MA MATH ASSESSMENT PLAN

UNIVERSITY OF CENTRAL ARKANSAS
ACADEMIC ASSESSMENT PLAN

Requirements

1. Submit with New Program Proposal
   a. Programs are encouraged to consult with the Office of University Assessment.
   b. Contact information assessment@uca.edu
2. Send a copy of the Assessment Plan to the Office of University Assessment, Wingo 215.
3. Update the Program Assessment Plan based upon EAPR or Accreditation Cycles.

Basic Information

Program Name:

MA Mathematics Education

College:

College of Natural Science and Mathematics

Department:

Mathematics

Program Level (check all that apply)

- ☐ Associate's
- ☐ Bachelor's
- ☐ Undergraduate Certificate
- ✓ **Masters**
- ☐ Doctoral
- ☐ Graduate Certificate

Date Plan Submitted: **February 11, 2021**

College Dean & email: **Dr. Stephen Addison (saddision@uca.edu)**
College Curriculum Committee Chairperson & Email: **Dr. Scott Austin (saustin@uca.edu)**
Department Chairperson & email: **Dr. Ramesh Garimella (rameshg@uca.edu)**
Department Curriculum Committee Chairperson & email: **Dr. Garth Johnson (garthj@uca.edu)**

Note: The MA Mathematics Education program submitted program revisions recently. These have been approved by the College Curriculum Committee, but those changes are pending at the University and Graduate School Level. This Assessment Plan assumes that all program revisions will be accepted.

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1. **Introduction**
   - **Purpose**

     The purpose of this program is to prepare students to address the mathematical needs of education, business, industry, and government in Arkansas, surrounding states, and the nation. Our high quality, student-centered program integrates critical thinking, problem-solving skills, mentored research, and cutting edge technology. The program prepares our majors to succeed in their chosen professions and/or advanced studies.

   - **Unit Mission Statement**

     The primary mission of the Department of Mathematics is to prepare students to address the mathematical needs of education, business, industry, and government in Arkansas. In support of this mission, the department creates and delivers relevant instructional programs that enable students to acquire an appropriate foundation of mathematical knowledge. These programs consist of courses designed to enhance students' critical thinking, problem solving, communication, and technology skills, and to prepare our majors for advanced studies. The department supports the professional and academic growth of faculty to ensure that programs are forward thinking and adaptive. The secondary mission of the department is to provide professional services to the university and community at large.

2. **Student Outcomes**
   - **Learning Outcomes by Program (focused on student performance, clearly stated, and measurable)**

     Learning Outcome 1: Graduates will have mastered advanced mathematical concepts in the content areas of Algebra, Calculus, and Geometry.

     Learning Outcome 2: Graduates of the MA Program will have demonstrated exceptional understanding of current research in a particular subject area.

     Learning Outcome 3: Graduates will demonstrate effective communication of key concepts from Mathematics Education.

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3. Assessment Cycle

- Assessment Cycle will be determined with assistance from the Office of Assessment

<u>Learning Outcome 1</u>: Students will complete an assessment activity in these three required classes when those classes are offered.

- MATH 6310 Advanced Algebra for Mathematics Educators
- MATH 6350 Advanced Geometry for Mathematics Educators
- MATH 6370 Advanced Calculus for Mathematics Educators

<u>Learning Outcome 2</u>: Students will demonstrate their understanding of mathematics education research on either a Comprehensive Exam or Thesis.

<u>Learning Outcome 3</u>: Students will demonstrate their ability to communicate key concepts from Mathematics Education on the Comprehensive Exam or Thesis.

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4. Curriculum Map

This table shows only the specific course and program requirements for students in this program. Students also take many other elective courses.
MA Mathematics Education Students are given the choice of either taking Comprehensive Exams or completing a Thesis.

		Objectives		
	MATH Course Number & Name	**1. Graduates will have mastered advanced mathematical concepts in the content areas of Algebra, Calculus, and Geometry.**	**2. Graduates will have demonstrated exceptional under-standing of current research in a particular subject area in mathematics education.**	**3. Graduates will demonstrate effective communication of key concepts from Mathematics Education.**
	Admission Requirements	I	-	-
Core Courses	6310 Advanced Algebra	R A E	I R	I R
	6350 Advanced Geometry	R A E	I R	I R
	6370 Advanced Calculus	R A E	I R	I R
Program Requirement (Option)	Comprehensive Exams	A	A E	A E
	Thesis	-	A E	A E

I = Introduction – This skill is introduced in the course. The student is not expected to have prior knowledge in the skill.

R = Reinforced – This skill is reinforced in the course. Students are expected to have some prior knowledge in the skill upon entering the course, but that knowledge may be incomplete.

A = Advanced/Applied – This is applied in the course. Students are expected to apply knowledge into an advanced problem or realistic situation.

E = This course is used for assessment evaluation.

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5. **Assessment Methods and Measures (Formative and Summative recommended)**
   - **Record the assessment measure(s) that evaluate each student learning outcome (note: each learning outcome should have an associated assessment measure).**
   - **Direct Methods/Measures Preferred/Used at the Course and Program Levels (examples: writing examples, oral examinations, internships, clinicals, quizzes, test, team/group projects and presentations)**
   - **Indirect Methods/Measures Preferred/Used at the Course and Program Levels (examples: surveys, quantitative data, course grades, alumni surveys, student evaluation of instruction**

Learning Outcome 1: This is evaluated using a direct measure of the students' knowledge in Algebra, Geometry, and Calculus courses.

Learning Outcome 2: This is evaluated using a direct measure of the students' knowledge of current research in a particular subject area in mathematics from a common rubric. This rubric will be used for comprehensive exam and thesis students both.

Learning Outcome 3: This is evaluated using a direct measure of the students' ability to communicate mathematics using a common rubric. This rubric will be used for comprehensive exam and thesis students both.

6. **Data Collection and Review**
   - **When will data be collected for each outcome?**
   - **How will data be collected for each outcome?**

Learning Outcome 1: All students in the MA Math Program will be required to take courses in Algebra, Calculus, and Geometry. Students will be given common assignments embedded within each course.

Learning Outcome 2: All students in the MA program will either take comprehensive exams or complete a thesis toward the end of the program. Students' understanding of mathematics education research will be evaluated from their comprehensive exam or thesis using a common rubric.

Learning Outcome 3: All students in the MA program will either take comprehensive exams or complete a thesis toward the end of the program. Students' ability to communicate mathematics will be evaluated from their comprehensive exam or thesis evaluated using a common rubric.

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- **What will be the benchmark/target for each outcome?**

  Learning Outcome 1: At least 80% of the students will score an average of "3" or greater using a 4-point rubric on the embedded questions found in each of the three required courses.

  Learning Outcome 2: At least 80% of the students will score an average of "3" or greater using a 4-point rubric on each student's comprehensive exam or thesis.

  Learning Outcome 3: At least 80% of the students will score an average of "3" or greater using a 4-point rubric on each student's comprehensive exam or thesis.

7. Participation in Assessment Process

- **Who will participate in carrying out the assessment plan?**
- **What will be their specific role/s?**

  The faculty member for each targeted course will administer the evaluations. The specific questions the students work will be created by a committee.

8. Data Analysis

- **How and will the data and findings be shared with faculty?**

  The data and findings will be shared with the entire Mathematics department at an upcoming faculty meeting. The faculty will receive a written and oral presentation on the collected data and findings. This meeting will probably occur early in the fall semester.

- **Who was involved in analyzing the results**

  The assessment committee will analyze the results. Certain other faculty members may be included, for instance if a faculty member's course is targeted in the assessment process.

- **How are results aligned to outcomes and benchmarks?**

  This will be determined once the results are finalized. The assessment committee will make recommendations to the department if any of the student learning outcomes do not meet established benchmarks. These will be included in the assessment report.

9. What are the plans to evaluate students' post-graduate success?

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Data will be collected from the UCA's Office of Institutional Research Exit Interview Questionnaire completed by all graduating seniors and alumni.

Our goal is that at least 75% of all graduates of the MA Mathematics program will be successful in their pursuit of employment as secondary mathematics teachers or admission to doctoral programs within three years of graduation.

10. What are the plans to evaluate teaching effectiveness?

All faculty members are evaluated using the standard college-wide student evaluation each term.

11. Appendices-Required….Curriculum Maps by Program, Assessment Tools (examples: Rubrics, Surveys, Tests, etc.), any other important materials/documentation

- Curriculum Maps are found earlier in this document.
- Rubrics are found in Appendices A through C.

12. Submit Assessment Plan

- Send completed form electronically to assessment@uca.edu

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13. Appendix A: Rubrics for Learning Objective 1 (Mastered concepts)

Rubric for MATH 6310 Advanced Algebra (One page)

The assignment students will complete is in development. This is the intended rubric for each problem the student works.

Rubric to evaluate student responses:

4 Points	3 Point	2 Points	1 Points	0 Points
Advanced	Proficient	Basic	Minimal	Absent
Complete Understanding With allowance for minor calculation or notation errors	Essentially Correct Understanding Evidences of conceptual understanding but may have calculation error	Incomplete understanding	Little to no understanding	No response, incorrect response, or Blank
95% or above	80 to 94%	60 to 79%	1 to 59%	0%

"Success" is defined as scoring at least a "3" on the 4-point rubric.
We can have the goal that at least 80% of students will score a 3 or better on the 4-point rubric.

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Rubric for MATH 6350 Advanced Geometry (Two pages)
Rubric for MATH 6370 Advanced Calculus (Unknown number of pages)

This will be developed at a later date. (This delayed section was ok'd by Dr. Held.)

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14. Appendix B: Rubrics for Learning Objective 2 (Research)

Comprehensive Exams option and Thesis option both use the same rubric. (One page)

Rubric to evaluate: Students will demonstrate their understanding of mathematics education research on either a Comprehensive Exam or Thesis.

	4 Point	3 Points	2 Points	1 Point	0 Points
	Exceptional	Satisfactory	Developing	Unsatisfactory	
Minimal Use of Math Ed Research	Uses 9 or more peer reviewed articles	8 < articles < 6	5 < articles <2	1	none
Math Ed Literature Appropriately Used and Cited	Both of the following criteria are demonstrated for all cited articles 1. Main theme of the article are properly described 2. Proper formatting and citing (for example APA or some other notable style)	The following criteria are demonstrated for most cited articles: 3. Main theme of the article are properly described 4. Proper formatting OR The main theme of the article is properly described for all articles, but some formatting issues are present	The main theme of the article is not properly described in less than half of the cited articles.	The following criteria are demonstrated in less than a fourth of the cited articles: 5. Main theme of the article are properly described 6. Proper formatting	The following criteria are demonstrated for none of the cited articles: 7. Main theme of the article are properly described 8. Proper formatting
Demonstrates Broad Understanding of a Body of Math Ed Research	-Synthesize: Do the articles interact with each other? -Analyze: Is literature accurately summarized in their lit review? -Critique: Do they bring up issues that their articles do not address? -Generalize: Do they extend ideas presented in the literature to other topics/instructional methods/ect.?	Three out of 4	Two out of 4	One	none
Properly Answers the Question at hand	Question is clearly answered and their inquiry is advanced	Question is answered	Question is somewhat answered or answer is not rooted in literature/results	Question is not answered or incorrectly answered	

"Success" is defined as scoring an average of "3" on the 4-point rubric.
We can have the goal that at least 80% of students will average a score of 3 or better on the 4-point rubric.

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15. Appendix C: Rubrics for Learning Objective 3 (Communication)

Comprehensive Exams option and Thesis option both use the same rubric. (One page)

Specific Skill or Knowledge Area Related to the Mathematics Education Goal	Student Learning Outcomes				
	4	3	2	1	0
Central Message	Central message of mathematics education is compelling, reinforced, and strongly supported.	Central message of mathematics education is clear and consistent with the supporting material.	Central message of mathematics education is basically understandable but is not reinforced.	Central message of mathematics education can be deduced, but is not explicitly stated.	Assign a zero for performance that does not meet a score of one (1).
Organization	Organizational pattern is clear and consistent, polished, and makes the mathematics education content cohesive.	Organizational pattern is clear and consistent.	Organizational pattern is partially developed.	Organizational pattern is poorly developed and unclear.	
Supporting Material /Evidence	Employs timely and sufficient materials relevant to mathematics education to provide effective support in a way that reflects a thorough understanding of the topic/thesis.	Selects sufficient materials relevant to mathematics education, but lack in analysis, comparisons, or credible authorities.	Uses some supporting materials relevant to mathematics education with limited or incomplete explanations, examples, and/or descriptions.	Uses insufficient or inappropriate supporting materials.	
Context and Audience	Demonstrates a thorough understanding of the context as it relates to the mathematics education, uses compelling language appropriate to the audience.	Demonstrates adequate consideration of the context as it relates to the mathematics education and uses thoughtful language given the audience.	Demonstrates some awareness of the context as it relates to the mathematics education and uses mundane language given the audience.	Demonstrates minimal attention to the context as it relates to the mathematics education and uses unclear language given the audience.	

Overall, has this student demonstrated appropriate knowledge and skills for this level in this discipline? __ Yes __No
__ This student did not turn in an acceptable response to the assignment (e.g., failed to turn in a paper, plagiarized, etc.)