institutions will have impacted other target groups prior to the formal introduction date. Many of these activities involve combinations of courses and workshops, some during the academic year, and others during the summer.

Note also that the table is representative of only activities those are strongly collaborative. For instance, distance-learning graduate courses offered by individual institutions are not listed (although the general idea of mathematics distance learning is listed). These “unlisted activities” figure prominently for instance in the outreach, dual/deferred credit, and certificate programs.

Also, beyond the organizational workshops for college faculty there are implicitly implied activities with in-service teacher impact that necessarily involve workshops (which may be structured as formal courses) and subsequent mentored implementations for each teacher participant.

We emphasize that the activities that are listed in the table are primarily structural activities, whose full implementation will involve large amounts of time and effort and once initiated will carry through the remainder of the project and beyond.

AMSP Math Activities Timetable								
Group (rows)/ activity (cols)	Pre-Service Undergrad / Grad.	In-Service Elem. Tchrs.	In-Service Middle Tchrs.	In-Service High Tchrs.	In-Service College Tchrs.	Elem. / Middle Students	High Students	General College Students
Comm. Math. (UK)	UK 1998 SCC 2004 PC 2004 EKU2004 UC2004 KSU2004 MSU2004 UTK2004	UK 1998 SCC2004 PC 2004 EKU2004 UC 2004 KSU2004 MSU2004 UTK2004	UK 1998 SCC2004 PC 2004 EKU2004 UC 2004 KSU2004 MSU2004 UTK2004	UK 1998 SCC2005 PC 2005 EKU2005 UC 2005 KSU2005 MSU2005 UTK2005	UK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UTK2003	UK 1999 SCC2005 PC 2005 EKU2005 UC 2005 KSU2005 MSU2005 UTK2005	UK 1999 SCC 2006 PC 2006 EKU2006 UC 2006 KSU2006 MSU2006 UTK2006	
Comb. Geom. (UK)	UK 2002 EKU2003 KSU2004 UTK2005 SCC2005		UK 2003 EKU2004 KSU2005 UTK2006 SCC2005		UK 2003 EKU2003 KSU2003 UTK2004 SCC2004 PC2003 UC2003	UK 2004 EKU2004 KSU2005 UTK2006 SCC2006		
Applic. Algebra (UK)				UK 2001 UC 2005	UK 2004 PC2004 UC2004 SCC2004 UTK2004 MSU2004 EKU 2004			
HS./Coll. Alg. Curric. (UK)			UK 2002 PC2005 UC 2005 SCC2005 EKU2005	UK 2002 PC2005 UC 2005 SCC2005 EKU2005	UK 2004 PC2004 UC2004 SCC2004 UTK2004 MSU2004 EKU 2004	UK 2003 PC2005 UC 2005 SCC2005 EKU2005	UK 2003 PC2005 UC 2005 SCC2005 EKU2005	UK 2003 PC2005 UC 2005 SCC2005 EKU2005
Math. Elem. Teach. Curric. (UTK,MSU)	UTK 2000 SCC 2004 PC 2004 EKU2004 UC 2004 KSU2004 MSU2004 UK2004				UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003			

Group (rows)/ activity (cols)	Pre-Service Undergrad / Grad.	In-Service Elem. Tchrs.	In-Service Middle Tchrs.	In-Service High Tchrs.	In-Service College Tchrs.	Elem. / Middle Students	High Students	General College Students
Exploring Teaching (UK)					UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003			UTK 2003 SCC 2003 PC 2003 EKU 2003 UC 2003 KSU 2003 MSU 2003 UK 2001
Certificate Programs (UK)		UK 2002 KSU2003 UTK2004 EKU2004	UK 2002 KSU2003 UTK2004 EKU2004	UK 2002 KSU2003 UTK2004 EKU2004	UK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UTK2003			
Excel Collab. Learning (KSU, UK)	UK 1990 KSU 2000				UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003		UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003	UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK1990
"Excel" Summer orient. (KSU)					UTK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003		KSU 2003 UK 2004	
Dual Credit (UK)				UK 2004	UK 2005 SCC 2005 PC 2005 EKU2005 UC 2005 KSU2005 MSU2005 UTK2005		UK 2004	

Group (rows)/ activity (cols)	Pre-Service Undergrad / Grad.	In-Service Elem. Tchrs.	In-Service Middle Tchrs.	In-Service High Tchrs.	In-Service College Tchrs.	Elem. / Middle Students	High Students	General College Students
Outreach and Community Support for Math (UTK,MSU)		UTK 2001 UK 2004 MSU2004	UTK 2001 UK 2004 MSU2004	UTK 2001 UK 2004 MSU2004	UK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UTK2003	UTK 2001 UK 2004 MSU2004	UTK 2001 UK 2004 MSU2004	
Undergrad. TA (KSU)	KSU2002 SCC 2003 PC 2003 EKU2003 UC 2003 UK2002 MSU2003 UTK2003				UK 2003 SCC 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UTK2003			KSU2002 SCC 2003 PC 2003 EKU2003 UC 2003 UK2002 MSU2003 UTK2003
Math Distance Learning (MSU) (UTK) (EKU)		MSU2003 UTK 2004 EKU2000	MSU1999 UTK 1998 EKU2000	MSU1999 UTK 1998 EKU2000	UTK2003 MSU 2003 PC 2003 EKU2000 UC 2003 KSU2003 MSU2003 UK2003			UTK 1998 MSU 1999 EKU2000
Delayed Credit (UK)					UTK2003 MSU 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003		UTK2004 MSU 2004 PC 2004 EKU2004 UC 2004 KSU2004 MSU2004 UK2004	
MA/MS/MM and Rank 1 Cohort Programs (MSU,UTK)		UTK2003 MSU 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003	UTK2003 MSU 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003	UTK2003 MSU 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003	UTK2003 MSU 2003 PC 2003 EKU2003 UC 2003 KSU2003 MSU2003 UK2003			

1. THE HIGHER EDUCATION PARTNERS

EKU – Eastern Kentucky University
KSU – Kentucky State University (An HCBU)
MSU – Morehead State University
PC – Pikeville College
SCC – Somerset Community College
UC – Union College
UK – University of Kentucky
UTK – University of Tennessee at Knoxville

2. THE ACTIVITIES

COURSES

Communicating Mathematics – This course combines problem-solving skills, training in the creation of effective problems, and designing and authoring of problem sets to be uploaded and made accessible through mathclass.org. UK already has substantial experience (several years, with NSF support) with offering courses and workshops of varying length and method of delivery on this material, and implementing mathclass.org support for “standard” college courses as well as providing feedback to high school students on mathematics preparation (KEMTP).

Combinatorial Geometry – This course consists of a substantial introduction to two- and three-dimensional mathematical modeling, both physical and virtual. There is a variant of this course at UK for pre-service middle school teachers, funded through NSF support, piloted at UK in Fall 2001 and Fall 2002, and at Lexington Community College in Spring 2003. A variant for doctoral students in mathematics education will be taught as part of the NSF ACCLAIM project in Summer 2002 at the University of Tennessee.

Applicable Algebra – This course, piloted at UK in Spring 2002 for MST majors, based on a course developed at Cornell University, in which topics in a typical abstract algebra course are developed in the context of such areas as error-detecting and error-correcting codes, cryptography, and symmetry.

High School/College Algebra – This is a new College Algebra curriculum, presently undergoing development and revision at UK, suited for a dual/deferred credit course that can be taught by trained high school teachers. This is a true “college algebra” course, not a simple re-working of high school algebra.

Mathematics for Elementary School Teachers – Mathematics for Elementary School Teachers curriculum. The University of Tennessee at Knoxville, and Morehead State University, will assume the lead position in the revamping and redesign of this fundamental course sequence.

STUDENT AND TEACHER DEVELOPMENT

Dual/Deferred Credit – Students in high school will enroll in advanced (though not necessarily AP) high school courses that lead to college credit at the AMSP partner colleges. Typically a student will enroll in a year-long course in the Fall, then upon successful progress will enter Dual or Deferred Credit status in the Spring. Upon completion of the course, which includes an examination delivered by the partner college, the student will either receive college credit (Dual Credit), or will receive a commitment to grant course credit upon enrollment at that partner institution (Deferred Credit).

“Excel” Collaborative Learning – Both college and high school students will be trained and serve in collaborative learning programs as peer mentors in certain course. For example, high school students to middle school students, and pre-service teachers to college students enrolled in lower-level mathematics courses (particularly the AMSP courses). These will be designed by Michael Freeman and modeled on several successful “Treisman” models across the country, including MathExcel at UK for calculus. Kentucky State University has fresh experience with implementations of Excel-type programs for entering college students, and will serve as a lead institution in its expansion.

Excel Summer Orientation – This is the training program for students who will serve as mentors in the various Excel programs. There will be versions for both high school and college (pre-service) students. These trainings will be modeled after those developed by Treisman, and will be designed by Michael Freeman and his collaborators.

Exploring Teaching – In this program, college students who are pre-service teachers (or contemplating this major) will be engaged in a wide variety of early teaching experiences, including serving as peer mentors for students in lower-level mathematics courses, tutoring, serving drop-in students at a mathematics help center, etc. UK will launch this in connection with its AMSP courses, the recently-opened “Mathskeller” drop-in mathematics resource center, and local and distant workshops.

Undergraduate Teaching Assistants – Ample opportunities exist for undergraduate pre-service teachers to serve as Undergraduate Teaching Assistants to instructors of the AMPS college courses (particularly the ones delivered in a distance-learning format), workshops, and teachers in partner school districts. Kentucky State University has already launched a program of undergraduate TA’s, and will be lead institution in expanding this activity to partner colleges.

Mathematics Distance Learning – This activity focuses on the development and increase of mathematics courses delivered in various combinations of distance-learning formats. For example, course members (e.g., high school teachers) may be brought together for an initial period of time at some central location, disperse for the next few weeks with constant supervision, communication, and encouragement facilitated by the TA’s, and then brought back together again periodically. University of Tennessee already has some experience in this through the NSF ACCLAIM and other projects, and

will serve with Morehead (which is participating with UK in a new “Mathematics Center” in rural Morgan County) and Eastern Kentucky Universities in further development.

Certificate (or Diploma) Programs – UK will designate and cluster certain combinations of activities and courses formally to acknowledge levels of professional development of teachers in the form of certificates (or diplomas). Certificates may represent mastery of foundational material and skills, or of more advanced and specialized training (such as the knowledge, skills, and experience to teach an AP calculus course).

MA/MS/MM and Rank 1 Cohort Programs – In general, attention will be paid to offering courses, in both traditional and distance-learning format, that can lead to Masters degrees in Mathematics or Mathematics Education and Rank 1 Certification. There is substantial opportunity for collaboration with the NSF ACCLAIM project in this initiative, and both University of Tennessee and Morehead State University will act as lead institutions.

Outreach and Community Support for Math – UK has made a commitment to establish two outreach professorships, with the first to be made available to the Department of Mathematics. The Department of Mathematics at the University of Tennessee at Knoxville has already established and filled such a position (and its occupier, Reid Davis, is one of the co-PI’s in the NSF ACCLAIM project). Other partner institutions have committed to finding effective ways to increase their outreach effectiveness.