ATTACHMENT C

LETTER OF NOTIFICATION – 13
EXISTING CERTIFICATE or DEGREE OFFERED via DISTANCE TECHNOLOGY

Institutions with at least one certificate or degree program approved for distance technology by the Arkansas Higher Education Coordinating Board must submit Letter of Notification-13 to request approval to offer additional existing (on-campus) certificates or degrees via distance technology. The institution must submit to ADHE a copy of the e-mail notification to the Higher Learning Commission (HLC) about the proposed distance technology program. If HLC requires a focused visit for the proposed distance technology program, please submit the scheduled review date.

Definitions

Distance technology (e-learning) – When technology is the primary mode of instruction for the course (50% of the course content is delivered electronically).

Distance instruction – When a course does not have any significant site attendance, but less than 50% of the course is delivered electronically, e.g., correspondence courses.

Distance program – When at least 50% of the major courses are delivered via distance technology.

1. Institution submitting request: University of Arkansas, Fayetteville

2. Contact person/title: Dr. Sharon L. Gaber / Provost and Vice Chancellor for Academic Affairs

3. Telephone number/e-mail address: 479-575-5459 / sgaber@uark.edu

4. Name of Existing Certificate or Degree: Secondary Mathematics, MA

5. Proposed Effective Date for distance technology delivery: fall 2015

6. CIP Code/Degree Code: 13.1311 / 5460

PROGRAM INFORMATION

7. Reason for offering program by distance technology: The MA in Secondary Mathematics is a degree program designed to serve in-service middle and high school mathematics teachers. Because of this, most of the students in the program will have full-time positions, and coming to campus for courses will be difficult. The degree program requires 30 semester hours, including at least 12 hours of graduate mathematics, up to 6 hours of graduate education, up to 6 hours of professional development work (e.g. AP or IB institutes), and 3-6 hours of independent study and research. A portfolio documenting each degree program's components and including a significant report of the independent study and research project is required. The graduate mathematics courses usually are the four core courses for this degree: MATH 5013, 5023, 5033, and 5053; advanced calculus, abstract algebra, geometry, and probability and statistics (all with connections to school mathematics). The four core courses will be offered online, and the remainder of the degree requirements can be met with online courses in education and independent study directed electronically. The proposed change will have no known effect on other degree programs, and no program or program components will be eliminated. The only effect expected will be the teaching of the four core courses in face-to-face sessions on campus. As of now, these four courses are offered in a rotation with one course each semester. That likely will not be needed if the four courses are offered online.

8. Provide the list of courses (course number/title) in the certificate or degree listed above currently offered by distance technology. Indicate which existing distance technology courses are taught by

adjunct faculty.

None are taught by adjunct faculty.

MATH 5023. Geometry with Connections to School Mathematics (Odd years, Fa). 3 Hours.
School geometry from an advanced perspective including conformity to the Common Core State Standards for Mathematics. Study will include historical developments and geometry based on transformations of two- and three-dimensional space. Prerequisite: Graduate standing.

MATH 5053. Probability & Statistics with Connections to School Mathematics (Sp). 3 Hours.
An advanced perspective of probability and statistics as contained in the high school mathematics curriculum with connections to other components of school mathematics. The content is guided by the content of the high school probability and statistics of the Common Core State Standards for Mathematics. Prerequisite: Graduate standing.

9. List of new courses and course descriptions for distance technology courses for the degree listed above. Indicate which new distance technology courses will be taught by adjunct faculty.

None will be taught by adjunct faculty.

MATH 5013. Abstract Algebra with Connections to School Mathematics (Irregular). 3 Hours.
Basic structures of abstract algebra (rings, fields, groups, modules and vector spaces) with emphasis on rings and fields as generalizations of the ring of integers and field of rational numbers. Degree credit will not be awarded for both MATH 4113 (or MATH 5123) plus MATH 5001 and for MATH 5013. Prerequisite: Graduate standing or departmental consent.

MATH 5033. Advanced Calculus with Connections to School Mathematics Teaching (Irregular). 3 Hours.
Rigorous development of the real numbers, continuity, differentiation, and integration. Degree credit will not be awarded for both MATH 4513 (or MATH 5503) plus MATH 5001 and for MATH 5033. Prerequisite: Departmental consent.

10. Provide the course syllabus for each distance technology course for the program listed above and indicate the maximum class size for each distance course. Indicate the course delivery mode(s) and class interaction mode(s) for each distance technology course.

MATH 5013 Abstract Algebra with Connections to School Mathematics

Class Maximum – 20

Course Delivery Mode – Online

Class Interaction Modes – electronic bulletin board and email

Textbook: *An Introduction to Abstract Algebra with Notes to the Future Teacher* by Nicodemi, Sutherland, and Towsley (Pearson/Prentice Hall, 2007)

The goal of the course is to review (or learn) basic material in abstract algebra, beginning with the integers and proceeding through rings (especially rings of polynomials), fields, a bit of group theory, and finally seeing how these algebraic structures combine to yields some well-known and rather deep results about the possibilities of certain algebraic constructions. The one we will focus on is the possibility of solving fifth-degree polynomial equations with radicals, as one does with quadratic equations via the quadratic formula.

Assignments for MATH 5013, Fall 2012, from Textbook (B. Madison, Instructor)

Chapter 1 – Sections 1, 2, 3, 4, 7, and 8 for future teachers. Chapter 2 – Sections 1, 4, 5, 6, and 7 for future teachers. Chapter 3 – Sections 1, 2, 4, 5, 6, 7, and 9 for future teachers. Chapter 4 – Sections 1, 2, 4, 5, 6, 7, and 9 for future teachers. Chapter 5 – Sections 1, 2, 3, 4, and 8 for future teachers. Chapter 6 – Sections 1, 2, and 5. Each chapter has a historical section (**From the Past**) and one or two **Worksheet** section. You are encouraged to read the historical sections. The worksheet sections outline a topic for students to develop further with details. Solutions for the following exercises will either be collected for grading or presented in class by a student. All students are responsible for the textbook material in the sections with exercises assigned. In addition to and as preparation for Chapters 1-6 read pages 375-390 on logic, proof, sets, functions and binary operations.

Chapter 1 – Write out solutions to the following exercises. Exercises 1.1 – 2, 4, 6..Exercises 1.2 – 3, 4, 6, 10. Exercises 1.3 – 8 (ii), 10(iii). Exercises 1.4 – 2, 6. Exercises 1.7 – 2, 7. Chapter questions – 4(ii)

Chapter 2 – Write out solutions to the following exercises. Exercises 2.1 – 8, 15(i, ii, iii). Exercises 2.4 – 4, 6, 8, 10, 12. Exercises 2.5 – 8, 12, 16, 18. Exercises 2.6 – 6, 8(iii), 12, 14

Chapter 3 – Write out solutions to the following exercises. Exercises 3.1 – 2, 6, 12, 14. Exercises 3.2 – 4, 8. Exercises 3.4 – 1, 2, 3, 4, 5, 6, 7. Exercises 3.5 – 2, 4 . Exercises 3.6 – 1(ii). Exercises 3.7 – 2, 8, 10. Chapter questions – 16

Chapter 4 – Write out solutions to the following exercises. Exercises 4.1 – 4, 6, 10, 14, 16, 18. Exercises 4.2 – 2, 4, 6, 8. Exercises 4.4 – 2, 4, 8, 10, 14, 18, 24, 26. Exercises 4.5 – 6, 10, 12, 14. Exercises 4.6 – 6, 10,, 12, 14. Exercises 4.7 – 2, 6, 8, 10, 12, 14. Chapter questions – 28, 29

Chapter 5 – Write out solutions to the following exercises. Exercises 5.1 – 2, 6, 8, 12, 14, 18. Exercises 5.2 – 4, 8, 10, 16, 18. Exercises 5.3 – 2, 4, 6, 8. Exercises 5.4 – 4, 6, 8, 10, 12, 18, 20

Chapter 6 – Write out solutions to the following exercises. Exercises 6.1 – 6. Read sections 1, 2, & 3 to understand how one shows that fifth degree polynomial equations cannot be solved by radicals.

Syllabus for MATH 5023 – Geometry with Connections to School Mathematics
Class Maximum - 20
Delivery Mode - Online
Class interaction mode - electronic bulletin board and email

Prerequisite: Graduate standing and an undergraduate course in geometry or equivalent experience.

Textbooks: *Mathematics for High School Teachers: An Advanced Perspective* by Usiskin, Peressini, Marchisotto, and Stanley; 2003, Pearson.

The second half of this book, Chapters 7-11, focuses on geometry with connections to algebra and analysis.

The principal topics for the course are:

- Congruence using transformations
- Distance and similarity
- Trigonometry
- Area and volume
- Connections to analysis and algebra

Additional resources:

Euclid's *Elements,* various translations

Common Core State Standards for Mathematics, especially the high school geometry section.

Class meetings will have the following components:

- Presentations of textbook and other resources material by the instructor
- Presentations of textbook and other resources material by students
- Presentations of assigned problems by students, including proofs of theorems
- Enhancement material by instructor

Grades will be determined by instructor evaluations of presentations by students (approximately 1/3), instructor evaluations of written responses to assigned problems, (approximately 1/3), and performance on a final examination (approximately 1/3).

MATH 5033 - Advanced Calculus with Connections to School Mathematics

Class Maximum – 20
Course Delivery Mode – Online
Class Interaction Modes – electronic bulletin board and email

Textbook: *Principles of Mathematical Analysis* by Walter Rudin (3rd Edition) McGraw-Hill, 1976.

Recommended books:

Mathematics for High School Teachers by Usiskin, Peressini, Marchisotto, and Stanley, Pearson Prentice Hall, 2003

Calculus Connections: Mathematics for Middle School Teachers by Asma Harcharras and Dorina Mitrea, Pearson Prentice Hall, 2007.

Resource Material: *Common Core State Standards for Mathematics*, 2010

General assignments:

1. Read the textbook.

2. Look for connections to the classroom and be ready to discuss those in class. Some connections can be found in the two recommended books.

3. Be prepared to present in class solutions to assigned exercises and theorems or propositions.

Coverage: Selections from the textbook and selections from the two recommended books.

Grades will be based on presentations in class and written assignments.

MATH 5053 – Probability and Statistics with Connections to School Mathematics

Class Maximum – 20
Course Delivery Mode – Online
Class Interaction Modes – electronic bulletin board and email

Prerequisite: Graduate standing and an undergraduate course in probability and statistics or equivalent

experience

Possible textbooks: *Statistics in Action: Understanding a World of Data (*Key Curriculum Press) by Ann E. Watkins, Richard L. Scheaffer, and George W. Cobb, 2004.

Resources:

- AP Statistics Course Description
- *Common Core State Standards in Mathematics (CCSSM)*, Probability and Statistics sections
- CCSSM Progression for High School Statistics and Probability
- *Data and Probability Connections: Mathematics for Middle School Teachers* by D. Perkowski and M. Perkowski, Pearson Prentice Hall, 2007.
- Guidelines for Assessment and Instruction in Statistics Education, American Statistical Association

The principal topics for the course are:

- Interpreting categorical and quantitative data
- Making inferences and justifying conclusions
- Conditional probability and the rules of probability
- Using probability to make decisions
- Simulation as a tool for understanding statistical inference and making statistical decisions

Class meetings will have the following components:

- Presentations of textbook and other resources material by the instructor
- Presentations of textbook and other resources material by students
- Presentations of assigned problems by students, including proofs of theorems
- Enhancement material by instructor

Grades will be determined by instructor evaluations of presentations by students (approximately 1⁄3), instructor evaluations of written responses to assigned problems, (approximately 1⁄3), and performance on a final examination (approximately 1⁄3).

11. Discuss the provisions for instructor-student and student-student interaction that are included in the program design and the course syllabus.

The program design incorporates online technology for the interaction between faculty and students as well as for student to student interactions. All will work on Blackboard platform (online learning management system) where all course materials, presentations, exercises, and related course components are housed. This platform also offers a collaborative tool, Blackboard Collaborate, that allows video/audio interactions between faculty and students in real time or asynchronous, and includes a digital whiteboard as well as screen sharing capabilities.

The Blackboard infrastructure also allows for the integration of other digital means for the sharing of content as well as interactions (synchronous and asynchronous) among students and between students and faculty. Some of these are active discussion boards, blogs, wikis as well as screen capture and video sharing capabilities through Kaltura (software that is embedded in Blackboard).

All of these options are in addition to standard email communication that is always available for students and faculty.

12. Provide a semester-by-semester degree plan/course schedule for student access to all courses necessary to complete the program.

Year 1:
Fall Semester – MATH 5013
Spring Semester – MATH 5033
Summer – 6 hours of Professional Development Institutes (e.g AP Calculus, AP Statistics, IB Mathematics offered at various sites across the US and internationally and Graduate Education courses (Recommended courses include CIED 5483, 6013, 6023, 6033, 6043, and 6053) either face-to-face or online.

Year 2
Fall Semester – MATH 5023
Spring Semester – MATH 5053
Summer – 6 hours of Professional Development Institutes (e.g AP Calculus, AP Statistics, IB Mathematics offered at various sites across the US and internationally); Graduate Education course (Recommended courses include CIED 5483, 6013, 6023, 6033, 6043, and 6053) either face-to-face or online.

Year 3
Fall Semester – 6 hours of Independent Study and Research
Spring Semester – Prepare portfolio and sit for MA examinations.

13. Provide a list of services that will be supplied by consortia partners or outsourced to another organization (faculty/instructional support, course materials, course management and delivery, library-related services, bookstore services, services providing information to students, technical services, administrative services, online payment arrangements, student privacy consideration, services related to orientation, advising, counseling or tutoring, etc.) **Include the draft contract/Memorandum of Understanding (MOU) for each partner/organization offering faculty/instructional support for the program.** Submit final contract/MOU signed by partner institutions or organizations upon completion of ADHE proposal review.

All services to our students will be provided by University of Arkansas faculty, staff, and administration. Fulbright College of Arts and Sciences and the Department of Mathematical Sciences are receiving support from the UA Global Campus in developing the new distance track.

14. Estimate costs for the proposed distance technology program for the first 3 years. Include faculty release time costs for course/program planning and delivery.

The program design anticipates the creation of revenue streams from distance enrollment. All development costs should be recouped from this revenue stream within a reasonable period of time. We anticipate that significant program development will occur throughout the current academic year (2013-2014). With ADHE approval, we would like to begin admitting degree students to the distance track in Spring or Fall of 2015. With all courses developed and program fully deployed, there are no additional costs since current faculty would carry the load of instruction for the program. In cases where additional instructional costs are incurred to allow for the faculty to teach the online courses, the revenue of the program would be utilized to cover the additional costs. The program should not incur in any cost that is not expected to be covered by the revenue it generates.

15. Provide institutional curriculum committee review/approval date for proposed distance technology program.

16. Provide documentation that proposed program has been reviewed/approved for distance technology delivery by licensure/certification board/agency, if required. [HLC review must follow ADHE review and AHECB program approval.]

There is no additional requirement for approval of the distance education track for this program.

17. Provide additional program information if requested by ADHE staff.

INSTITUTIONAL APPROVAL

President/Chancellor Approval Date:

Board of Trustees Notification Date:

Chief Academic Officer: Date:

LON-13